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Book of Abstracts
&
Book of Programme

Editors

Baki AKKUŞ, Gülfem SÜSOY DOĞAN, Ertan GÜDEKLİ, Değer SOFUOĞLU, Aylin ÇALIŞKAN


Turkish Physical Society 39th International Physics Congress
31 August - 4 September, 2023 - Bodrum - Herodot Cultural Center
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Değerli katılımcılar,

Türk Fizik Derneği tarafından her yıl düzenlenen Türk Fizik Derneği Uluslararası Fizik Kongresi'nin 39.'su Bodrum Belediyesi Herodot Kültür Merkezi ev sahipliğinde Bodrum/Muğla'da, 31 Ağustos - 4 Eylül 2023 tarihleri arasında gerçekleşecektir.

Ülkemizde en geniş katılımcı sayısına sahip Fizik kongrelerini gerçekleştiren Türk Fizik Derneği, Fizik biliminin tüm alt dallarını ve konularını içermektedir. 39.'sunun Cumhuriyetimizin 100. yılında düzenlendiği Türk Fizik Derneği Kongresi eş zamanlı olarak Ulu Önder Mustafa Kemal Atatürk'ün: "Gelecek gençlerin, gençler ise öğretmenlerin eseridir." sözünü ilke alarak uluslararası platformda akademisyenler ile bilim dünyasına adım atmış olan genç araştırmacıları en güncel bilimsel çalışmalar eşliğinde bir araya getirmekte ve disiplinler arası bilgi alışverişini sağlamayı amaçlamaktadır. Türk Fizik Derneği, Cumhuriyetimizin kurucusu Ulu Önder Mustafa Kemal Atatürk'ün bilime verdiği önemi "Eğer bir gün benim sözlerim bilimle ters düşerse bilimi seçin." sözüyle bir kez daha anımsayarak ve bu değeri düstur edinerek uluslararası fizik camiasından bilim insanlarını bir araya getirmeyi ve temel bilim olan Fizik bilimini daha geniş bir kesime ulaştırmayı, bilimi güncel ve aktif tutmayı, fizikçiler arasında verimli bilimsel işbiriklerinin oluşumuna ortam hazırlamayı hedeflemektedir.

TFD-39 Kongremize 24 çağrılı konuşmacı olmak üzere toplamda 514 bilim insanı ve öğrenci katılmaktadır. Kongremize yapılan başvurular arasından bilim kurulu üyelerimizin değerlendirmeleri sonucunda 189 sözlü bildiri, 64 adet poster bildiri kongrede sunulmak üzere kabul edilmiştir.

Türk Fizik Derneği Başkanı Prof. Dr. Baki AKKUŞ başta olmak üzere Türk Fizik Derneği Uluslararası Fizik Kongresi'nin 39.'sunun düzenlenmesinde katkısı olan Bilim Kurulu Başkanı Prof. Dr. Oğuz GÜLSEREN ile bilim kurulu üyelerine, Danışma Kurulu Başkanı Prof. Dr. Kazım Yavuz EKŞİ ile danışma kurulu

üyelerine, davetimizi kabul ederek bizi onurlandıran 24 Türk ve yabancı çağrılı konuşmacımıza ve siz değerli katılımcılarımıza katkılarından dolayı teşekkür ederiz.

Cumhuriyetimizin 100. yıldönümü coşkusu ile verimli ve keyifli bir kongre süreci geçirmeniz dileğiyle…

Saygı ve sevgilerimle.

Prof. Dr. Ertan GÜDEKLİ
İstanbul Üniversitesi
TFD–39 Düzenleme Kurulu Başkanı

Değerli Katılımcılar,

1950 yılında kurulan Türk Fizik Derneği (TFD), fizik alanındaki Türk akademisyen, araştırmacı ve lisansüstü öğrencilerinin büyük çoğunluğunu temsil etmektedir. TFD'nin çeşitli bilimsel ve eğitimsel faaliyetleri arasında, Uluslararası Fizik Kongresi serisi fiziğin tüm alt ve ilişkili alanlarını kapsayan, türünün Türkiye'deki en büyük yıllık organizasyonudur. Bildiğiniz gibi bu yıl bizim için **Türkiye Cumhuriyeti'nin 100. yılını** kutlayacağımız çok özel bir yıl olması sebebiyle 2023 TFD konferansını özel bir öneme sahiptir. Bu özel yılı şanıyla kutlamak üzere oldukça yüksek standartta, çok önemli bilim insanlarınında davetli konuşmacı olarak yer aldığı bir kongre ortaya çıkarmaya çalıştık.

Sözlük tanımı olarak fiziği maddenin, enerjinin ve aralarındaki etkileşimin incelenmesidir şeklinde basitleştirsekte, fizik temel sorular sorup bunları gözlemleyerek ve deneyerek yanıt vermeye çalışarak insanlığın ilerlemesinde kilit rol oynayan bir temel bilimdir:

- Fizik, gençlere ilham veren ve doğa hakkındaki bilgimizin sınırlarını genişleten heyecan verici bir entelektüel maceradır.
- Fizik, gelecekteki teknolojik gelişmeler için gerekli temel bilgileri üreterek dünyanın ekonomik ilerlemesinde lokomatif olmaktadır.
- Fizik, teknolojik altyapıya katkıda bulunur ve bilimsel gelişmelerden ve buluşlardan yararlanacak personelin eğitiminde önemli bir unsurdur.
- Fizik, kimya, biyoloji ve çevresel bilimler, tarım, yer bilimleri gibi diğer disiplinler hakkındaki anlayışımızı da genişletir ve geliştirir.
- Fizik, bilgisayarlı tomografi, manyetik rezonans görüntüleme, pozitron emisyon tomografi, ultrasonik görüntüleme ve lazer ameliyatı gibi tıbbi uygulamalar için yeni enstrümantasyon ve teknikler geliştirmek için gerekli temel anlayışı sağlayarak yaşam kalitemizi artırır.

Özetle, tüm bu nedenlerden dolayı fizik gelişmiş bir toplumun vazgeçilmez bir parçasıdır. 2012 yılında Higgs bosonlarının gözlenmesi, 2015 yılında yerçekimi dalgalarının ölçülmesi, 2019 yılında karadelik ufkunun fotoğrafının çekilmesi,

2023 yılında birkaç ay önce bilimin en büyük gizemlerinden biri olan dünyadaki yaşamın kökenine yönelik olarak inorganik moleküllerin organik maddeye dönüşmesiyle ortaya konulması gibi fizikteki yeni gelişmeler başdöndürücü bir hızla devam etmektedir. Bütün bunlardan dolayı Türk Fizik Derneğinin düzenlediği bu kongrenin önemi açıktır.

Temel ve uygulamalı fizik ve yanı sıra çok disiplinli alanları kapsayan bu kongre programında, oldukça çeşitli, önemli ve güncelliğini koruyan araştırma konuları yer almaktadır. Astrofizik ve kozmoloji, atom ve molekül fiziği, enerji, fizik eğitimi ve felsefesi, istatistiksel fizik, kuantum mekaniği ve kuantum enformasyon kuramı, matematiksel fizik, medikal fizik, nükleer fizik, optik, uygulamalı fizik, temel parçacıklar ve alanlar, yoğun madde ve malzeme fiziği, yüksek enerji ve plazma fiziği dalları altında sayabileceğimiz çağrılı konuşmalar ve sözlü sunumların yanı sıra poster bildirileri yer alacaktır.

İlgi ve merakla izleyeceğimiz, çağrılı konuşmalar ve diğer sözlü sunumlar sonrasında, ve poster sunumları sırasında gerek sunucularla ve gerekse diğer tüm katılımcılarla oluşturulacak bilimsel ortamlarda bilgi alış-verişi yapma olanağımız olacaktır.

Kongremizin hepimiz için yararlı ve başarılı geçmesini dilerim.

Saygılarımla,

Prof. Dr. Oğuz GÜLSEREN,
TFD-39 Bilim Kurulu Başkanı

Fizik bize çevremizdeki dünyanın göründüğünden çok farklı olduğunu söyleyen bir bilim. Bunu da sadece gözlem ve deney sonuçları ile zorlayarak değil, örneğin "dalga" gibi son derece kapsayıcı kavramları olağanüstü çeşitlilikteki olgularda kullanarak yani bizi "tatlı tatlı" ikna ederek yapıyor. Dokunduğumuz sert nesnelerin büyük ölçüde boşluk olduğunu, Dünya'nın evrenin merkezinde ve hareketsiz olmayıp boşlukta dönen bir gezegen olduğunu, zamanın göreliliğini, atomaltı dünyanın sezgilerimize ters tüm olgularını ve bunların süperiletkenlik gibi makroskopik dışavurumlarını bize hep fizik gösterdi. Müziği, atomları ve gök mekaniğini, örneğin, rezonans gibi ortak kavramlar kullanarak açıklıyor olmamız fiziğin düşünen hiçbir insanın kayıtsız kalamayacağı güzelliğini ortaya sermektedir.

Bu yıl konferansımız James Webb teleskopundan gelen birbirinden güzel resimlerin evrene ilişkin bakış açımızı şekillendirmeye başladığı, oda sıcaklığında süperiletken özelliklere sahip bir malzemenin keşfedildiğine dair makalenin, henüz kabul edilmemekle birlikte, büyük ses getirdiği, erken evrendeki büyük kütleli karadeliklerin birleşmelerinin yaydığı gravitasyonel dalga arkaplanının keşfedildiği heyecanlı bir döneme denk geldi.

Türk Fizik Derneğinin bu yıl 39'uncusunu düzenlediği bu uluslararası konferans fiziğin çok farklı alanlarında çalışan birbirinden değerli uzmanları bir araya getirmektedir. Bu yıl da kongrenin gerçekleştirilmesinde yoğun çaba sarf eden TFD başkanı Prof. Dr. Baki Akkuş'a, Bilim Kurulu, Düzenleme Kurulu ve Danışma Kurulunda yer alan değerli çalışma arkadaşlarıma ve sunumlarıyla kongreye katkıda bulunan tüm bilim insanlarına teşekkürlerimi sunarım.

Prof. Kazım Yavuz EKŞİ
TFD39 Danışma Kurulu Başkanı
İstanbul Teknik Ünversitesi


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Değerli Fizikçiler,

27 Mart 1950 tarihinde ülkemizin önde gelen bilim insanları tarafından İstanbul Çemberlitaş'ta Muallimler Birliği binasında kurulan Fizik Derneği, 12 Ekim 1976 gün ve 15732 sayılı Resmi Gazete'de yayımlanan 7/12434 sayılı bakanlar kurulu kararıyla "Türk Fizik Derneği" adını almış; bakanlar kurulunun 13 Haziran 1977 gün ve 7/15806 sayılı kararnamesiyle Türk Fizik Derneği kamu yararına çalışan dernekler arasına girmiştir.

Derneğimiz; her yıl düzenlediği bilimsel etkinliklerle, fizik camiasını bir araya getirip fizikçiler arasında verimli bilimsel işbirliklerinin oluşumuna vesile olmanın yanısıra, içinde Nobel ödülllü fizikçilerin de olduğu, dünya fiziğininin en önemli isimlerinden bazılarının ülkemizi ziyaret etmelerini sağlayarak genç fizikçi adaylarının dünyayı tanımalarını olanaklı kılmıştır.

İçinde bulunduğumuz 2023 yılı cumhuriyetimizin 100. yıldönümü. Bu anlamlı yılda yine bilimsel etkinliklerimizi gerçekleştirecek olmanın mutluluğunu ve gururunu yaşıyoruz. Bu mutluluğu ve gururu yaşamamızda etkin olan çok değerli fizikçileri cumhuriyetimiz, ilk yüzyılı içinde dünya fizik camiasına armağan etti. Bu değerli insanlar fizikte belli bir düzeye gelmemizde çok önemli bir oynadılar. Bunun dışında, ilk yüzyılımızda, Türk Fizik Derneği'nin de önemli katkılarıyla cumhuriyet tarihimizin bilim ve teknoloji alanındaki en önemli projelerinden birisi olan Türk Hızlandırıcı Merkezi (THM) projesi tasarlandı ve kurulumuna başlandı. Cumhuriyetimizin ikinci yüzyılında da TFD olarak gidilecek çok yolumuz olduğunun bilincindeyiz ve bu bilinçle ülkemizin bilimde çok daha ileri seviyeye gelmesi için gayretlerimizi sürdüreceğiz.

Cumhuriyetimizin kuruluşunun yüzüncü yılına denk gelen içinde bulunduğumuz 2023 yılında da bilimsel etkinliklerimizi her yıl olduğu gibi, ülkemizin en gözde, bilim, kültür, sanat, tarih, tatil, turizm merkezlerinden biri olan Bodrum'da düzenleyeceğiz. Bodrum Belediyesinin ev sahipliğinde Bodrum Belediyesi Herodot Kültür Merkezi, Bodrum / MUĞLA'da düzenleyeceğimiz bu bilimsel

etkinlikler şunlardır: **Türk Fizik Derneği 39. Uluslararası Fizik Kongresi** (31 Ağustos – 4 Eylül 2023), **Türk Fizik Derneği 8. Fizik Öğrencileri Kongresi ve Şenliği** (31 –Ağustos - 2 Eylül 2023), **Türk Fizik Derneği 15. Ulusal Parçacık Hızlandırıcıları ve Dedektörleri Yaz Okulu (UPHDYO-XV)** (05 - 10 Eylül 2023). Öğrenci kongresi gerçekleştirildiği sırada, **Türkiye Cumhuriyeti'nin Kuruluşunun 100. Yılı Türk Fizik Derneği 2. Bir Doğa Olayının Görüntülenmesi Fotoğraf Yarışması** düzenlenecektir.

Türk Fizik Derneği 39. Uluslararası Fizik Kongresi, Bodrum Kaymakamlığı, Bodrum Belediyesi, TÜBİTAK, TENMAK (Türkiye Enerji Nükleer Maden Araştırma Kurumu), TÜBA (Türkiye Bilimler Akademisi), İstinye Üniversitesi, SMART Güneş Teknolojileri, Renko RENTECH Eğitim Teknolojileri AŞ., GES Teknoloji desteğiyle gerçekleştirilecektir.

Kongrenin Bilim Kurulu Başkanlığını Bilkent Üniversitesi'nden **Prof. Dr. Oğuz GÜLSEREN,** Danışma Kurulu Başkanlığını İstanbul Teknik Üniversitesi'nden **Prof. Dr. Kazım Yavuz EKŞİ** ve Düzenleme Kurulu Başkanlığını İstanbul Üniversitesi'nden **Prof. Dr. Ertan GÜDEKLİ** yapmaktadır.

Bu yılki (2023) Türk Fizik Derneği Ödülleri aşağıda belirtildiği şekilde verilmiştir.

2023 YILI TÜRK FİZİK DERNEĞİ ONUR ÖDÜLÜ'nün**,** Eskişehir Osmangazi Üniversitesi'nden **Prof. Dr. Tamer AKAN**'a, Manisa Celal Bayar Üniversitesi Rektörü **Prof. Dr. Ahmet ATAÇ**'a, Yozgat Bozok Üniversitesi'nden **Prof. Dr. Mustafa BÖYÜKATA**' ya, Süleyman Demirel Üniversitesi'nden **Prof. Dr. Seyfettin ÇAKMAK**'a, Sağlık Bilimleri Üniversitesi'nden **Prof. Dr. Bahar DİRİCAN'**a, Harran Üniversitesi Rektörü **Prof. Dr. M.Tahir GÜLLÜOĞLU'**a, Hacettepe Üniversitesi'nden **Prof.Dr. Semra İDE'**ye, Süleyman Demirel Üniversitesi'nden **Prof. Dr. Abdullah KAPLAN'**a, Karadeniz Teknik Üniversitesi'nden **Prof. Dr. Belgin KÜÇÜKÖMEROĞLU'**na, Yıldız Teknik Üniversitesi'nden **Prof. Dr. Devrim YAZICI'**ya, Gazi Üniversitesi'nden **Prof. Dr. Şenay YURDAKUL'**a,

Eskişehir Teknik Üniversitesi'nden **Prof. Dr. Murat TANIŞLI**'ya, Gaziantep Üniversitesi'nden **Doç. Dr. Mustafa YILMAZ'**a Yıldız Teknik Üniversitesi'nden **Dr. Öğretim Üyesi Macide Cantürk RODOP**'a verilmesi kararlaştırılmıştır. Kendilerine Türk Fizik Derneği tarafından plaket ve ödül belgesi verilecektir.

2023 YILI TÜRK FİZİK DERNEĞİ SMART GÜNEŞ TEKNOLOJİLERİ ÖZEL ÖDÜLÜ'nün**,** Ege Üniversitesi Güneş Enerjisi Enstitüsü'nden **Prof. Dr. Ceylan ZAFER'e** verilmesi kararlaştırılmıştır. SMART GÜNEŞ ENERJİSİ TEKNOLOJİLERİ AR - GE ÜRETİM SAN. VE TİC. AŞ. tarafından verilecek **50.000.-TL'lık** ödül tutarı dışında, ayrıca Türk Fizik Derneği tarafından da ödül belgesi verilecektir.

2023 YILI TÜRK FİZİK DERNEĞİ ULUSLARARASI ÖZEL ONUR ÖDÜLÜ'nün Avrupa Fizik Derneği (EPS) Başkanı **Prof. Dr. Luc BERGE** verilmesi kararlaştırılmıştır. Kendisine Türk Fizik Derneği tarafından plaket ve ödül belgesi verilecektir.

2023 YILI TÜRK FİZİK DERNEĞİ SANAYİCİ VE İŞ ADAMI ÖZEL ONUR ÖDÜLÜ'nün RENKO Bilgi ve Eğitim Teknolojileri İthalat ve İhracat Ltd. Şti. CEO' su **Sayın Can AKALIN**'a verilmesi kararlaştırılmıştır. Kendisine Türk Fizik Derneği tarafından plaket ve ödül belgesi verilecektir.

2023 YILI TÜRK FİZİK DERNEĞİ BASIN ÖZEL ONUR ÖDÜLÜ'nün İçişleri Bakanı Baş Danışmanı **Prof. Dr. Ergun YOLCU**'ya takdim etmeyi kararlaştırılmıştır. Kendisine Türk Fizik Derneği tarafından plaket ve ödül belgesi verilecektir.

2023 YILI TÜRK FİZİK DERNEĞİ PROF. DR. ENGİN ARIK BİLİM İNSANI ÖDÜLÜ'nü Bilkent Üniversitesi ve Manchester Üniversitesi öğretim üyesi **Prof. Dr. Coşkun KOCABAŞ** kazanmıştır. Kendisine, ARIK ailesi tarafından verilecek **2.000 USD**'lık ödül tutarı dışında, ayrıca Türk Fizik Derneği tarafından da ödül belgesi verilecektir.

2023 YILI TÜRK FİZİK DERNEĞİ PROF. DR. ŞEVKET ERK GENÇ BİLİM İNSANI ÖDÜLÜ'nü Nişantaşı Üniversitesinden **Dr.Öğr.Üyesi Duygu ŞEN BAYKAL** kazanmıştır. Kendisine, ERK ailesi tarafından verilecek **1.000 USD'** lık ödül tutarı dışında, ayrıca Türk Fizik Derneği tarafından da ödül belgesi verilecektir.

TÜRK FİZİK DERNEĞİ 2022 ÖZGEN BERKOL DOĞAN EN İYİ DENEYSEL POSTER BİLDİRİ ÖDÜLÜ' nü İzmir Yüksek Teknoloji Üniversitesi'nden **Sevde Nur KOÇ** kazanmıştır. Kendisine, Türk Fizik Derneği tarafından ödül belgesi verilecektir.

TÜRK FİZİK DERNEĞİ 2022 Engin ABAT EN İYI KURAMSAL FİZİK POSTER BİLDİRİ ÖDÜLÜ'nü Tongji Üniversitesi'nden **Caner BAYDUR** kazanmıştır. Kendisine Türk Fizik Derneği tarafından ödül belgesi verilecektir.

Kongreye katkılarından dolayı Bodrum Kaymakamı Sayın **Bilgehan BAYAR'**a, Bodrum Belediye Başkanı Sayın **Ahmet ARAS'**a, TENMAK Başkanı Sayın **Prof. Dr. Abdülkadir BALIKÇI**'ya, TENMAK Başkan Yardımcısı Sayın **Prof. Dr. Uğur ÇEVİK**'e, TÜBİTAK Başkanı Sayın **Prof. Dr. Hasan MANDAL**'a, TÜBA Başkanı Sayın **Prof. Dr. Muzaffer ŞEKER**'e, Avrupa Fizik Derneği (EPS) Başkanı Sayın **Prof. Dr. Luc BERGE**'ye, Balkan Fizik Birliği (BPU) Başkanı Sayın **Prof. Dr. Radu Dan CONSTANTINESCU'**ya; kongremizin gerçekleşmesi için destek veren tüm kurum ve kuruluşlara teşekkür ediyoruz.

Kongremizin hazırlık sürecindeki özverili katkıları için Bilim Kurulu Başkanı Sayın **Prof. Dr. Oğuz GÜLSEREN**'e ve Bilim Kurulu üyelerine, Danışma Kurulu Başkanı Sayın **Prof. Dr. Kazım Yavuz EKŞİ'**ye ve Danışma Kurulu Üyelerine, Düzenleme Kurulu Başkanı Sayın **Prof. Dr. Ertan GÜDEKLİ'**ve Düzenleme Kurulu üyelerine, Yerel Düzenleme Kurulu Başkanı Sayın **Doç. Dr. Sadiye Çetinkaya ÇOLAK** ve Yerel Düzenleme Kurulu üyelerine; kongre davetimizi kabul ederek kongremizi onurlandıran çağrılı konuşmacılarımıza,

bildirileri ve posterleriyle kongrede yer alan tüm araştırmacılara teşekkür ediyoruz.

Cumhuriyetimizin 100. yıldönümünde gerçekleştirmekten onur duyduğumuz kongremizin tüm mesletaşlarımıza ve fizikçi adayı öğrencilerimize yararlı olmasını diliyoruz.
Saygılarımızla.

Prof. Dr. Baki AKKUŞ
İstanbul Üniversitesi
Türk Fizik Derneği Başkanı


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"Bilime, bilimsel araştırmaya önem vermeyen ve bundan dolayı ileri teknolojileri üretemeyen ülkelerin, varlıklarını sürdürebilmeleri mümkün değildir."

Prof. Dr. Baki AKKUŞ – 2007


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Aramızdan ayrılanlar kitabına Türk Fizik Derneği web sitesi **http://tfd.com.tr/** adresinden ulaşabilirsiniz.


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Türk Fizik Derneği 39. Uluslararası Fizik Konferansı (TFD-39), "TÜBİTAK-BİDEB 2223 Yurt İçi Bilimsel Etkinlikleri Destekleme Programı B-Yurt İçi Bilimsel Etkinlik Düzenleme Desteği" tarafından desteklenmiştir.


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Presidents

Prof. Ertan GÜDEKLİ – **President of Organizing Committee**
Prof. Oğuz GÜLSEREN – **President of Scientific Committee**
Prof. Yavuz EKŞİ – **President of Advisory Committee**
Prof. Baki AKKUŞ – **President of Turkish Physical Society**

Invited Speakers

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Topics

01- Atomic and Molecular Physics

- Atomic Physics
- Molecular Physics
- Laser Technology
- Molecular Spectroscopy
- Atomic Spectroscopy
- Laser Spectroscopy
- Molecular Imaging
- Non-Linear Physics
- Quantum Physics
- Cold Atoms, Ions, Molecules and Plasma
- Astrophysics (Experimental)
- Polymers
- Radiation Physics
- Molecular Docking
- Structure and Properties of Atoms, Ions and Molecules
- Etc..

02- Applied Physics

- Geophysics and Related Topics
- Atmospheric Events and Application
- Physical, Theoretical and Computational Chemistry
- Electrical and Electronics Technology
- Environmental Engineering and Technologies
- Computer Sciences in Physics
- Computer Simulation Studies in Physics
- Application of Machine and Deep Learning to Physical Sciences
- Optical Physics
- Polymer Sciences
- Acoustic
- Etc..

03- Condensed Matter Physics

- Nanotechnology and Nanomedicine
- Nanobiotechnology
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- Nanointerfaces
- Energy Efficiency
- Etc..

04- Energy and Applications

- Solar Energy and Application
- Photovoltaic Technology
- Geothermal Energy
- Bioenergy and Biomass Energy Technology
- Wind Energy and Application
- Hydrogen and Fuel Cell Technology
- Nuclear Energy
- Sustainable Fossil Energy Systems
- Renewable Energy Technologies, Management and Environmental İmpact
- Energy Utilization and Environmental Effect, Energy Efficiency
- Sustainable Energy Technologies in The Built Environment
- Climate Change Modelling/Simulation,Climate Networks, Weather Forecasts/Scenarios
- Renewables, Hydrogen/Nuclear/Other Cleaner Energy Resources/Technologies
- Etc…

05- High Energy, Particle and Plasma Physics

- Accelerator Physics
- High Energy and Particle Physics
- Plasma Technology and Application
- Chaotic Systems
- Quantum Information
- Quantum Entanglement
- Non-Linear Physics
- Etc…

06- Material Science and Applications

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- Chemical Engineering
- Polymers and Amorphous Materials
- Biomaterials Science and Engineering
- Melting and Casting
- Powder Metallurgy
- Steels and Steel Production Technologies
- Mechanical Behaviour of Materials Ceramic and Glass
- Science and Technology Composite Materials
- Materials Characterization
- Glass Science and Engineering
- Plastic Engineering
- Membranes and Membrane Science
- Sol-Gel Science and Technology
- Thin Film and Choating Technology
- Construction Materials
- CO_2 Reduction and Low Carbon Technologies
- Etc…

07- Mathematical Physics, Astrophysics and Applications

- Cosmology
- Theoretical Physics
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- Astronomy
- Dynamical Systems
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- Computational Mathematics,
- Statistical Physics
- Etc..

08- Medical Physics and Applications

- Medical Physics
- Biophysics
- Radiotherapy and Application
- Radiology--Radiobiology and Application
- Nuclear Medicine
- Etc…

09- Nuclear Physics

- Nuclear Structure
- Reactor Technology
- Hadron Structure
- Neutron Physics
- Nuclear Astrophysics
- Radiation Physics
- Nuclear Application In Life Sciences
- Spectroscopy and Measurement Techniques
- Etc..

10- Physics Education and Applications

- Learning / Teaching Methodologies and Assessment
- Global Issues In Education and Research
- Educational Measurement & Evaluation
- Teaching and Learning Processes
- Communication Technologies in Education
- Information Technologies in Education
- Science and Mathematics Education
- Teacher Education
- Internet Technologies
- Etc..

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Turkish Physical Society 39th International Physics Congress
31 August - 4 September, 2023 - Bodrum - Herodot Cultural Center
The 100st years of
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www.tfd39.org

ABBREVIATIONS

IS: INVITED SPEAKERS

PP: POSTER PRESENTATION

OP: ORAL PRESENTATION

Invited Speakers

The oral presentations are arranged in alphabetical order according to the conference topics and then the name of the presenters.

Oral Presentations

Atomic and Molecular Physics

Applied Physics

Condensed Matter Physics

Energy and Applications

High Energy, Particle and Plasma Physics

Material Science and Applications

Mathematical Physics, Astrophysics and Applications

Medical Physics and Applications

Nuclear Physics

Physics Education and Applications

The poster presentations are arranged in alphabetical order according to the conference topics and then the name of the presenters.

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Applied Physics

	Fabrication and Characterization of Polycrystalline Silicon Solar Cells Created on Ceramic Substrate through Aluminum-Induced Crystallization	
02PP12	**Uygar Ege Kocakır** Development of A Multi-Package Program for Photovoltaic Analysis of Solar Energy Measurements (Current-Voltage And Power-Time Example) Using PYTHON	314

Condensed Matter Physics

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Physics Education and Applications

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Invited Speakers

SCIENCE OPPORTUNITIES AT SESAME

ANDREA LAUSI
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The utilisation of synchrotron radiation sources has had an important impact on various scientific disciplines, encompassing areas such as materials science, drug design, biochemistry, healthcare, catalysis, geosciences, planetary research, palaeontology, and cultural heritage. SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) is a "third-generation" synchrotron light source, the first in the Middle East and neighbouring countries, and also the region's first major international centre of excellence. Developed under the auspices of UNESCO, SESAME is a cooperative venture by scientists and governments of the region.

SESAME provides unique analytical tools for the destruction-free operando and in situ exploration of the molecular and electronic structure and processes in novel materials and biological systems.

SESAME is the world's first large accelerator complex to be fully powered by renewable energy, thus making it the world's first carbon neutral accelerator laboratory. This makes SESAME economically, as well as environmentally sustainable. SESAME has signed the United Nation's Climate Neutral Now pledge.

SESAME has five operational beamlines with three other beamlines under various stages of construction or planning, which are broadly broken down into three energy ranges – infrared (< 1 eV), soft X-ray (100 eV to 2500 eV) and hard X-ray (>2500 eV) [1]

As an intergovernmental scientific and technological centre of excellence open to all scientists from the Middle East and elsewhere, SESAME serves as a propeller for the scientific, technical, and economic development of the region, and strengthens collaboration in science. Not only do the scientists who visit SESAME take back scientific expertise and knowledge, which they will share with their colleagues and students, but it also creates a motivating scientific environment that encourages the region's best scientists and technologists to stay in the region or to return if they have moved elsewhere.

[1] M.Abdellatief et al, Eur. Phys. J. Plus (2023) 138: 379. DOI: 10.1140/epjp/s13360-023-03955-w

BIOLOGICAL SIGNIFICANCE OF CHIRALITY

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Biological systems typically exhibit broken chiral symmetry, with distinct left-right asymmetry. For instance, our hearts are consistently located on the left side, and our right hands are mirror images of each other. While some biological macromolecules like DNA, bacterial filagella, and cilia are intrinsically chiral, the reason behind their contribution to large-scale morphological chirality remains unknown. Additionally, it is uncertain whether this broken symmetry confers any biological or evolutionary benefits to living organisms. In this presentation, I will summarize our recent findings, which aim to address this mystery from the perspective of active matter physics. Our research indicates that chiral active systems offer specific dynamical advantages to competing populations, fostering grooving behaviors. In the context of crowded bacterial populations, chiral systems exhibit remarkably different dynamics. Moreover, we speculate that this dynamical advantage may be extrapolated to comprehend the general broken symmetry observed in various biological systems.

EXOSOME BIOPHYSICS

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Exosomes are small, membrane-bound extracellular vesicles with diameters ranging from 30 to 150 nm. They are secreted into the extracellular environment by a variety of cell types. The biological functions of exosomes, such as intercellular communication, modulation of the immune response, and disease progression, depend critically on their biophysical properties, which include their size, shape, and mechanical properties. This presentation will be an overview of the current understanding of the biophysical properties of exosomes. Methods that can be used to characterize exosomes such as Raman spectroscopy, nanoparticle tracking analysis (NTA), dynamic light scattering (DLS), and atomic force microscopy (AFM) will be discussed. The biomechanical interactions between exosomes and recipient cells will also be discussed. For the uptake of exosomes and their functional effects, these interactions play a crucial role. By understanding the biophysics of exosomes, it will be possible to gain insight into their biological roles and potential applications in diagnostics and therapeutics.

QUANTUM SCARS AND REGULAR EIGENSTATES IN A CHAOTIC SPINOR CONDENSATES

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Quantum many-body scars (QMBS) consist of a few low-entropy eigenstates in an otherwise chaotic many-body spectrum, and can weakly break ergodicity resulting in robust oscillatory dynamics. The notion of QMBS follows the original single-particle scars introduced within the context of quantum billiards, where scarring manifests in the form of a quantum eigenstate concentrating around an underlying classical unstable periodic orbit (UPO). A direct connection between these notions remains an outstanding problem. Here, we study a many-body spinor condensate that, owing to its collective interactions, is amenable to the diagnostics of scars. We characterize the system's rich dynamics, spectrum, and phase space, consisting of both regular and chaotic states. The former are low in entropy, violate the Eigenstate Thermalization Hypothesis (ETH), and can be traced back to integrable effective Hamiltonians, whereas most of the latter are scarred by the underlying semiclassical UPOs, while satisfying ETH. We outline an experimental proposal to probe our theory in trapped spin-1 Bose-Einstein condensates.

Reference: arXiv 2306.10411, in peer review.

THE KM3NeT INFRASTRUCTURE: STATUS AND RECENT RESULTS

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KM3NeT is a new generation neutrino observatory currently being deployed in the Mediterranean Sea. It consists of two detectors: ARCA off the SE Sicily and ORCA off the Toulon coast in France (for Astroparticle and Oscillation Research with Cosmics in the Abyss, respectively). ARCA will instrument 1 Gton of seawater, with the primary goal of detecting cosmic neutrinos with energies between tens of GeV and ~10 PeV, while ORCA with an instrumented volume of ~ few Mtons is a smaller and denser array, optimized for the detection of atmospheric neutrinos in the 1 – 100 GeV energy range. It can also study low-energy neutrino astronomy, such as MeVscale core-collapse supernova, and search for exotics phenomena like dark matter. In this contribution we present the performances of KM3NeT, as well as the current status and the first results obtained with the data collected with ARCA and ORCA so far.

TOPOLOGICAL CONTROL OF LIGHT WITH GRAPHENE DEVICES

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The topological structure associated with the branchpoint singularity around an exceptional point (EP) can provide tools for controlling the propagation of light. Using graphene-based devices, we demonstrate the emergence of EPs in the electrically controlled interaction of light with a collection of organic molecules in the terahertz regime at room temperature. We show that the intensity and phase of terahertz pulses can be controlled by a gate voltage which drives the device across the EP. Our electrically tuneable system allows reconstructing the Riemann surface associated with the complex energy landscape and provides a topological control of light by tuning the loss-imbalance and frequency detuning of interacting modes. Our approach provides a platform for developing topological optoelectronics and studying the manifestations of EP physics in light-matter interactions.

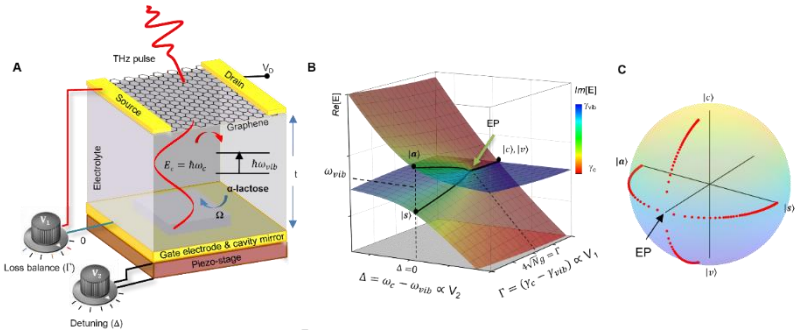

Figure 1: Electrically tuneable EP device. A, Schematic of the electrolyte-gated graphene transistor embedded with lactose microcrystals. B, Riemann surface obtained using numerical simulations shows the complex energy eigenvalues of the device plotted on the two-parameter voltage space defined by V_1 and V_2. C, Visualization of the evolution of the supermodes of the coupled system on a Bloch sphere as the gate voltage V_1 is varied (loss imbalance Γ is tuned).

References:

[1] Ergoktas, M. Said, et al. "Topological engineering of terahertz light using electrically tunable exceptional point singularities." Science 376.6589 (2022): 184-188.

ZERO- TO ULTRALOW-FIELD NUCLEAR MAGNETIC RESONANCE WITH OPTICAL MAGNETOMETERS

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Magnetometers are used for measuring local magnetic fields and magnetic properties of materials, for fundamental particle searches, as well as for broader applications in chemistry, geophysics, and biomedicine. One application is to measure the chemical structure of a sample using nuclear magnetic resonance (NMR) by probing nuclear spin ensemble's response to time-dependent perturbations in the local magnetic field. An NMR device typically uses a large static magnetic field applied with a superconducting solenoid magnet cooled to cryogenic teperatures, to polarize the spins and to measure their response at radio frequencies. An alternative approach is to measure NMR at the zero- to ultralow-field (ZULF) without a superconducting magnet. In the ZULF NMR regime, the dominant interactions are of nuclear spin-spin couplings that give information about the chemical structure of a sample.
In this talk, I will focus on the optical magnetometers with a vapor of optically-pumped alkali-metal atoms in a glass cell magnetically shielded at room temperature as detectors for the ZULF NMR. I will explain how we are using these magnetometers in fundamental particle searches, and how their use can be expanded to applications in novel NMR-based devices.

GRAPHENE-GOLD SUPERLATTICES WITH SELF ASSEMBLED THIOLATES

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Motivated by the potential use of graphene in conjuntion with thiolate self-assembled monolayers (SAMs) grown on Au(111) in the fields of MOSFETs and biosensors, superlattices of Au(111)/Graphene/Alkanethiol and Au(111)/Graphene/Alkanethiol hetero-interfaces were considered. As a first step, probable common supercells of Graphene/Au(111) were systematically identified for the first time depending on the twist angle of graphene on the gold surface. Atomic structures and electronic properties of Au(111)/Graphene superlattices were investigated using van der Waals supplemented density functional theory (vdW-DFT) calculations. The Dirac cones of graphene and the the linear behavior of the energy states in the vicinity of the Dirac point are essentially not destroyed by the weak electronic interactions between the gold surface and the graphene layer. In addition, the Fermi energy of gold-supported graphene shifted down relative to the Dirac point depending on the rotational angle of graphene on the metal surface and therefore can be described as p-type doped. Then, alkanethiol molecules up to ten carbon chains were taken into consideration with isolated, striped phase and standing up phases at Au(111)/Graphene/Alkanethiol and Au(111)/Alkanethiol/Graphene conformations. Depending on the molecular density, morphological and electronic properties of these three-component heterointerfaces were revealed by the vdW-DFT calculations. The Dirac cone structure of graphene is still traceable in the electronic band structures of the combined systems. The results were discussed in comparison with Au(111)/Alkanethiol and Graphene/Alkanethiol adsorption geometries. In Au(111)/Alkanethiol/Graphene compositions graphene appears to improve the alkanethiol film stability and found to be a good protective top layer. We propose new structures to be realizable by experimental studies.

Support from TÜBİTAK (Grant No. 116F174) is gratefully acknowledged.

UNCONVENTIONAL TRANSPORT PHENOMENA IN STRONGLY DISORDERED TWO-DIMENSIONAL MULTILAYERS

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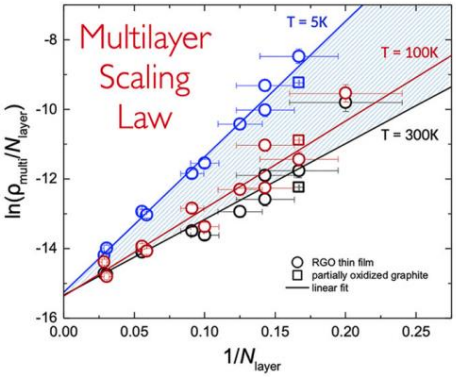

Quantum transport has been at the heart of condensed matter physics before the era of two-dimensional materials. Yet, the exfoliation of a single layer of graphene started a new chapter in the field. Novel and peculiar transport phenomena emerged not only in graphene but in many of these novel 2D and quasi-1D systems. In this talk, I will first give an overview of some key concepts in quantum transport and of our methodological toolbox for simulations. Then, I will focus on transport across multilayer reduced graphene oxide, which is a strongly disordered system and deviates from well-known scaling laws. [1]

We follow a multiscale computational approach bridging first-principles calculations with large scale transport simulations, and investigate the relevant transport scaling laws. We observe a reversal in the hierarchy of transport regimes, between diffusion and localization. We also derive a scaling law for resistivity, depending on the number of layers. Our predictions compare very well with the experimental data [2]. Lastly, we show that the multilayer scaling law is valid not only for reduced graphene oxide but other multilayer 2D materials as well. [1] A. Kovtun, A. Candini, A. Vianelli, A. Boschi, S. Dell'Elce, M. Gobbi, K. H. Kim,, S. Lara Avila, P. Samorí, M. Affronte, A. Liscio, V. Palermo, "Multiscale Charge Transport in van der Waals Thin Films: Reduced Graphene Oxide as a Case Study". ACS Nano 15, 2654 (2021) [2] Mustafa Neşet Çınar, Aleandro Antidormi, Viet-Hung Nguyen, Alessandro Kovtun, Samuel LaraAvila, Andrea Liscio, Jean-Christophe Charlier, Stephan Roche, H. Sevinçli, "Toward Optimized Charge Transport in Multilayer Reduced Graphene Oxides" Nano Letters 22, 2202 (2022)

MONTE CARLO SIMULATIONS IN MEDICAL APPLICATIONS: A GAME-CHANGER TOOL

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Monte Carlo simulations have a substantial impact on many medical applications, offering useful insights and contributing in the resolution of complex problems that pose challenges for analytical solutions. Random sampling and statistical methodologies are employed in these simulations to effectively represent and study various systems, processes, or phenomena. As a result, they have been extensively utilized in the field of medicine, showcasing a wide range of applications. The utilization of Monte Carlo simulations is prevalent in the modelling of ionizing radiation's action within tissues for the purpose of radiation treatment planning. These tools assist in the computation of the spatial distribution of radiation dosage within the anatomical structure of a patient, with the aim of optimizing treatment strategies and guaranteeing the secure and efficient administration of radiation to specific target tissues, while simultaneously avoiding any potential harm to healthy tissues. Monte Carlo simulations are employed in the field of nuclear medicine to simulate and analyse the interaction of radiation emanating from radioactive tracers within the human body. This helps in the assessment of the tracer's distribution and absorption, facilitating precise picture reconstruction in modalities such as Single-Photon Emission Computed Tomography (SPECT) and Positron Emission Tomography (PET). Meanwhile, Monte Carlo simulations are employed in the field of medical imaging to simulate the interactions between X-rays, gamma rays, or other imaging modalities and the human body. These tools assist in the optimization of imaging methods, dosage estimations, and image reconstruction algorithms. The objective of the presentation is to illustrate the fundamental operational process of Monte Carlo simulations for Medical Applications using the MCNPX general-purpose Monte Carlo code. The presentation will further focus on the validation procedure of Monte Carlo simulation through empirical studies for the purpose of diagnostic radiology.

Keywords: Monte Carlo simulations; medical applications; MCNPX; diagnostic radiology

RECENT HIGHLIGHTS ON LASER SPECTROSCOPY AT COLLAPS - CERN

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LASER-DRIVEN INTENSE TERAHERTZ FIELDS: SOURCES AND APPLICATIONS

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Terahertz pulses are very popular because of their numerous applications, for example in security screening, medical imaging, time-domain spectroscopy and remote detection [1]. Located between microwaves and optical waves in the electromagnetic spectrum, terahertz waves can now be exploited in molecular spectroscopy from plasma emitters produced by femtosecond laser pulses ionizing gases such as air.

At non-relativistic laser intensities, gas plasmas created by two-color optical pulses supply suitable emitters free of any damage. Electrons are tunnel ionized by the asymmetric light field usually composed of a fundamental wavelength and its second harmonic [2]. The resulting "photocurrent" generates an ultrabroadband terahertz radiation, which finds direct applications in the coherent spectroscopy of complex molecules [3,4]. At relativistic intensities, plasma waves trigger a strong longitudinal field used in laser-wakefield acceleration. Accelerated electrons crossing the plasma-vacuum interface then emit coherent transition radiation operating in the terahertz band [5,6].

This talk will review the different physical mechanisms involved in the terahertz emission by laser-gas interaction at moderate or relativistic intensity. First, recent results on the plasma-based terahertz spectroscopy of materials will be presented in the context of the project ALTESSE. Second, new perspectives in the production of ultra-intense terahertz pulses from electron acceleration in relativistic plasmas will be discussed. Finally, THz radiation originating from the ponderomotively-driven electron dynamics in strongly magnetized plasmas [7,8] will be addressed. Particle-in-cell simulations will display evidence that THz pulses transmitted in this regime can reach field strengths > 100 GV/m and allow laser-to-THz conversion efficiencies exceeding 2‰ by adjusting the B-field strength and the background electron plasma density.

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SPECTROSCOPY OF 2D MATERIALS: INTERPLAY OF EXCITONS AND PHONONS

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Optical spectroscopy - such as absorption, luminescence, and Raman spectroscopy - is frequently used for the characterization of 2D materials. It helps to understand the chemical composition and the intrinsic properties of 2D materials. Furthermore, it also helps to determine the number of layers, the interaction with the substrate, the level of doping, and the presence impurities. The field of theoretical spectroscopy deals with the fundamental understanding of light-matter interaction and serves to obtain a thorough understanding of the spectral peaks.

The absorption of a photon leads to an electronic excitation in the material. In 2D materials, excitations often manifest themselves in the form of strongly bound excitons, i.e., electron-hole states within the band gap of the material. These excitons can couple to the lattice vibrations (phonons) of the crystal. The proper calculation of exciton-phonon couplings is thus at the base of a quantitative understanding of Raman spectroscopy as well as of phonon-assisted absorption and luminescence spectroscopy in indirect band gap materials.

I will give an overview over the theoretical and computational methods for the understanding of spectroscopy of 2D materials and discuss some recent examples of theoretical spectroscopy that helped to draw a maximum of information from spectra measured by different partner groups:

(1) Distinguishing different crystalline stackings of hexagonal boron nitride layers using luminescence spectroscopy (phonon-assisted recombination of finite-momentum excitons),

(2) Detecting a Raman-inactive mode of an hBN-layer by resonantly exciting an exciton in a neighbouring WSe2 layer (inter-layer exciton-phonon interaction),

(3) Influence of a dielectric substrate on the Raman spectra of graphene (screened exciton phonon interaction).

ENERGY AND ENERGY EFFICIENCY: FROM SCIENCE TO APPLICATIONS

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This talk focuses on energy use and possible energy efficiency measures required to decrease the energy density in buildings and industry. Climate crisis we currently face clearly shows that It is important to move away from extensive use of fossil fuels for residential and industrial heating and cooling. However, with increasing urbanization and population, it is not possible to simply reduce the use fuels which release CO2, H2O and aerosols to the atmosphere. Energy savings would mean such simple reduction, manifested by turning down the knob(s) to reduce the use of energy. Yet, with the increasing complexity of technology, industrial and building systems, we must focus on energy efficiency measures for energy production and energy consumption.

From physics point of view, we have to consider both the first and the second law of thermodynamics for energy efficiency, rather than just the first law required for the energy savings. This means that we have to consider the interrelations between the energy systems and the surrounding in a detailed way. In this context, the surroundings may include the input from disciplines such as architecture, economics, psychology, sociology, new communication technologies (internet of things, cyber/physical systems), among others. Also, the energy transition need to be well formulated, by providing open communication and interaction between the common person on the street all way to the government officials who come out with rules and regulations. All these transdisciplinary approaches need to be formulated to have strategies to be developed for the solutions of layers of complex problems.

In this talk, an overview of the research carried out by the Center for Energy, Environment and Economy researchers will be highlighted to show the extent of the complex problems need to be considered for energy efficiency in built environment and in industrial systems. Several examples will be presented from various funded projects and completed theses and dissertations.

AB-INITIO SIMULATIONS OF MATERIALS FOR ENERGY APPLICATIONS

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In this talk, I will show how computer simulations based on first principles can provide insight into crucial processes for energy conversion taking place at a photoelectrode and at the interface between photoelectrode and electrolyte in photoelectrochemical cells. Relations between atomic structure of the system and photoabsorption, charge dynamics, and chemical reactivity are investigated. This helps the interpretation of electrochemical measurements, and leads to a deeper understanding of the functional behaviour of the materials. Current challenges and possible ways forward will be discussed as well.

NEW APPROACHES IN PHYSICS TEACHING: RESEARCH BASED EXAMPLES FROM PHYSICS DEPARTMENTS

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Scientific research in physics dates back several centuries; however, research in physics learning and teaching is relatively new. Previous research in physics education up to now has shown that students think physics is a collection of facts and formulas; they have misconceptions, difficulty in interpreting physical laws, poor problem-solving skills, and cannot connect physics with daily life [1-2]. With the identification of students' problems in physics, physics education research aims to develop pedagogical tools and techniques to help students understand physics at any grade level from primary school to university [3]. Several research-based approaches with instructional designs and materials were developed from the 1960s [4]. Some of the effective and widely used approaches can be summarized as "Physics by inquiry" [5], "Workshop physics" [6], "Studio physics" [7], "Socratic dialog laboratories" [8], "Interactive lecture demonstrations" [9], "Modeling physics" [10], "Peer instruction" [11], "Tutorials in physics" [12], "Realtime physics and microcomputer-based laboratories-MBL" [13]. With the increase of investigations about students' physics learning, the adaptation of previous research-based approaches to different physics domains and other disciplines, and the development of new approaches about physics teaching increased. In this talk, some of the research-based examples from physics departments at different universities will be presented, and the implementations about effective physics teaching and results will be discussed for further designs and research.

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EXOPLANETS AROUND EVOLVED BINARY STAR SYSTEMS REVEALED WITH ECLIPSE TIMING TECHNIQUE

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Low-mass companions within planetary mass limits around binary systems with evolved components can be very common. Since they are difficult to find with other techniques employed in exoplanet discovery due to their small sizes and masses, analyses of Eclipse Timing Variations (ETVs) turn out to be the most efficient way to reveal them. We are tracking the ETVs observed in such systems based on data from space-borne and ground-based observatories. As the data accumulate over time, ETV models converge to more consistent solutions, which hint at the existence of multi-body systems formed either in ensemble (first-generation hypothesis) or from the material ejected by the primary companion during its evolution, which we now observe as a hot sub-dwarf or a white dwarf (second-generation hypothesis). Within this contribution, I introduce the eclipse timing technique and the binary systems we look for planetary bodies around, review the state of the field, provide examples of sub-stellar bodies found with this technique including our dicovery of two planets around Kepler-451 system, and the challenges we are faced with.

DEEP-LEARNING SIMULATIONS: A WINDOW INTO EARTH'S CORE

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The phase diagram and physical properties of iron at extreme conditions of pressure and temperature are at the basis of our understanding of the formation and evolution of the Earth's core. However, the crystal structure of solid iron at core conditions is widely debated and the origin of the anomalously low shear velocity of seismic waves in the inner core is unknown. Ab-initio simulations of iron at core conditions are challenged by the large sizes and time scales required to achieve statistical convergence. We developed a machine-learning model that retains the accuracy of ab-initio methods but is computationally much more cost-effective. We find that the most stable phase of iron at Earth's inner core conditions is hcp. However we also find that bcc is the structure that provides the best match with seismic data for the shear velocity of elastic waves. Possible reasons for the discrepancy will be discussed.

SYMMETRY CONSIDERATIONS IN CHROMATIN STRUCTURE AND DYNAMICS

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Nucleosomes are symmetric structures. However, binding of linker histones generates an inherently asymmetric H1-nucleosome complex, and whether this asymmetry is transmitted to the overall nucleosome structure, and therefore also to chromatin, is unclear. Efforts to investigate potential asymmetry due to H1s have been hampered by the commonly used DNA sequence, known as 601, which naturally differs in each half of the nucleosome. To overcome this issue, we have designed and analyzed in depth by cryo-EM a nucleosome reconstituted with a palindromic (601L) 197 bp DNA sequence, which allows, independent of sequence-dependent flexibility, to shed light on the contributions of both the core and the linker DNA conformations on the global architecture of the nucleosome. Like the case of the non-palindromic 601 sequence, linker histone H1 restricts the overall flexibility of the DNA termini but reveals partial asymmetrical unwrapping of the otherwise palindromic strands. However, in contrast to the non-palindromic 601 nucleosome, in the palindromic (601L) nucleosome the H1's disordered C-terminal domain collapses to the proximal linker. Molecular dynamics simulations show that this is very likely dictated by a slightly tilted orientation of the globular domain of H1 in the palindromic nucleosome, which appears to be determined by the local DNA sequence of the nucleosome dyad. We observe similar context-dependent switches in linker DNA flexibility conferred by core histones as well, specifically in nucleosomes containing the centromere-specific H3 variant, CENP-A, a protein critical for mitotic fidelity. Our molecular simulations verified by cryo-EM and restriction enzyme assays demonstrate that a configuration suitable for the assembly of the inner kinetochore machinery is likely the outcome of a delicate crosstalk between epigenetics, DNA sequence, and solvent environment.

CHIRAL PROCESSES IN NON-HERMITIAN SYSTEM

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NANOTECHNOLOGY FOR PHOTOVOLTAICS

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In the roadmap to overcome the Shockley-Queisser (SQ) limit for single junction solar cells the basic concepts of physics have been employed in photovoltaic conversion in devices such as: multijunction solar cells, intermediate band solar cells, hot electron solar cells, multiple exciton generation solar cell, upconversion, down conversion. Potential of nanotechnology and nanomaterials in the progress of these concepts for photovoltaic conversion have been attracting significant interest in academic and industrial research. The nanostructures in photovoltaic conversion might be categorized as: (i) dimensionless (zero dimension) such as quantum dots and nanoparticles; (ii) one dimension such as nanowires and nano tubes; (iii) two dimensions such as quantum wells; (iv) three dimensions such as nanostructured bulk materials and composites. Nanotechnology promises a significant potential for designing and manufacturing photovoltaic cells at higher efficiencies at lower cost. This work aims to give a brief summary of the statues of nanotechnology for photovoltaic conversion.

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FUTURE PHYSICS WITH ATLAS AND CMS DETECTORS AT HL-LHC

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The High-Luminosity Large Hadron Collider (HL-LHC) is expected to deliver an integrated luminosity of up to 3000 fb-1. The very high instantaneous luminosity will lead to about 200 proton-proton collisions per bunch crossing (“pileup”) superimposed to any potential event of interest, providing enriched and extremely challenging experimental conditions. Prospects for SM measurements including Higgs boson and searches for beyond the SM are discussed.

MATERIALIZING COGNITION - INFORMATION PROCESSING IN COGNITIVE MATTER

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TIME – SYMMETRIC QUANTUM MECHANICS: WEAK VALUES AND BERRY'S PHASE

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In quantum mechanics there are two types of time evolution processes: Unitary, continuous change of state vectors described by the Schrödinger equation and non-unitary, discontinuous jumps or collapses postulated in measurement axiom. However, it is possible to consider more general evolution processes between these two extremes. Time – symmetric formulation of quantum mechanics allows us to introduce weak measurements and weak values where the quantum system is disturbed in a very small amount during the contact with the measurement apparatus. Weak values are in general complex numbers. In this talk, after a brief summary of six decades old two state vector (one propagating forward in time and one going backward in time) formalism and weak measurements, we shall show that argument of weak values are nothing but Berry's phase determined by the initial, final and projective measurement states.

Oral Presentations
Atomic and Molecular Physics

DESIGNING A FARADAY CUP SETUP FOR LASER ABLATION MATERIAL ANALYSIS

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This study investigates laser-induced ion detection setups, with a specific focus on the Faraday Cup (FC) and Faraday Plate configurations. Our work encompasses an in-depth analysis of FC response characteristics, encompassing rise and fall times of input signals, as well as an exploration of the influence of key experimental parameters on FC performance. We examined the dynamic behavior of the FC setup using a signal generator. By assessing signal rise and fall times, we gained valuable insights into the temporal dynamics of ion detection. Furthermore, we explored laser-induced ion production from a carbon target under varying laser pulse energies. Moreover, the impact of applying bias voltage to the FC setup was investigated, revealing its influence on signal acquisition and quality. Our study underscores the significance of the Faraday Cup as a central component of laser ablation ion detection systems. The insights garnered from this research hold immense potential for advancing material analysis techniques in fields ranging from environmental monitoring to materials engineering. In summary, this research examines laser-induced ion detection setups, emphasizing the Faraday Cup's role in material analysis.

A NEW MOLECULE'S (3-(2-((4-NITROPHENYL)AMINO)THIAZOL-4-YL)-2H-CHROMEN-2-ONE) STRUCTURAL CHARACTERIZATION COMBINING FT-IR, DFT, AND NMR

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In this work we designed and synthesized novel coumarin and thiazole derivative compound. We suspended 3-bromoacetyl coumarin and 4-fluoropheny thiazole in water and performed condensation reaction in ultrasonic bath (50 Hz) at 70OC. To reveal and confirm its stable structure we used both experimental and theoretical spectroscopic methods. For theoretical calculations we gave ten-degree rotations to sigma bonds (C4-C12, C15-N17, N17- C18 and C21-N24) of compound. This calculation was made with the Semi-Empirical method PM3 method in the Spartan program. Geometry optimization calculations were performed to obtain exact energy values of conformations. This calculations were carried out with Gaussian program and conformations which have overlapping energies were eliminated. Energies, bond lengths, bond angles and dihedral angles were calculated with this calculations. By comparing conformation energies, the conformation with lowest energy determined as structure likely to be found in nature. After that both IR vibration frequencies were calculated. Experimentally evaluated spectrum and theoretically simulated spectroscopic data were compared. In the light of these information's, it was decided whether the synthesized structure was the calculated structure. Then, using the DFT/B3LYP technique with the 6-311++G(d, p) basis set in the ground state, molecular electrostatic potential (MEP), and HOMO-LUMO of AB02 have all been calculated simultaneously. AB02 synthesis, characterization, and a thorough conformational search are all reported here.

THE INVESTIGATION OF THE ULTRAFAST ELECTRONIC RELAXATION DYNAMICS OF ORGANIC COMPOUNDS

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Trajectory surface hopping simulation (TSH) is one of the best analysis methods for understanding ultrafast electronic relaxation dynamics. To comprehend the hopping mechanism both the electronic state characteristics and absorption spectrum of a target compound should be determined to explain the interconnection between them. More importantly, the absorption characteristic should be obtained for a set of samples that can be treated through distribution methods. Therefore, the excited state dynamics of an organic compound were performed within a 100-fs period at 300K. The dynamic processes of all samples are modeled as nonadiabatic transitions. The relative percentage change of state populations for the first six lowest states has been tracked. The study has shown that applying statistical sampling methods creates superior results in explaining the overall spectra and underlying effects.

Acknowledge: The numerical calculations reported in this paper were fully/partially performed at TUBITAK ULAKBIM, High Performance and Grid Computing Center (TRUBA resources) and have been supported TUBITAK project number 121F039. This study has been supported by the Manisa Celal Bayar UNIVERSITY Research Projects Coordination Office through Project Grant Number: FBE–2017/139.

STRUCTURAL CHARACTERIZATION ON A NEW 3-(2-((4-FLUOROPHENYL)AMINO)THIAZOL-4-YL)-2H-CHROMEN-2-ONE MOLECULE UTILIZING DFT, FT-IR, AND NMR

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The aim of this study is to create new coumarin and thiazole derivative compounds. We conducted a condensation process utilizing 3-bromoacetyl coumarin and 4-fluoropheny thiazole suspended in water and conducted in an ultrasonic bath (50 Hz) at 70 OC. From the point of view of biological activities, we employed theoretical and experimental spectroscopic approaches to discover and validate its stable structure. Using the Semi-Empirical method (PM3) in the Spartan program, the conformational analysis of the 3-(2-((4-fluorophenyl)amino)thiazol-4-yl)-2H-chromen-2-one was performed, and the single bond C4-C12, C15-N17, and N17- C18 in the structure was rotated by the angle at 10° steps from 0 to 360°. At the end of the calculations, eleven different conformations were obtained. The geometric optimization of the heading molecule was estimated for each form via density-functional theory (DFT) Becke–3–Lee Yang Parr (B3LYP) process with 6-311++G(d,p) basis set using the Gaussian 09 applications. The energy and dipole moment of the 3-(2-((4-fluorophenyl)amino)thiazol-4-yl)-2H-chromen-2-one's most stable form has been identified to be -910414.60 kcal/mol and 2.075 Debye, accordingly. In the present research, we theoretically supply the bond lengths, bond angles, and dihedral angles by considering note of the most permanent form or molecular structure of the 3-(2-((4-fluorophenyl)amino)thiazol-4-yl)-2H-chromen-2-one molecule. The FT-IR vibrational frequencies were determined inside the same framework, and the outcomes were compared to experimental spectra for verification peak assignments. In addition, both the carbon and hydrogen NMR chemical shifts were computed in a vacuum and in the solvent used (Chloroform) using the gauge-invariant atomic orbital (giao) strategy, and outcomes were contrasted to what was discovered in the measurements. It was determined if the synthesized structure was the estimated structure in light of these details. Molecular electrostatic potential (MEP) and HOMO-LUMO of 3-(2-((4-fluorophenyl)amino)thiazol-4-yl)-2H-chromen-2-one have then been simultaneously computed applying the DFT/B3LYP approach with the 6-311++G(d,p) basis configured as the neutral state. Therefore, we present the synthesis, characterization, and exhaustive conformational search of 3-(2-((4-fluorophenyl)amino)thiazol-4-yl)-2H-chromen-2-one.

INVESTIGATION OF THE ROLES OF KOKUMI AND UMAMI ACTIVE DIPEPTIDES IN TASTE SENSING AND TASTE MASKING BY VIBRATIONAL SPECTROSCOPY AND MOLECULAR MODELING TECHNIQUES

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The main goal of this work is to use vibrational spectroscopy (IR and Raman spectroscopy), molecular modeling, and molecular docking techniques to investigate some dipeptides that play a role in the perception of kokumi and umami flavors, and to determine the mechanisms by which these dipeptides bind to taste receptors, as well as the types of residues to which they attach, and to reveal the mechanisms by which they interact with these residues. It is hoped that by examining them together for the first time with vibrational spectroscopic and molecular modeling tools, it will be possible to further elucidate the mechanisms by which these structures that cause alterations in taste perception create these effects. As a result, it is predicted that a new contribution will be made to the understanding of the roles of the dipeptides to be studied in taste perception.

COMPARING THE PERFORMANCE OF VARIOUS VARIATIONAL QUANTUM CLASSIFIERS USING THE IBM QUANTUM COMPUTER: A STUDY IN THE FIELD OF NEUROSCIENCE

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Glioma is a common brain tumor, and distinguishing between high-grade and low-grade gliomas is crucial due to their distinct prognoses and therapeutic strategies. In recent years, quantum computing has emerged as a promising avenue for solving complex problems in various fields, including neuroscience. Despite the limitations of NISQ computers, numerous studies have demonstrated the potential of quantum computers to outperform classical computers in specific applications. Variational quantum classifiers (VQCs) have emerged as a promising approach toward achieving quantum advantage on NISQ computers. In this study, different VQCs with varying quantum gates and circuit depths have been designed, and their performance has been investigated for the diagnosis of glioma tumors using the IBM quantum computer. The ZZFeatureMap was utilized for encoding features. An optimal value of 76% accuracy was achieved with a VQC consisting of single-qubit gates Ry and Rz, as well as a two-qubit gate Cy.

INVESTIGATING THE EFFECT OF QUANTUM FEATURE MAPS ON CLASSIFICATION RESULTS

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Quantum computers only interact with data expressed as quantum states. To process classical data through quantum algorithms, classical data necessitates transformation into quantum states. There are various feature mapping methods used to embed classical data from classical vector space to potentially vastly higher-dimensional, namely quantum Hilbert space. Nonetheless, the investigation of the effect of mapping techniques on classification outcomes remains limited, despite being a pivotal subject within the realm of quantum computing. In this study, we conducted a comparative analysis between two significant quantum feature mapping techniques: Pauli Feature maps and Angle encoding. After encoding, the same parametrized quantum circuit was used as classifier in both situations. The results show that the incorporation of Ry and Cy quantum gates from Angle encoding technique within a variational ansatz yielded the most favorable outcome, achieving an accuracy rate of 78%.

EFFECT OF THE CATHODE SURFACE TEMPERATURE ON THE CATHODE FALL LAYER PARAMETERS

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Studies in literature reveal a significant effect of the cathode temperature on the basic parameters (such as the electric field profile, thickness of the cathode fall layer, current density, and gas temperature) of the cathode fall of the self-sustained normal DC atmospheric pressure glow discharge (APGD) in helium. Numerical models developed in this study are spatially one- and two- dimensional and based on drift-diffusion theory of gas discharges and extended fluid approach (EFA). It was observed that heating of the cathode, resulting from a flow of the discharge current in APGD with a constricted positive column, leads to an increase of the interelectrode voltage if the cathode is not cooled and its temperature increases. Simulation results exhibit reasonably good agreement with experiment for APGDs with cooled and uncooled cathodes.

THE SPECTROSCOPIC INVESTIGATION OF 3-AMINO-X-BROMOPYRIDINE MOLECULES (X=2,4,5) WITH THE QUANTUM CHEMICAL CALCULATIONS

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This study was carried out by examining the spectroscopic and structural properties of 3-amino-X-bromopyridine molecules (X=2,4,5) from amino pyridine bromide derivatives molecules using quantum chemical calculations; The effect of the binding site of the bromine atom to the pyridine ring was investigated. First of all, the conformational properties of the studied molecules were determined, and a scan was made between the pyridine ring and the NH2 group, and the predicted stable structures were obtained. These stable structures formed the basis for the calculations of subsequent structural and spectroscopic results. All calculations were obtained with the density functional theory (DFT) B3LYP method 6-311++G(d,p) basis set. The results of these calculations will be useful for understanding the effect of the bromine atom on the structural and spectroscopic properties of the binding site for 3-amino-X-bromopyridine molecules.

INVESTIGATION OF INTERACTIONS BETWEEN DIHALOGEN COMPOUNDS AND NCH LEWIS BASE UNDER EXTERNAL ELECTRIC FIELD

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Quantum chemical calculations are performed using Gaussian 09 program to theoretically elucidate dihalogens (F2, FCl, FBr, Cl2, ClBr, Br2) ⋯ NCH complexes in the presence and absence of an external electric field. The considered complexes were optimized using second-order Møller-Plesset pertürbation theory (MP2) with the aug-cc-pVDZ basis set. In the interaction energy calculations, the basis set superposition error (BSSE) was taken into account with the counterpoise correction method. Natural Bond Orbital (NBO) method was utilized orbital interactions between occupied and empty orbitals and Wiberg Bond Index (WBI). Noncovalent Interaction (NCI) index analyses were performed using Multiwfn software and visualized with Visual Molecular Dynamics (VMD) software. The numerical calculations reported in this paper were fully/partially performed at TUBITAK ULAKBIM, High Performance and Grid Computing Center (TRUBA resources).

THE INVESTIGATION OF ELECTRONIC STRUCTURE, REACTIVITY, TOXICITY, AND BINDING CHARACTERISTICS TO ESTROGEN RECEPTOR OF SOME TAMOXIFEN DERIVATIVES

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Selective Estrogen Receptor Modulators (SERMs) have been utilized to inhibit Estrogen receptors (ER) for the prevention of breast cancer for a long time. Thus, the effectiveness and compatibility of SERMs have been the subject of various research fields and groups from clinical, in-vitro, and in-silico perspectives. The most pronounced compound among SERMs is tamoxifen. However, several compatible tamoxifen derivatives have been generated and numerous functionalized SERMs have been released. The E-Z isomer effect on the other hand is mostly ignored or weakly discussed. Therefore, this study focuses on the structure, reactivity, and ER binding characteristics of tamoxifen, droloxifen, afimoxifen, endoxifen, N-desmethyl tamoxifen, and norendoxifen compounds by considering their both isomeric forms. The binding of SERMs with ER was examined for active and inactive forms of the target and compared to that of estrogen to underline the agonist/antagonist behavior of the ligands. Besides, Developmental toxicity, Bioaccumulation factor, LD50, LC50, and Ames mutagenicity of the compounds were obtained for a better understanding of their toxic character.

DFT, HIRSHFELD SURFACE ANALYSIS AND MOLECULAR DOCKING, DRUGLIKENESS AND ADMET OF ZN(II)-SULFAMETHOXAZOLE COMPLEX WITH DIETHYLENTRIAMINE LIGANDS

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Theoretical calculations of the [Zn(dien)2].2(smtx) complex were calculated using the basis set DFT, B3LYP and LanL2DZ. The values obtained as a result of the calculations obtained are quite compatible with the geometric parameters of the experimental structure. However, it was calculated using the DFT/B3LYP/6-311G basis set of the sulfamethoxazole ligand and the results were compared with the complex structure. After the complex was optimized, EHOMO and ELUMO values were determined. The chemical and biological activities of Frontier Molecular Orbitals (FMOs) and complex and free ligand (Hsmtx) were compared. Electrophilic and nucleophilic regions of the complex were determined by Muliken population analysis, MEP (Molecular Electrostatic Potential) and MEP counter notation. The experimental IR results of the complex and the Hsmtx ligand were compared with the theoretically obtained values. Intermolecular interactions were investigated in detail with the Hirshfeld surface analysis method. The optimized structure of the complex was studied by molecular docking calculation and to find the most preferred binding mode, DHPS (dihydropteroate synthase) was inserted into the protein structure (PDB ID: 3TZF) cavity. ADMET studies have been carried out to predict druglikeness characters.

MOLECULAR DOCKING ANALYSIS OF OXYTETRACYCLINE WITH CYTOCHROME C OXIDASE

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Oxytetracycline (Oxytetracycline) has antimicrobial activity against animal diseases and is also used in livestock with its effect of accelerating animal growth. In addition, thanks to its strong absorption in the soil, it also has a field of use in agriculture [1]. Oxytetracycline is used to raise fish and shrimp in a healthy way, due to its positive features such as low cost and toxicity, as well as having a wide area of use [2]. Cytochrome c oxidase is the terminal enzyme of the mitochondrial respiratory chain that catalyzes the reduction of molecular oxygen to water using electrons from cytochrome c [3]. Cytochrome c oxidase is a protein complex composed of three core subunits encoded by mitochondrial DNA and multiple accessory subunits encoded by DNA [3]. It has been suggested that the use of high doses of antibiotics may cause inhibition of mitochondrial respiration. [4]. The use of oxytetracycline antibiotic over a certain dose inhibits the formation of cytochrome c oxidase [5-7]. In our study, molecular docking simulations of oxytetracycline and mitochondrial protein complex cytochrome c oxidase were performed. The binding modes and binding affinities of the oxytetracycline-mitochondrial protein complex cytochrome c oxidase were determined. Our results may shed light on drug production studies.

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MOLECULAR DOCKING ANALYSIS OF FARNESOL WITH CYTOCHROME P450

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Farnesol (C15H26O) molecule is a component of essential oils obtained from natural plants such as lemongrass, rose, tuberose, balsam, cyclamen, neroli and musk. It is a low-toxicity bioactive compound used in the treatment of diabetes, allergic asthma, obesity and hyperlipidemia [1]. In addition, studies have shown that Farnesol has anti-neoplastic activity that suppresses tumor growth in various types of cancer, such as prostate cancer, lung cancer, breast cancer, pancreatic cancer, and multiple myeloma [1]. In recent studies, it has been observed that Farnesol has antimicrobial activity [2]. Cytochromes P450 is an enzyme that catalyzes the oxidation of endogenous and exogenous organic substrates [3]. Cytochrome P450 enzymes have the ability to metabolize foreign chemicals that cells do not recognize [4]. It has been observed that some promising cancer drugs are rapidly metabolized by microsomal cytochrome P450 enzymes [5]. Studies have shown that farnesol significantly inhibits microsomal cytochrome P450 enzymes [4,5]. In our study, to elucidate the bioactive properties of Farnesol, molecular docking was simulated and it has been demonstrated that Farnesol can form a stable complex with P450. The interactions and the binding modes between the target and Farnesol ligand were determined. In summary, our findings can shed light on the production of anticancer drugs that can inhibit microsomal cytochrome P450 enzymes.

ELECTRIC DIPOLE TRANSITION PARAMETERS FOR HIGHLY IONIZED TANTALUM ION

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In this study, we investigate energy levels and electric dipole transition data as wavelengths, oscillator strengths and transition probabilities for some levels in Na-like tantalum (Ta62+). The calculations have been carried out using the AUTOSTRUCTURE atomic structure code developed by Badnell. Calculations include Breit and quantum electrodynamics contributions. A comparison of the results obtained from this study is made with the available results. Our results are in good agreement with others. Also, new results for tantalum ion have been presented. We hope the reported results will be useful for atomic and astrophysics applications.

SOME TRANSITION PARAMETERS FOR HYDROGEN LIKE BERKELYUM

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Some atomic data of allowed electric dipole (E1) and forbidden electric quadrupole, magnetic dipole and quadrupole (E2, M1 and M2) transitions for hydrogen like berkelyum (Bk96+, Z=97) between nl (n=1-9, l=0-4) levels have been carried out. The investigation is performed with both multiconfiguration Hartree-Fock (MCHF) and fully relativistic multiconfiguration Dirac-Fock (MCDF) methods. The calculations are contained Breit-Pauli (BP) relativistic corrections in multiconfiguration Hartree-Fock calculation and the transverse photon (Breit) and quantum electrodynamics (QED comprises self energy and vacuum polarization) effects in multiconfiguration Dirac-Fock calculation besides electron correlations. Some transition parameters (wavelengths, λ, logarithmic weighted oscillator strengths, log gf-value, and transition probabilities, Aki) transitions are represented in this work. It is made a comparison and interpretation for investigated energy levels. This work is performed as a part of extensive study about hydrogen helium and lithium like actinide atoms (Z=89-103). It is a hope the present paper will lead to theoretical and experimental studies for Bk96+ and also in the field of technology in future.

A CALCULATION FOR HYDROGEN LIKE BERKELYUM

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Some calculations carried out for hydrogen like berkelyum (Bk^{96+}, Z=97) structure. The investigation is performed with widely used multiconfiguration Hartree-Fock (MCHF) approximation and multiconfiguration Dirac-Fock (MCDF) methods. The multiconfiguration Hartree-Fock calculation contains Breit-Pauli (BP) relativistic corrections and the multiconfiguration Dirac-Fock method includes the transverse photon (Breit) and quantum electrodynamics (QED consist of self energy plus vacuum polarization) effects, besides correlations. nl (n=1-9, l=0-4) configurations are selected for calculations. It is made a comparison and interpretation for investigated energy levels. This work is performed as a part of extensive study about hydrogen helium and lithium like actinide atoms (Z=89-103). It is a hope the present paper will lead to theoretical and experimental studies for Bk96+ and also in the field of technology in future.

THE LIFETIMES OF HYDROGEN LIKE BERKELYUM

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The lifetimes have been calculated as a part of transition parameters investigation of hydrogen like berkelium (Bk^{96+}, Z=97). The calculation is performed with widely used multiconfiguration Hartree-Fock (MCHF) approximation and multiconfiguration Dirac-Fock (MCDF) methods. The multiconfiguration Hartree-Fock calculation contains Breit-Pauli (BP) relativistic corrections and the multiconfiguration Dirac-Fock method includes the transverse photon (Breit) and quantum electrodynamics (QED consist of self energy plus vacuum polarization) effects, besides correlations. nl (n=1-9, l=0-4) configurations are selected for calculations. The results are presented comparatively and interpreted for Bk96+.

ELECTRON IMPACT EXCITATIONS OF 74W, 75RE, 76OS, 77IR ATOMS RELATIVISTIC L SUBSHELLS IONIZATION CROSS SECTION CALCULATIONS BY USING LOTZ'S EQUATION

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Relativistic L shell (σ^{rel}_{L}) and L_i σ^{rel}_{Li} (i = 1, 2, 3) subshells ionization cross sections by electron impact on $_{74}$W, 75Re, $_{76}$Os 77Ir atoms calculated. By using Lotz' equation in Matlab, σ^{rel}_{L} and σ^{rel}_{Li} cross section values obtained for 21electron impact(E_0) values in the range of $E_{Li}<E_0<7E_{Li}$ for each atom. Starting from $E_0=E_{Li}$(subshell ionization threshold energies), σ^{rel}_{L} and σ^{rel}_{Li} are increasing rapidly with E_0. For a fixed E_0 = 17keV, while Z value increases from 74W ≤ Z ≤ 77Ir atoms; σ^{rel}_{L} and σ^{rel}_{Li} decrease. Results show that for smaller values of E_0(close to E_{Li}), x-ray yields formation of L_i (i =1,2,3) subshells decreases while competing other yields are increase. Results may help to understand similar findings which obtained from other electron impact excitation of L σ^{rel}_{L}, subshells σ^{rel}_{Li} studies for single atoms.

Key Words: Relativistic σ_L and σ_{Li} L_i subshells ionization cross sections calculations for $_{74}$W, $_{75}$Re, $_{76}$Os, $_{77}$Ir atoms, Near L subshells threshold region, Electron impact.

MN DOPING EFFECT ON THE NON-LINEAR OPTICAL PROPERTIES OF 2D MNAU7 CLUSTERS BY DFT CALCULATIONS

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Due to the potential applications of the molecular magnets of gold with Mn atom-doped, the non-linear optical (NLO) properties have been studied to define the origin of magnetism. For this purpose, the preferable site for Mn dopant in 2D MnAu7 clusters can be determined by estimating the formation energies of different doping configurations. The dipole moment, polarizability, anisotropic polarizability and hyper-polarizability have been calculated for those doping configurations. Thus, the doping configuration with the highest hyper-polarizable value has been obtained for the MnAu7 cluster to use in the cancer researches.

A COMPARISON BETWEEN TWO QUBIT AND TWO QUQUART QUANTUM PHASE ESTIMATION

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In quantum information processing, two level (d=2) quantum systems are called qubits and four level (d=4) quantum systems are called ququarts. Quantum Machine Learning (QML) is an interdisciplinary field that combines quantum information and machine learning. Quantum Phase Estimation (QPE) is used as a subroutine algorithm in some QML algorithms such as HHL algorithm. In this study, two qubit QPE and two ququart QPE were compared for a selected phase and its multiples. It is found that exact determinations of all these sixteen selected phases were found in two ququart QPE. But, in the case of two qubit QPE, only four of these selected phases were exactly determined. Thus, it has been shown that two ququart states are more advantageous than two qubit states in QPE algorithm.

THE CONSTRUCTIONS OF UP AND DOWN QUANTUM COUNTER CIRCUITS FOR QUDIT SYSTEMS

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A quantum computer can solve some problems faster than classical computer because of the quantum supremacy. Quantum circuits can include repeated sub-algorithms. In such cases, it is required to detect the number of iterations. In this study, we constructed up and down quantum counter circuits for qudits within these quantum circuits. Furthermore we generalized constructed circuits for multi-input qudit systems. The applications of the generalized circuit were presented for the cases of 3-qubit, 3-qutrit, and 3-ququart systems. Also, the quantum counter circuit executed for 3-qubit system on ibmq_quito quantum computer provided by IBM. The obtaind results verify the counting operation on qudit systems with high success rate.

SPECTROSCOPIC AND NON-LINEAR OPTICAL INVESTIGATIONS FOR A POLYCYCLIC ORGANIC COMPOUND BY USING DFT METHODS

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Due to their optoelectronic technology applications, huge nonlinear responses, and extraordinarily fast switching times, organic NLO compounds compared to recently investigate inorganic compounds have attracted great interest. In this context, the detailed theoretical investigations for (2E)−2-(2,4,6-trimethoxybenzylidene)−3,4-dihydro-2H-naphthalene-1-one (TBDN) [1] characterized experimentally was carried out by using the DFT/HSEh1PBE and DFT/CAM-B3LYP methods with 6-311++G(d,p) basis set. The optimized structural parameters, 1H and 13C NMR chemical shifts, vibrational wavenumbers, linear polarizabilities (α and Δα) and first- and second-order hyperpolarizability (β and γ) parameters of TBDN were obtained at the same DFT levels. Furthermore, the electronic absorption and emission spectra for TBDN in gas phase were fulfilled at the TD-HSEh1PBE/6-311++G(d,p) and TD-CAM-B3LYP/6-311++G(d,p) levels. In addition, molecular electrostatic potential (MEP) surfaces were acquired by the same DFT methods. Finally, a thorough comparison of the structural, spectral, and electronic behaviors of TBDN with experimental and theoretical data was provided.

ATOMIC MULTICONFIGURATION CALCULATIONS OF ALLOWED (E1) AND FORBIDDEN (E2 AND M1) TRANSITIONS AND ENERGIES FOR CO-LIKE KRYPTON (KR X)

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By employing the general-purpose relativistic atomic structure package (GRASP) based on a fully relativistic multiconfiguration Dirac-Fock (MCDF) method we have reported the energy levels and transition parameters, such as wavelengths, transition rates, oscillator strengths, and line strengths for allowed transition (electric dipole, E1), and forbidden transitions (electric quadrupole, E2, and magnetic dipole, M1) for Co-like krypton (Kr X). Obtained results have been compared with available theoretical, and experimental values in the literature to assess the accuracy of the data. Moreover, some new values, such as energies, and transition parameters of E1, E2, and M1 transitions have been presented firstly for Kr X in this work. We predict that new values will form the basis for future experimental and theoretical works.

INVESTIGATION OF SPECTROSCOPIC PROPERTIES OF CU(II)-ACETAZOLAMIDE/NICOTINAMIDE COMPLEX BY COMPUTATIONAL CHEMISTRY METHOD: MOLECULAR MODELLING STUDY, ADME AND TOXICOLOGY

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Theoretical calculations of the [Cu(Hacm)2(na)2(H2O)2] [H2acm; acetazolamide, na; nicotinamide] complex were calculated by DFT method using B3LYP and LanL2DZ basis set. The values obtained as a result of the calculations are quite compatible with the geometric parameters of the experimental structure. However, it was calculated using the DFT/B3LYP/6-311G basis set of the acetazolamide ligand and the results were compared with the complex structure. The experimental IR (Infrared) results of the complex and the H2acm ligand were compared with the theoretically obtained values. Intermolecular interactions in crystal network were performed by 2D and 3D Hirshfeld analyses. The calculated electronic transitions results were examined and, its molecular electrostatic potentials (MEP) were also determinated. The DFT-optimized structure of the small compound was used to perform molecular docking studies. Gyrase Type IIA Topoisomerase and DNA Gyrase enzyme were downloaded from PDB (Protein Data Bank) and molecular docking study was carried out using AutoDock 4.2.6 to find the most preferred binding mode of ligand within the protein cavity. Druglikeness assay, ADME and Toxicology studies have been carried out to predict good drug like characters.

MOLECULAR DOCKING ANALYSIS OF PROLINE-CONTAINING DIPEPTIDE

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Cyclo(Phe-Pro) dipeptide is a potential anti-cancer agent that inhibits the growth of tumors in colon, cervical and breast cancers. In colon cancer cells, cyclo(Phe-Pro) dipeptide has been found to inhibit cell growth by inducing apoptosis. This study aims to examine the anticancer activity of cyclo(Phe-Pro) dipeptide. The relationship between the structure and activity of a molecule is important, so in the first stage of this study, conformational analysis was performed using the Spartan 06 program. Three stable conformers of the cyclo(Phe-Pro) dipeptide were obtained as a result of this analysis and their energies were calculated. The conformer with the lowest energy was then optimized by the Gaussian 03 program. The elevated levels of epidermal growth factor receptor (EGFR) is known to be a common component of many cancer types. EGFR is known to be highly expressed in various solid tumors and a relationship between EGFR expression and cancer prognosis is suggested. High levels of EGFR appears to promote tumor growth. Therefore, EGFR is one of the main targets for the development of new anti-cancer agents. In this study, the interactions between cyclo(Phe-Pro) dipeptide and EGFR were examined by molecular docking studies to evaluate the anticancer activity of the dipeptide. AutoDock-Vina program was used to carry out docking simulations on the active region of the target receptor that was defined by the CAVER program and the binding affinity of EGFR-cyclo(Phe-Pro) complex was determined.

MOLECULAR DOCKING ANALYSIS OF ANILINO-MONOINDOLYLMALEIMIDE WITH PKCB2 RECEPTOR

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Protein kinase C (PKC) is a target for therapeutic agents used for the treatment of diabetic complications and cancer. PKC has a crucial role in cellular signal transduction pathways, cell proliferation and differentiation, tumor promotion and gene expression. Protein kinase C β (PKCβ) is a member of the PKC family. Previous studies have indicated that PKCβ activation is involved in the onset of diabetic microvascular complications such as diabetic neuropathy, nephropathy and retinopathy. Thus, there is a need for PKCβ inhibitors that prevents the onset of diabetic microvascular complications by blocking signal transduction pathways. Anilino-monoindolylmaleimide acts as a powerful, cell-permeable inhibitor of PKCβ isozymes (PKCβ1, PKCβ2). In this study, in order to clarify the interaction between the title compound and PKCβ2 receptor, the molecular structure and mechanism of the inhibitory activity of Anilino-monoindolylmaleimide have been investigated. First of all, the Spartan 06 program was used to obtain the most stable conformer of the compound. The lowest energy conformer of the compound was optimized with the Gaussian 03 program. The CAVER program was then used to determine the active sites on the receptor's surface. Finally, molecular docking simulations were performed by using AutoDock-Vina program on the identified active sites of the receptor.

STRUCTURAL, SPECTROSCOPIC (INFRARED, RAMAN AND UV-VIS) AND, ELECTRONIC PROPERTIES OF FOX-7 AND NITROGUANIDINE MOLECULES: A COMPUTATIONAL STUDY

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This research explores the ground state geometry and molecular properties of FOX-7 and Nitroguanidine molecules, with a focus on their spectroscopic (Infrared, Raman, and Uv-Vis spectra) and electronic characteristics. Initially, the conformational space of each molecule was systematically scanned using molecular mechanic calculations using the Spartan08 program and the most probable conformer structure was obtained for each molecule. Subsequently, geometry optimizations of molecules were conducted by using ab initio density functional theory (DFT) with Becke's three-parameter hybrid-exchange functional, which combines the Lee–Yang–Parr correlation functional (B3LYP) method, and the standard 6-311++G (d, p) basis set. The theoretically determined geometrical parameters from optimized structure and experimental values available in the literature were compared, providing validation for the structural properties of both molecules. Furthermore, the stability and reactivity properties of both molecules are estimated in terms of HOMO-LUMO energies. The vibrational properties of the molecules were analyzed using computational methods to investigate their infrared and Raman spectral characteristics. Overall, this study contributes to a comprehensive understanding of the ground state geometry, molecular structure, and spectroscopic behavior of FOX-7 and Nitroguanidine, paving the way for potential applications in various fields of science and technology.

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SELF-POWERED GRAPHENE/4H-SIC SCHOTTKY JUNCTION UV PHOTODETECTOR WITH ENHANCED SPECTRAL RESPONSIVITY

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Self-powered, high-performance graphene/Silicon Carbide (G/4H-SiC) Schottky junction ultraviolet photodetector (UV) has been fabricated. P-type CVD graphene sheet transferred on the top of 4H-SiC of an epilayer structure of n-/n+. The effect of utilizing monolayer and bilayer graphene sheets on the device performance was investigated. Electronic and optoelectronic characterizations were done under UV range from 240 to 350 nm. The proposed photodetector revealed the highest spectral responsivity known of a G/4H-SiC UV photodetector with two spectral responsivity maxima at 285 nm and 300 nm wavelengths, respectively. The results exhibited high spectral responsivity of R ~ 0.09 A/W, maximum detectivity of D* ~ 2.9 × 1012 Jones, and minimum noise equivalent power of NEP ~ 0.17 pWHz-1/2 in both devices. Using bilayer graphene showed no significant change in the photogenerated current and the spectral responsivity, however, it exhibited a significant improvement in the response speed. Where the response speed was increased by 50 % when bilayer graphene was used.

GENETIC ALGORITHMS-BASED SYNCHROTRON RADIATION OPTIMIZATION FOR AN X-RAY BEAMLINE: THE GASOLINE SOFTWARE

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Genetic algorithms (GAs) are commonly used in wide range of applications to generate high-precision solutions for optimization problems relying on biologically inspired operators such as mutation, crossover and selection. Optimization of beamline components utilized in accelerator-based light sources such as mirrors, lenses, monochromators as well as undulators, is a big concern for beamline scientists. Considering synchrotron based user experiments, radiation characteristics such as energy resolution, flux and beamsize are of great importance in terms of the feasibility of the experiment. GAs provide realistic and reliable solutions when full beamline optimization is needed before commissioning. In this respect, the GA-based software, abbreviated as GASOLINE, has been developed to track and optimize synchrotron radiation characteristics such as beamsize, beam position, photon flux and energy resolution starting from the undulator to the sample throughout beamline optics for dedicated user experiments. Finally, utilization of GAs is demonstrated to be well-consistent with the solutions of optimization problems obtained by different methods.

OPTIMIZATION OF SYNCHROTRON RADIATION PARAMETERS USING BIO-INSPIRED APPROACHES

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Since high precision alignment is required for synchrotron user experiments, adjustment of optical elements is crucial that takes some days even weeks depending on the complexity of the experimental technique. In this study, widely used optimization methods such as Evolutionary Algorithms (EA) and Swarm Intelligence (SI) were applied on synchrotron radiation parameters where photon flux and beam spot size were selected as objective functions. The calculations were carried out through a simulator called X-Ray Tracer. Two evolutionary algorithms are the Genetic Algorithms (GA) and the Non-dominated Sorting Genetic Algorithm II (NSGA-II), where the two swarm intelligence algorithms are Particle Swarm Optimization (PSO) and Artificial Bee Colony (ABC), applied for two different experimental setups. As decision variables, position of a crystal lens and the focal distance of Kirkpatrick-Baez mirrors were adjusted throughout an X-ray synchrotron beamline. At first, single-objective EAs were used to maximize the photon flux while minimizing the spot size individually. Subsequently, NSGA-II was used to optimize both objectives simultaneously. Since the simulator and optimization processes are stochastic, each algorithm configuration was run multiple times for Monte Carlo simulations. The results indicate that PSO provides the best solution among all single objective algorithms. Consequently, all four algorithms successfully optimize both objectives.

INACTIVATION OF PSEUDOMONAS AERUGINOSA PLANKTONIC BACTERIA BY SURFACE DIELECTRIC BARRIER DISCHARGE PLASMA

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Pseudomonas aeruginosa is a gram-negative bacterium and is widely found in the environment. This bacterium can live in various environments such as soil, water, and plants. However, it is a potential pathogen that can cause infections in people with weak immune systems or in hospital settings. The bacterium Pseudomonas aeruginosa is naturally resistant to many common antimicrobial drugs, including antistaphylococcal penicillins, amoxicillin-clavulanate, ampicillin-sulbactam, first and second-generation cephalosporins, some third-generation cephalosporins such as cefotaxime, ceftriaxone, and trimethoprim-sulfamethoxazole. This bacterium can also develop multiple antibiotic resistance by different mechanisms. It can complicate the treatment of infections due to its ability to develop resistance to the antimicrobial agents used rapidly. The bacterium Pseudomonas aeruginosa can cause a range of health problems in humans. This bacterium can cause serious infections, usually hospital-acquired infections, especially in people with weak immune systems and in patients after surgery. It can also cause lung infections, urinary tract infections, skin infections, and infected burns. Pseudomonas aeruginosa is also known for its ability to be resistant to antibiotics, which can make treatment difficult. Cold plasmas are used in many different applications in the medical field, especially in sterilization, as they produce charged atoms and/or molecules such as electrons and ions, high-energy excited atoms and/or molecules, radical atoms and/or molecules such as reactive oxygen and nitrogen species such as OH. and NO., and species and energies with high antibiofilm effect such as ozone and ultraviolet. Surface Dielectric Barrier Discharge (SDBD) is a special configuration of Dielectric Barrier Discharge (DBD) in which the dielectric material is usually placed on a flat or planar surface. In this study, a novel SDBD reactor, which can be used for samples/devices of different sizes and properties, was fabricated for antimicrobial purposes. Gram-positive Pseudomonas aeruginosa planktonic bacteria were placed in the reactor and inactivated by exposure to non-thermal plasma generated by the SDBD system for 10 minutes.

GERMANATE-BASED GLASSES FOR SCINTILLATION APPLICATIONS

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Rare earth ion doped glasses are known as one of the most promising candidates for scintillators due to their important advantages such as low cost, large volume production and easy shaping of elements. Dy3+ doped germanate-based glasses have been prepared using the standard melt quenching method. X-ray diffraction, Fourier transform infrared, absorption, photoluminescence, and decay time measurements have been utilized to obtain their physical, structural, optical, and luminescence properties. Titled glasses were found to have high-density values, which is very important for scintillators. The x-ray diffraction analysis has been performed to understand the amorphous nature of the sample. Fundamental vibrations of Bi2O3 and GeO2 groups have been described by Fourier transform infrared transmittance spectrum. The thermal properties of the glass have been determined from differential thermal analyzer measurements. In order to determine the bonding nature of the Dy3+-ligand environment in the prepared glasses, the nephelauxetic ratio and the bonding parameter were calculated using the optical absorption spectra. The emission spectra of glasses exhibit blue, yellow, and red emission at 480, 574, 662, and 752 nm under 350 nm excitation, respectively. The decay curve of the glass has been measured with the 387 nm excitation, monitoring the emission peak at 574 nm. The yellow-blue ratios, Commission International de l'Eclairage color coordinates, and correlated color temperature values have been determined using the photoluminescence excitation and emission spectra. The Commission International de l'Eclairage color coordinates and correlated color temperature values of titled glasses located in the pure white light region for all concentrations, indicating the suitability for solid-state lighting and scintillation applications.

ALL PM, 14 W, 2.8 GHZ INTRA-BURST REPETITION RATE YB-DOPED FIBER LASER

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We present the development of an all polarization maintaining (PM), high-power, ultra-high repetition rate, burst-mode Yb-doped fiber laser system with an average power of 14 W to achieve ablation-cooled material processing. Firstly, the mode-locked oscillator, which generates about two ps-long pulses at an 89 MHz repetition rate is developed. We used a cascade of 50/50 couplers and increased the pulse repetition rate to 2.89 GHz. Using three amplifier stages, all consisting of double-clad 10/125 fibers, 14 W output average power is achieved. We installed an acousto-optic modulator (AOM) after the first amplifier for burst generation in order to operate the laser in both uniform and burst modes. Using a pair of 1200 line/mm compressor grating and after decompressing the pulses, we achieved about 640 fs long pulses at approximately 150 nJ pulse energy.

THE STRUCTURAL AND ELECTRO-OPTICAL PROPERTIES OF MA3SB2I9-XBRX PEROVSKITE THIN FILMS DEPOSITED BY USING ULTRASONIC SPRAY PYROLYSIS

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Perovskite solar cells are promising semiconductor materials in photovoltaic technology. In addition to the general ABX3 structure of the perovskite, A3B2X9 structure perovskites which have a larger unit cell structure than the ABX3 structure are also studied. To reduce the use of lead metal (Pb2+) in perovskite solar cells, materials with the same atomic arrangement as lead are increasingly being used. For perovskite materials, metal cations such as Bi3+, Sn2+, Ge2+, and Sb3 are frequently preferred instead of Pb. Antimony (Sb+3) metal halide hybrids exhibit low toxicity and excellent stability. In this study, MA3Sb2I9, MA3Sb2I7.5Br1.5, and MA3Sb2I6Br3 perovskite materials were deposited on glass substrates using the ultrasonic spray pyrolysis (USP) method. Structural, elemental, and electro-optical analyses of the perovskites were studied with XRD, EDS, and UV-VIS systems. The position of the peaks in the XRD pattern shifted gradually when the I/Br ratio changed. UV-Vis experiments showed that the band gap of the MA3Sb2I9-xBrx perovskites can be tuned by the changing I/Br ratio. Acknowledge: This work was supported YOK 100/2000 PhD Scholarship.

EVALUATION OF THE CAUSES OF FLICKERING OF VEHICLE HEADLAMP BY USING STRUCTURAL ANALYSIS

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Headlamps are one of the most crucial and mandatory parts in vehicles for safer driving. Several problems occur with this product during the service life. One of the most common issues is headlamp flickering. Vibrations coming from the road conditions and other parts of the vehicle cause this situation. This flickering leads to some troubles such as lack of visibility for drivers or bright light blindness for counter drivers. To prevent dire consequences, there are some regulations created by The United Nations Economic Commission for Europe (UNECE). These regulations incorporate the technological innovations of vehicles to make them safer and more environmentally. Also, automotive manufacturers have developed many tests and analyses for the evaluation of the flickering state. The structure of headlamp is one of the most important cases that affect the light flickering. Analyzing the structure of the components of the headlamp and their relations with each other gives a better understanding. This helps to create solutions. In this work, Modal, Harmonic, and Power Spectral Sensity (PSD) analyses of structural dynamic analysis methods were used to evaluate the headlamp flickering state.

Keywords: Head Lamp, Light Beam Vibrations, Light Flickering, Structural Dynamic Analysis

MANIPULATION OF BROWNIAN PARTICLES BY CIRCULAR OPTICAL LIGHT FIELDS: A SIMULATION STUDY

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Radiation pressure is a fundamental phenomenon in which electromagnetic fields interact with matter, resulting in the transfer of momentum and inducing mechanical effects. This interaction enables the manipulation of micrometer-sized objects. In this study, I focus on the separation of a mixture of spherical microparticles with different sizes, suspended in a liquid, by utilizing time-varying periodic optical light fields. To achieve this objective, I have developed a simulation code that accurately calculates the trajectories of the particles under the influence of the light force field. The simulations demonstrate the efficacy of using time-varying periodic optical light fields for effectively separating mixtures of particles with varying sizes. This research sheds light on the potential applications of radiation pressure in the manipulation and sorting of microparticles, offering promising prospects in various scientific and technological fields.

ESTIMATION OF PLASMA PARAMETERS OF LASER INDUCED BREAKDOWN SPECTROSCOPY (LIBS) USING AG EMISSION LINES

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Electron temperature and density of the laser-induced plasma produced on Ag sample has been investigated. The plasma was produced at atmospheric pressure by an Nd: YAG laser beam (1064 nm wavelength, 4.4 ns pulse with output energy 450 mJ and repetition frequency 20 Hz) and spectroscopic measurements are carried out by Mechell type ICCD spectrometer with 0.05 nm resolution. Multi-elemental panoramic line spectra (200-900 nm) have been analyzed at different delay times (0.1 - 1 μs) and integration time of 10 μs. Emission lines at 328.09 nm, 338.31 nm, 520.94 nm and 546.57 nm were identified and utilized to evaluate the plasma parameters. Electron temperature were estimated by using the Boltzmann plot techniques while electron density was determined by comparison of measured Ag I 328.09 nm emission line Stark broadening with the broadening value obtained by theoretical methods. The temperature and electron density of the plasma conform the Maxwell distribution and McWhriter criteria for the laser induced plasma in local thermal equilibrium condition.

Keywords: LIBS, spectroscopy, material analyses, plasma

LASER INDUCED BREAKDOWN SPECTROSCOPY QUANTATIVE ANALYSIS OF A CERAMIC SAMPLE VIA CALIBRATION FREE METHOD

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Quantative analysis of a ceramic sample by means of laser induced breakdown spectroscopy (LİBS) via calibration free (CF) method is performed. The plasma was produced by an Nd: YAG laser beam (1064 nm) at atmospheric pressure and multi-elemental panoramic line spectra (200-900 nm) have been analyzed at different delay times and gate widths and optimal parameters were chosen for implementation of CF algorithm. Having estimated the plasma temperature by Boltzmann plot method and using NIST database for Si and Al transitions we have estimated their content in the sample. The obtained results were compared with the ones given in the specification of the sample which appear to be in good agreement with each other.

DESIGN AND COMPARATIVE ANALYSIS OF BLACKBODY CALIBRATION SYSTEMS FOR INDUSTRIAL INFRARED THERMOMETER CALIBRATION

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This scientific research investigates the design of blackbody calibration systems for the calibration of industrial infrared thermometers. Three different calibration systems were designed and compared to identify the most suitable ones for calibration purposes. One of the systems utilizes a standard cavity for the calibration of clinical type thermometers, while the other two blackbody cavity systems were specifically designed within our laboratory. One of the laboratory-designed systems is comparatively more expensive and its production is contingent upon several parameters. However, the third system is significantly more cost-effective and can be produced in a shorter period of time. The study includes an examination of the suitability of these systems for practical and cost-effective calibration of industrial infrared thermometers. Uncertainty budgets were estimated to assess the measurement uncertainties associated with the selected calibration systems. The findings of this research contribute to the development of reliable and efficient calibration methods for industrial infrared thermometers.

GENERATION OF 150 FS PULSES DIRECTLY FROM A 1.2 GHZ SINGLE-MODE ER-DOPED FIBER LASER AT 1.5 W OUTPUT POWER

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We present the development of an Er-doped fiber laser generating 150 fs pulse directly at 1.5 W average power. The pulse repetition rate of the laser is 1.2 GHz, and the central wavelength is about 1550 nm. The laser system consists of a passively mode-locked oscillator with a 77.6 MHz repetition rate and 16.3 mW average power. We obtained 1.23 GHz repetition rate pulses from the repetition rate multiplier consisting of six 50/50 couplers. The output of the repetition rate multiplier amplifies up to about 4.5 W using a cladding pump 10/125 Er-Yb doped gain fiber. The shortest pulse duration is achieved at 1.5 W output power. The variation of the spectral width and the pulse duration with the output power has been investigated by experiment and simulation.

IMPROVING ACOUSTIC PERFORMANCE OF A TRIPLE-LAYER PERFORATED PANEL BY EXAMINING THE GEOMETRIC PARAMETERS

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In the daily life, humans are exposed to a wide range of noise sources. This causes a broadband sound pollution in the built environment. Triple-layer perforated absorbers could be a sufficient solution as they provide a wide-band sound absorption. Here, we investigate the impacts of the geometric parameters of a triple-layer perforated panel on acoustic absorption to improve its performance. The hole diameter, panel thickness, and air back cavity depth were altered. Increasing the hole diameters decreased the amplitude of the absorption coefficient whilst it had no impact on the peak frequencies. Thickening of the panels slightly shifted the absorption peaks towards low-frequency region. Expanding the cavity depths significantly transfer the peaks to low-frequencies. Geometric parameters have a substantial effect on the acoustic performance of triple-layer structures. Thus, to achieve the best result, the parameters should be adjusted carefully.

DETERMINING SCHOTTKY DIODE CHARACTERISTICS WITH PYTHON

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A semiconductor diode is created when a metal is joined with a semiconductor material. This type of diode has a small forward voltage drop and can switch very quickly. For instance, a silicon p–n diode usually has a forward voltage around 600–700 mV, while a Schottky diode has a forward voltage of 150–450 mV. This lower forward voltage requirement allows for faster switching and improved system efficiency. Schottky diodes are often used to prevent saturation issues in Schottky transistors. However, Schottky diodes are generally less robust compared to power p–n diodes. This is because the Schottky diode's junction is directly exposed to thermally sensitive metallization. Consequently, a Schottky diode can handle less power compared to an equivalently-sized p–n diode with a deeply embedded junction, particularly during reverse breakdown. The benefit of the lower forward voltage in Schottky diodes becomes less significant at higher forward currents, where the series resistance becomes the dominant factor in voltage drop. Recently, electronics based on carbon, particularly graphene (G), have gained interest. By intentionally modifying graphene's electrical and optoelectronic properties through physical/chemical processes or synthetic methods, new applications might emerge. To explore how incorporating graphene affects the electrical properties of a Schottky diode, researchers have covered on the surface of p-Si with graphene using a hydrothermal technique. The electrical characteristics of the carbon-based diode, p-Si/G, are studied using the current–voltage (I–V) technique, in thermionic emission analysis. The main problems related with the measurement of the diode I-V characteristics were; although, the measurement process was highly algorithmic and repetitive, the data acquisition with the source meter, and processing it had required much human-power, and been quite time-consuming. In addition, the I-V characterization technique includes finding a linear region in the data, which humans can only find it by eye. Hence, a need for automating these processes, and developing a stable and reliable tool was emerged. In the light of the aforementioned problem, a computer program that triggers the source meter, acquires the raw I-V data, and processes it to determine the I-V characteristics of the Schottky diode was written. Python is selected for the development of this program, because of its vast libraries. These made controlling the source meter, processing the data, and in specific, finding the linear portion much more applicable, flexible, repeatable, and reliable, compared to the human-processing of the same data. In conclusion, an effective Python program was written to ease data acquisition, data-processing, finding the linear portion (with high R2) and determining the Schottky parameters (ideality factor (ŋ), reverse saturation current (I0), barrier height (Φb), series resistance (Rs), shunt resistance (Rsh), and rectification-ratio (R.R.)). The program also provided us to do these tasks, that had been done in one day, in just a few minutes.

MEASUREMENT OF PHASE CALIBRATION STANDARD FOR VERIFICATION OF EXPERIMENT PARAMETERS OF DIFFRACTION PHASE MICROSCOPY SETUP

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There has been increasing interest in micrometer/nanometer scale surface profiling in thin film research and production, especially for the detection of defects. Diffraction phase microscopy (DPM), a non-destructive method, is one of the surface profiling systems used. In this quantitative phase imaging system, which consists of an inverted microscope, an interferometric combination called 4f and an analysis unit, it is possible to use different types of light sources depending on the sample. In this study, the profile of the phase calibration standard was calculated by Fourier transform analysis from the interferograms obtained from the DPM setup. Obtained calibration standard profile is consistent with the reference given for the standard. Thus, the accuracy of the measurement made with the DPM experimental setup was demonstrated. With this system, it was preferred to use laser light source for obtaining thin film surface profile and halogen light source for obtaining biological materials profiles. Therefore, it is shown that surface profiles of different samples in the order of 100nm-5micrometer can be examined with high accuracy with DPM.

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IMPEDANCE SPECTROSCOPY AND AC MODELLING OF POROUS SCAFFOLD WITHIN A TEMPERATURE RANGE OF 293 – 373K

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Fabrication of porous scaffolds has been of great interest in biotechnological applications for many years particularly in various tissue engineering applications. Since large pores are necessary for cell proliferation while small pores in scaffold structure are required to support nutrient and oxygen transfer to cells. In this study, hierarchical porous polymeric scaffolds were prepared by combining ice templating and phase separation methods. Although the porosity and elasticity of such biomaterials have been extensively studied, there is still a need for investigation of a.c. conductivity and impedance characterization. AC conductivity and dielectric behavior for the natural polymer based hierarchical porous scaffolds sample were examined in the frequency range 0.1 – 2x107 Hz and within a temperature range of 293 – 373K using Alpha-A High Resolution Dielectric, Conductivity and Impedance Analyzer. The frequency and temperature dependence of the ac response of this natural protein is explained by establishing an ac circuit model, and the conductivity mechanism is explained by the CBH model.

SYNTHESIS OF AL AND ZN DOPED COPPER OXIDE NANOPARTICLES BY SOL- GEL METHOD AND COMPARISON OF ANTIMICROBIAL ACTIVITIES FOR ESCHERICHIA COLI

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Interest in antimicrobial nanoparticles has increased in the last decade. Although studies primarily focus on silver nanoparticles, they are not preferred because they are expensive, especially in industries that require intensive use such as textiles and wall paints. For this reason, the usage areas, production and researches of copper nanoparticles with similar antimicrobial properties have increased. Doping is also a frequently used method to increase the antimicrobial properties of copper nanoparticles. In this study; Pure, Al and Zn doped CuO nanoparticles were produced by annealing at 400 o C annealing temperature for 4 hours using Sol-Gel method. XRD, FTIR and FESEM characterizations were performed for all pure and doped CuO nanoparticles. In these characterization studies, the main CuO peaks and Al, Zn contributions were determined. Al and Zn additive ratios were made as 4, 8, 12 and 16 %, and after the nanoparticles obtained from this production were tableted, the inhibition zone was examined by disk diffusion method and their antimicrobial properties were compared using Escherichia coli. bacteria. It was observed that both Zn and Al doping enhanced the antimicrobial effect of pure CuO nanoparticles. In addition, it was determined that Al additive provided more antimicrobial effect than Zn additive. As a result, doping of CuO nanoparticles enhanced their antimicrobial properties.

Keywords: CuO nanoparticles, Sol-gel method, Al and Zn doping, Antimicrobial effect.

QUANTUM COMPUTATION, COMMUNICATION AND FUZZY THEORY

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Fuzzy Theory and Fuzzy Logic has come a long since it was first subjected to technical research field in 1965 when Dr. Lotfi Zadeh published his seminal work "Fuzzy Sets" in the journal of Information and Control [1]. Since that time the subject has been the focus of many independent research investigations by mathematicians, engineers, physicists and many scientists from many inter disciplines of the sciences from around the world, especially from Japan, USA, and China [2]. At the moment there are many works especially in the applied sciences and in the engineering fields of the Fuzzy Theory resulting many new devices and instruments which are not possible by usual scientific methods or engineering techniques including in measurements [3,4], computation, image recognition, data analysis, neural networks, artificial intelligence [5,8] in even programming [9] by using quantum mechanical principles and calculations [10]. Although there are not many works resulting direct technological outcomes from the quantum mechanical applications of Fuzzy Theory other than the quantum computers, there are an increasing number of articles in "Fuzzy Physics" [11] which looks becoming a new branch of physics just like the applications of Group Theory in physics. Currently the quantum information science exists mainly as theoretical area of research and technology. In our present work we want to investigate the fuzzy theory basics and then its applications into the quantum computation especially in the quantum registers which is now a very important subject of the quantum computation and information studies. Keywords: Fuzzy Theory, Fuzzy Sets, Fuzzy Logic, Quantum, Computation, Communication, Artificial Intelligence, Fuzzy Physics, Engineering.

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ENHANCING PERFORMANCE AND STABILITY OF HYDROGEL-BASED IONIC DIODES THROUGH CROSS-LINKING RATIO OPTIMIZATION AND BENDING ADAPTABILITY

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This research investigates the performance and characteristics of hydrogel-based flexible ionic diodes (HBFIDs) with a focus on their electrical and optical properties, offering a detailed analysis of cross-linking ratios' effects on their flexibility based on bending behavior. A comprehensive investigation was conducted on hydrogels classified as n-type and p-type, assessing their morphological, optical, and dielectric/electrical attributes. The study delved into various characterization methods including Fourier-Transform Infrared (FT-IR) spectroscopy, Scanning Electron Microscopy (SEM), cyclic voltammetry (CV), impedance spectroscopy, energy band gap determination, and dielectric constant measurements. The n-type hydrogel exhibited significant ionic conductivity improvements with increased cross-linking ratios, suggesting its suitability for applications demanding high conductivity. The absorption coefficient and capacitance measurements validated the promising energy storage capabilities of n-type hydrogels, particularly n-HG/12, highlighting their potential for capacitive applications. Furthermore, the different configurations of p-n heterojunctions yielded ionic diodes with distinct rectification behavior. The forward biasing of these diodes resulted in low current levels of <0.03 mA cm-1. The performance of the HG/12 diode which contained the n-type hydrogel that has the highest cross-linking ratio in this study, stood out with a remarkable rectification ratio of 1269. The switching times of these flexible diodes were evaluated, emphasizing their rapid response and stability over multiple cycles. The research extended to investigate the impact of bending on these flexible HBIDs. Experimental results demonstrated that these devices maintained their performance even under substantial bending angles of up to 60°, highlighting their potential for integration into flexible electronics and bio-interfaced applications. The findings underscore the role of cross-linking ratios in shaping their performance, paving the way for enhanced applications in various fields, including flexible electronics and biosensing platforms.

POLYMER DOPING OF TUNGSTEN PELLETS TO ENHANCE SURFACE ROUGHNESS OF CATHODE SURFACE THEREFORE ELECTRON EMISSION OF THERMIONIC CATHODES

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Tungsten powders are widely used in powder metallurgical studies especially used for radar, telecommunications and some high temperature applications. In most applications, tungsten-based matrix dispenser cathodes are used for vacuum electron devices. Tungsten is the most common main material included in cathode devices operating as electron sources. Wolphram is preferred due to its superior electrical and thermal conductivity and strong mechanical qualifications. However, tungsten has some drawbacks in terms of its machining properties. It is so brittle that not to be processed with its pure form. There are some cracks and disorders inside the morphology of tungsten pellet structure when it is machined without any binder with tungsten. In literature, there are some solutions for preventing such problems. They are; copper infiltration, plastic or monomer doping techniques. They have some disadvantages in terms of diminishing the cathode emission performance, taking a lot of time for processing and cost effectiveness. In this study, a novel polymer type -for this area- polyacrylamide is used and doped before isostatically pressed. In this way, there is no need to use rubber molds and handle with monomer to polymer chain reactions. It is obtained successful results after doping the tungsten powders with polyacrylamide and fabricating cylindrical pellets. The roughness values throughout the surface of pellets are improved by decreasing one roughness parameter from 70µm to 10µm. This improvement is crucial for enhancing the emission performance of a dispenser cathode. As a consequence, the tungsten pellets surface roughness is improved with a cost effective and novel technique.

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THE SHAPE MEMORY CHARACTERISTICS OF CuAlNiCr HTSMA INCLUDING QUATERNARY Cr ELEMENT ADDITION

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CuAlNi shape memory alloys (SMAs) are one of the most prominent Cu-based SMAs mainly due to their shape memory properties at high temperatures. Therefore, they are interested in high temperature SMA applications. Their good thermal stability but brittleness originated from their coarse grain size are their other pros and cons. In this work, the quaternary CuAlNiCr high-temperature SMA (HTSMA) with an unprecedented chemical composition including minor amount of chromium element was fabricated by arc melting technique. After arc melting process, traditional homogenization of small alloy samples in the high β-phase temperature region and quenching them in iced-brine water were proceeded. To characterize the shape memory effect property of the alloy, differential calorimetry and microstructural X-ray diffraction (XRD) tests were carried out. The differential scanning calorimetry (DSC) tests taken at various heating/cooling rates showed the splendid exothermic and endothermic peaks of reversible martensitic phase transformations in the teperature range between around 150-220 °C, thence the alloy is qualified as a high-temperature SMA. Using DSC peak analysis data, the phase transformation start and finish temperatures, hysteresis gap, and some other important thermodynamical parameters were determined. Among them, the high enthalpy change amounts occurred during the transformations implied the good shape memory effect feature of the alloy. The differential thermal calorimetry (DTA) test taken at a single heating/cooling rate revealed both the reversible martensitictransformation peaks and the other phase transition peaks at higher temperatures. The consecutive phase transition step peaks of β'1→ B1(L21)→B2→A2 on the heating part of the DTA curve of the alloy were observed as similar to those seen in the other Cu-based shape memory alloys. Furthermore, at room temperature, the existence of the formed martensite phases in the alloy was revealed by the XRD pattern of the alloy by using CuKα radiation. The results showed that the novel CuAlNiCr high-temperature SMA can be useful in the high-temperature SMA applications.

Keywords: CuAlNiCr high-temperature SMA, Martensitic transformation, Shape memory effect, DSC, DTA, XRD

STRUCTURAL AND THERMAL SHAPE MEMORY EFFECT ANALYSIS OF CuAlFe HIGH-TEMPERATURE SHAPE MEMORY ALLOY

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In this study, Cu-rich ternary CuAlFe high-temperature shape memory alloy (HTSMA) was produced by casting via using a vacuum arc melter. After obtaining the as-cast ingot alloy at the end of arc melting, cutting the as-cast ingot alloy into small pieces to make alloy samples for tests, homogenization of samples in a furnace in the high β-phase temperature region and rapidly cooling by immediate quenching the homogenized alloy samples in iced-brine water were carried through. Calorimetry measurements were performed by using DSC (differential scanning calorimetry) and DTA (differential thermal calorimetry) instruments to observe the reversible martensitic phase transformation peaks as indicator of a shape memory effect property, and also to observe the CuAlFe alloy's thermal behavior in high temperature region. Both DSC and DTA measurement thermograms showed excellent martensitic transformation peaks during on heating and on cooling the alloy. The thermodynamic parameters, related to these martensitic transformations, such as transformation temperatures, hysteresis gap, equilibrium temperature, enthalpy and entropy change values, and activation energy of the CuAlFe alloy were determined by using the analysis data of DSC peaks obtained at different heating/cooling rates. The forward and reverse martensitic transformation peaks at different DSC heating/cooling rates were seen to have high thermal stability, and the temperature range these transformations was found between 220-340 °C circa which classifies the alloy as a high-temperature shape memory alloy. Additionally, the high enthalpy change values of the transformations indicates the powerful shape memory effect property of the alloy. DTA curve at single heating/cooling rate showed the sequential phase transition steps of A2→B2→L21→β'1 on cooling the alloy from high temperature (900 °C) to room temperature as compatible with the other Cu-based shape memory alloys. Moreover, the formation of the martensite phases, i.e. the microstructural base mechanism for the shape memory effect of the alloy, were confirmed by X-ray diffraction (XRD) test result obtained at room temperature using CuKα radiation. The findings of this study can be useful in the high-temperature shape memory alloy related application areas, in which areas different shape memory properties are highly demanded.

Keywords: CuAlFe high-temperature shape memory alloy, Shape memory effect, Martensitic transformation, Differential calorimetry, XRD

RADON ANOMALY EFFECTS ON ATMOSPHERE IN MIDDLE AND EQUATORIAL LATITUDES

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In our study, we will examine the effects of radon gas on the ionosphere. The fact that radon(222Rn) gas is an inert gas allows it to ionize the air by α-decay without undergoing chemical reactions. This feature of radon, its importance in Lithosphere-Atmosphere-Ionosphere Coupling has caused it to be the subject of much research. In this research, due to the ionosphere's natural plasma characteristics that can be influenced by both terrestrial and space factors, we will determine the changes in the Total Electron Content (TEC) of the ionosphere by using interquartile range method (IQR). Especially by considering the days with geomagnetic storms(disturbed) and the days without geomagnetic storms (quiet), dates and locations where radon anomaly (determined due to standard deviation method) is occurred will be chosen as coverage time.

METAL AND SILICON PROCESSING BY 2.8 GHZ, 14W, 640 FS YB-DOPED FIBER LASER

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Ultrafast fiber lasers operating in burst mode have drawn significant interest in laser-material processing and laser-induced breakdown spectroscopy (LIBS). We present laser ablation and LIBS using our developed all-polarization-maintaining (PM), 14 W, 2.8 GHz Yb-doped fiber laser system. The system operates in the burst mode regime and generates 150 nJ pulses which are compressible down to 640 fs. To experiment, the laser beam is directed into a Galvo scanner and then focused on the sample by a 57 mm long f-theta lens. The ablation of gold and silicon at different burst energies was investigated, and the ablation efficiency of gold was calculated by measuring the ablated volume. As a new application, we employed the developed laser in the LIBS experiment on two different materials, silicon, and steel.

A SIMULATION WORK: DETERMINATION OF THE CHANGE IN ERROR RATE DEPENDING ON THE PARAMETER IN SURFACE PROFILE ANALYSIS WITH GABOR WAVELET

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Thin films have gained great momentum among scientific studies in recent years. Thin film technology is the defining element of technological studies today. Transistors, integrated circuits, and diodes are produced using thin films. Integrated circuits are constructed by combining transistors, diodes, and capacitors on a single thin film. These integrated circuits form the heart of televisions, computers, clocks, cameras, calculators, automobiles, and many renewable energy sources. Therefore, surface profile analysis of thin films is important for the development of device technology. There are many methods such as Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM) and optical methods as surface profile determination methods. Optical methods are the most preferred method among surface profile determination methods due to their economic and usefulness. This work has preferred Diffraction Phase Microscopy (DPM) as an optical method. In the Diffraction Phase Microscope, interferogram images of the thin film surface are taken and analyzed and with this method, the 3D surface profile is determined. In this work, simulation studies are used to analyze the surface profile of the thin film. The surface profile of the thin film obtained by simulation studies was analyzed by Gabor Wavelet. The analysis wavelet has the parameter sigma (σ), which determines the width of the window function. The resolution of the Gabor Wavelet does not change even if the σ parameter changes. For all σ values, Gabor Wavelet is equal to the best resolution value of $1/2$. Thus, Gabor Wavelet is preferred. This parameter should be at $\sigma>0$. Since, when $\sigma=1$, this wavelet is known as Morlet Wavelet. In this work, the surface of the simulated thin film has been analyzed by Gabor wavelet. Additionaly, the error rate changes in different values of the σ parameter are determined. This variation in error rates is discussed, so the minimum error rate is calculated.

This work was supported by the Turkish Scientific and Technical Research Council (TUBITAK-MFAG no: 120F325).

Keywords: Thin film, surface profile, error rate, Gabor Wavelet.

A NUMERICAL APPROACH FOR DETERMINATION OF THE REFRACTIVE INDEX OF DIELECTRIC FILM FROM REFLECTANCE SPECTRUM AT VARIOUS ANGLES OF INCIDENCE BY USING PAUL WAVELET

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In this study, Paul wavelet algorithm was implemented to determine the refractive index of dielectric film from the reflectance spectrum. In accordance with this purpose, the reflectance spectrum of the dielectric film was generated theoretically at various angles of incidence in the range of 300-1200 nm wavelength. These reflectance spectrums were analyzed by using Paul wavelet and the refractive index dispersion was obtained for several degrees of freedom of Paul wavelet. To show the advantages of this method and Paul wavelet, a noisy reflectance spectrum was also analyzed. All the results were compared with the input values and the results obtained by Morlet wavelet which is the most common wavelet in literature. In conclusion, the strengths and weaknesses of Paul wavelet were reviewed.

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Keywords: dielectric film, refractive index, Paul Wavelet.

MANUFACTURING OF GRAPHITIC CARBON NITRIDE MODIFIED CANNABIS BASED COUNTER ELECTRODES AND THE APPLICATIONS IN DSSC

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This study aims to enhance the stability and cost-effectiveness of Dye-Sensitized Solar Cells (DSSCs) by utilizing counter electrodes comprised of Graphitic-Carbon Nitride (g-CN) and Cannabis-derived Carbon (C). The counter electrodes were fabricated through dropping coating and electrophoretic deposition techniques. Melamine powder underwent thermal treatment at 600 ºC under Nitrogen to produce g-CN and a similar process was applied to Cannabis fibers to obtain C. Aqueous solutions were prepared by mixing g-CN, C, and g-CN/C mixture powders in different mass ratios with N-methyl-2-pyrrolidone. Film-coated counter electrodes were produced using pre-drilled fluorine-doped tin oxide (FTO) coated glasses, labeled to indicate the % carbon ratios in the mixture, as g-CN/F, C/F, 90C/F, 70C/F, and 50C/F. Similarly, electrophoretically deposited counter electrodes were named g-CN/E, C/E, 90C/E, 70C/E, and 50C/E. These counter electrodes were incorporated into DSSCs alongside TiO2 photoanodes sensitized with N719 dye. A comprehensive analysis was performed on ten counter-electrode configurations in DSSCs, evaluating their performance through Current-Voltage (I-V) measurements and Electrochemical Impedance Spectroscopy (EIS) analysis. Power conversion efficiencies ranging from 2.9% to 4.7% were observed for different counter-electrode compositions, demonstrating the potential of modified C with g-CN to enhance DSSC performance. Scanning Electron Microscopy (SEM) images were used to visualize the surface morphologies and structures of deposited films, highlighting the effectiveness of electrophoretic coating in porosity and improving DSSC performance.

Oral Presentations
Condensed Matter Physics

INTERACTION BETWEEN INTERFACE STATE AND DISLOCATION DENSITIES

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Two samples with 60 and 120 Å TiO2 interface thickness are investigated in terms of interaction between interface state density (Nss) and threatening dislocation densities (TDs). Sample structure is as Ag/TiO2/n-InP/Au for both specimen. Mentioned structure is grown by using sputtering method. Interface state density is calculated from current-voltage (I-V) characteristics and dislocation densities are calculated from high reslolution X-ray diffraction data. Different dislocation densities of TiO2 interfaces and their contribution to interface state density are discussed.

INVESTIGATION WITH PRESSURE OF STRUCTURAL, ELECTRONIC, ELASTIC, OPTICAL AND DYNAMICAL PROPERTIES OF Hg1−xZnxS ALLOYS

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In this study, structural, optical, electronic, thermodynamic, dynamic and elasticproperties of Hg1−xZnxS alloys have been investigated with using the combination of ab initio method based on Density Functional Theory (DFT) With Pressure. Generalized Gradient Approximation (GGA) has been used as Exchange correlation. Components ofelastic constants have been used in order to calculate as Poisson Ratio, BulkModulus, Shear Modulus, Compressibility, Kleiman Parameter, CouchyPressure. Refractive Constants, Extinction Coefficient, Absorption Coefficient, Energy Loss Function and Conductance Values have been obtained from dielectric constants using Kramers-Kronig relations. The properties of ternary alloys have been obtained with reference to known characteristics of binary alloys. The alloys have semiconductor properties with direct band transmission whose band gaps was determined. Finally, alloys with large band gaps are suitable semiconductors for optoelectronic devices such as diodes and laser.

GENERATING CHOLESTERIC LIQUID CRYSTAL FIBERS BY SINGLE-NEEDLE ELECTROSPINNING AND ANALYZING THEIR FUNDAMENTAL PROPERTIES

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Single-needle electrospinning is a low-cost method that allows a polymer, with or without additives, to be dissolved in a suitable solvent and spun into fibers. The basic working principle of the method is based on obtaining uniform fibers by applying a high electric field between the needle tip where the polymer solution is sprayed and the metal collector where the fibers are collected. Although cholesteric liquid crystals are locally very similar to nematic mesophase, the director, n, which expresses the preferred molecular orientation, periodically changes in a z-direction perpendicular to the director, forming a helix structure. In this study, electro-spun fibers with core-sheath structure were generated using mechanically resistant and low birefringence polyacrylonitrile polymer with cholesteryl stearate and cholesteryl oleyl carbonate liquid crystals in a single-needle electro-spinning system. Optical and morphological properties of the fibers were investigated depending on the spinning parameter.

INVESTIGATION OF VOLTAGE DEPENDENT ELECTRICAL PROPERTIES OF THE LAYERED METALOXIDE STRUCTURE

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In today's world, technology is advancing day by day and semiconductor devices are widely used in technological applications. For these reasons, semiconductors are one of the most studied areas among scientists. Metal oxides, which have many advantages such as being abundant in nature, low cost and so on, are widely used in semiconductor applications. In this study, the voltage dependent capacitance and current properties of the device obtained by growing a metal oxide semiconductor on TiO2 transparent metal oxide structure, which is widely used for photovoltaic applications, were investigated. It has been observed that the diode has been successfully obtained in the study.

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STRUCTURAL AND ELASTIC FEATURES OF Al4As3Mn MATERIAL

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In this research, structural and elastic properties of Al4As3Mn compound has been investigated using first principles computations based on the generalized gradient approximation (GGA). For the calculations, Vienna Ab initio Simulation Package (VASP) has been employed. The material is found to have a simple cubic crystal structure, adhering to $P4\bar{3}m$ space group with a space number of 215. Initially, ferromagnetic (FM) and three different A, C and G type antiferromagnetic (AFM) orders, have been considered to determine the most suitable magnetic order. Based on energy-volume graphs the material is identified as A type antiferromagnetic. Furthermore, the formation enthalpies of the material have been calculated for all the considered magnetic phases, and they have been found to be negative values, suggesting that the material can be synthesized structurally. Lastly, the elastic constants have been calculated, and several mechanical properties have been estimated. Based on these estimations, it can be concluded that the related material possesses mechanical stability and ductility.

INVESTIGATION OF CHARGE-DENSITY WAVE MECHANISMS IN TMDC NbSe2

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CDW is a collective state of electrons and holes that emerges due to instabilities between electrons and phonons leading to a host of fascinating physical anomalies electrical conductivity, periodic lattice distortions, and the opening of band gaps. Conventional CDW formation occurs as a result of the nesting phonons at the Fermi surface of one-dimensional or quasi-one-dimensional metals leading to a divergent behavior of the charge susceptibility as the temperature is lowered below a finite transition temperature. This CDW on the electron side is associated with the dimerization of the lattice (i.e. the Peierls distortion) leading to a Kohn anomaly and to the freezing of the phonons at the CDW wavevector. In two-dimensional layered materials, the CDW formation strongly deviates from this conventional picture. Particularly in the transition metal di-chalcogenides, a triple CDW instability occurs with Q^i_CDW, i=1,2,3. Unlike in the conventional picture, two candidates for the driving mechanism are still subject to strong debate: i) A Fermi surface nesting due to a weakly diverging susceptibility with a non-singular DOS or, ii) a divergent behavior of the renormalized electron-phonon vertex at a fixed number of Q^i_CDW, i=1,2,3 positions. Despite the fascinating properties, the triple-CDW formation currently lacks a solid understanding. We address these two debated issues in this work for the construction of a tangible microscopic theory. In our study, we investigate the electronic and vibrational properties and the renormalized electron-phonon vertex and multimode mixing of 1H-NbSe2 under different temperatures using numerical ab-initio methods. The ab-initio DFT study of this material is conducted using the code “Quantum ESPRESSO” (QE). QE is used to obtain the electronic and phonon dispersion diagrams individually. To investigate the electron-phonon coupling-related mechanisms we also use the “Electron-phonon Wannier” package (EPW).

PROBING THE ADSORPTION PROPERTIES OF SULFUR MONOXIDE ON B_12 BOROPHENE

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Understanding the interaction between molecules and two-dimensional materials plays a significant role in material science, particularly in sensor technologies. In this study, we investigated the adsorption properties of the sulfur monoxide (SO) molecule on the β_12 phase of borophene. This borophene has successfully been realized experimentally and found to be stable. SO molecules are placed on the borophene at various locations and orientations. The adsorption energies, bond lengths, charge transfers from SO to borophene (and vice versa), band structures have been investigated by means of first principle calculations. We used SIESTA code with PBE functional with double zeta atomic basis functions. Van der Waals (vdW) corrections are incorporated using Grimme (DFT-D2) method. The interaction between valance and core electrons is described by norm-conserving Troullier-Martins pseudopotentials. Our findings indicate that in all cases, the SO molecule is adsorbed on the borophene layer with energies ranging from -7.72 to -8.52 eV.

INVESTIGATION OF ZN DOPED V2O5 THIN FILM DEPOSITED BY THERMIONIC VACUUM ARC

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V2O5, one of the important transition metal oxides, has been used in many doped nanostructure studies in recent years due to its oxidation states ranging from V2+ to V5+. Zn-doped V2O5 thin films are used in various gas sensors, optoelectronic and electrochromic devices. Thermionic Vacuum Arc (TVA) is a system that generates plasma only in the vapor of the material whose thin film is to be deposited. Thin films deposited by TVA are highly surface adherent, flat, pure, and macro-particle free. In this study, V2O5 thin films containing 5% and 10% Zn and V2O5-Zn layered film were deposited on glass substrates. XRD, SEM, EDX, AFM, and UV-Vis analyses of the deposited Zn-doped V2O5 thin films were performed. The SEM images of the Zn-doped films show very homogeneous and similar surface images. The roughness values of the Zn-doped thin films are Rq= 4.865 nm for 5% Zn-doped film, Rq= 2.233 nm for 10% Zn-doped film, and 38.155 nm for V2O5-Zn layered thin film. The energy band gap (Eg) was calculated as 3.74 eV in the 5% doped film and 3.72 eV in the 10% doped film.

Keywords: Thermionic Vacuum Arc, Vanadium pentoxide, zinc, thin film

GRAIN SIZE ANALYSIS OF BETA IRRADIATED SODIUM CHLORIDE (NACL) FROM DIFFERENT REGION IN TURKEY

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In a nuclear accident that could result in the release of radioactive materials, radiation dose assessment is essential for first responders and the public. It is mandatoty to evaluate the current radiation dose in people who are likely to be affected by radiation. Salt is affordable, commercially available and equivalent to human body tissues. It is possible to use salt as a dosimeter. Based on this information, the aim of this study is to determine at which grain size the salts obtained from different sources in Turkey have the maximum Thermoluminescence (TL) peak intensity and to obtain the area under the TL glow curve. The first of the salt (NaCl) samples used in the experiments was salt obtained from Salt Lake, where 40% of Turkey's salt need is met, the second was rock salt produced unrefined from crystals obtained from Turkey's natural resources, and the third was iodised refined table salt. According to the results obtained; all three samples have two obvious TL peaks. The Salt Lake sample and the table salt sample have the highest intensity and the largest area at 200 μm, while rock salt shows changes according to low and high temperature TL peaks.

THE TWO-PARTICLES R-MATRIX FORMALISM

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The one-particle R-matrix formalism is extended to two-particle systems. The external conditions for our particles are the same in the standard R-matrix formalism: the particles are in an external potential which defines several leads, connected to a scattering region. The external potential is translationally invariant in the leads. We include particle-particle interaction which is manifested only in the scattering region—when at least one particle is in the leads, they do not interact with each other, so they behave as ideal particles. When at least one particle is in the leads, the two-particle wavefunction is a sum of atisymmetrized (symmetrized) products of two one-particle scattering states if our particles are fermions (bosons). In the scattering region, the eigenfunctions of the Hamiltonian are separately calculated, with the condition that at the interfaces with the leads the probability flux is zero—that is, the gradient of the wavefunction, projected on the normal to the interface, is zero. These boundary condition ensure that the Hamiltonian is self-adjoint, so its eigenfunctions form a complete orthonormal set in the Hilbert space of functions defined in the scattering region and integrable in modulus square. Then, the two-particle scattering function is expanded in terms of the Hamiltonian eigenfunctions when both particles are in the scattering region—notice that the two-particle scattering function is an eigenstate of the Hamiltonian in the whole system. Using this Ansatz and imposing the continuity of the flux and probability distribution at the interfaces between the scattering region and the leads, plus the energy conservation, we obtain a system of equations which determines the expansion coefficients and, therefore, the two-particle scattering states. Nevertheless, this system of equations raises some significant mathematical problems, at least in finding its numerical solutions. The two-particle scattering formalism is necessary also to account for the entanglement of the particles produced in the scattering process.

RESONANCE PHENOMENA AND KAPITZA PENDULUM EFFECTS IN A NANOMAGNET COUPLED TO A JOSEPHSON JUNCTION AND UNDER EXTERNAL RADIATION

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We investigated the resonances phenomena that appear in the magnetization precession of a nanomagnet coupled to a Josephson junction (JJ) and under external periodic drive. The dynamics of the magnetic moment of the nanomagnet is described by the Landau-Lifshitz-Gilbert equation. We integrate these equations numerically to find the time evolution and the oscillations of the nanomagnet. We observe several resonance peaks of the oscillation amplitude, when plotted vs. a frequency. Among these, in the absence of external radiation we observe the ferromagnetic resonance. When the external radiation is turned on, it interferes with the JJ's oscillations, producing a series of peaks in the oscillation amplitude of the nanomagnet. We analyze the system also analytically in the linear regime (small oscillations amplitudes), we explain the resonance phenomena, and we obtain a very good agreement with the numerical data. When the Josephson frequency and the frequency of the external radiation are much bigger than the ferromagnetic frequency, a qualitatively different situation arises. In such a case, the nanomagnet behaves like a Kapitza pendulum subjected to vibrations on two very different scales of frequency. Our numerical and analytical investigations are in agreement in the linear region. By the Kapitza pendulum effect, the nanomagnet is reoriented by the combined action of the JJ and external radiation [1]. The effects studied here provide a method to remotely control the oscillations and the equilibrium position of a nanomagnet. For example, by only changing the frequency and the amplitude of the external radiation one can control the equilibrium position as well as the amplitude of the oscillations of the nanomagnet. This is accomplished by making use of the interference between the effects of the JJ and of the external radiation.

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IMPROVING THERMOELECTRIC CHARACTERISTICS OF BI2SE0.1TE2.9 THIN FILMS THROUGH ANNEALING IN VACUUM ENVIRONMENT

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The unique ability of thermoelectric materials to directly convert thermal energy into electrical energy underscores the significance of developing thin films with outstanding thermoelectric performance. Such advancements hold great importance across various applications, including energy harvesting, solid-state cooling, and thermoelectric generators [1]. In order to improve the thermoelectric characteristics of thin films, it is common practice to utilize heat treatment as a means of incorporating various attributes into the materials. The precise regulation of the annealing temperature and surface microstructure of thin films is crucial for the comprehensive examination of their structural and morphological properties in the context of thermoelectric applications. Magnetron sputtering is a technique used to fabricate thin films by bombarding a target material with ions, causing atoms to be ejected and subsequently deposited onto a substrate. The present investigation employed a magnetron sputtering as a technique to fabricate thin films of Bi2Se0.1Te2.9, a widely recognized thermoelectric material, on Si (100) substrates. Subsequently, the thin films underwent annealing at a temperature of 250°C for a duration of 1 hour within a vacuum environment characterized by a pressure exceeding 2x10-5 mTorr. In order to assess the structural characteristics of the thin films, a variety of methodologies were employed, including X-ray diffraction (XRD), scanning electron microscopy (SEM), and atomic force microscopy (AFM). The findings of the study indicate that the electrical conductivity of the crystalline thin films was enhanced through the process of annealing in a vacuum. This improvement can be attributed to the optimization of carrier concentration and mobility. The observed outcome of the heat treatment at room temperature was a notable enhancement in the power factor, which quantifies the efficiency of heat-to-electricity conversion in a material. Specifically, the power factor exhibited an approximate twofold increase when comparing the values obtained before and after the heat treatment. The results indicate that utilizing a Bi-Se-Te thin film on a rigid Si(100) substrate for energy harvesting could enhance the efficiency of a thermoelectric energy generator. Moreover, the study underscores the importance of

carefully adjusting the annealing temperature and surface microstructure of thin films to enhance their thermoelectric performance. These findings carry substantial implications for diverse applications in energy conversion and thermal management.

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BEYOND THE BINARY: EXPLORING TERNARY TRANSITION METAL BORATES FOR ADVANCED COATINGS AND PERFORMANCE ENHANCEMENT

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The "borate transition metals" constitute a fascinating and novel class of materials, exhibiting remarkable properties that spark interest and curiosity. These materials offer enhanced tribological, corrosion, electrical, and thermal attributes, making them highly appealing for diverse applications, particularly in coatings. The properties of the coating are influenced by factors such as the chemical composition, presence of impurities, microstructural characteristics, defects, and preferred crystallographic alignment. [1]. The enhancement of hardness in these formations can be accomplished through feasible approaches, including the utilization of natural structural properties, the introduction of additional elements to create a ternary phase, the implementation of superlattice structures, and the control of grain sizes. Vanadium borides (VB2) and chromium borides (CrB2) exhibit several notable characteristics that distinguish them as exceptional hard coatings. These include elevated melting points, hardness, resistance to various forms of deterioration, superior electrical and thermal conductivity, high wear resistance, thermal shock resistance, and corrosion resistance. By incorporating VB2 into the CrB2 system, it is possible to mitigate the limitations associated with traditional methods of synthesizing transition metal borates. This approach aims to develop an enhanced coating material that exhibits superior corrosion resistance and hardness. The objective of this study is to comprehensively analyze and describe the properties of VB2 and CrB2 alloys prior to their transformation into ternary alloys. The formation of ternary phases will be ensured through the implementation of directly proportional approaches, which will be based on the obtained results and the successful attainment of the required attributes. This will be accomplished without compromising the crystal structure or purity of the materials, through the application of composition engineering techniques. The synthesis of vanadium borides (VB2) and chromium borides (CrB2) was conducted through the process of arc-melting. To achieve a uniform phase, the sample was subjected to

annealing at a temperature of 773 K for 2 days. The determination of the alloys' surface structure and composition was conducted through the utilization of scanning electron microscopy (SEM) and energy dispersive X-ray (EDX) analysis. Differential scanning calorimetry (DSC) measurements were conducted during both the heating and cooling cycles. The crystal structure of the alloys was determined using the X-ray powder diffraction technique. A comprehensive understanding of the surface morphology, composition, thermal behavior, and crystal structure of the synthesized alloys was achieved through the utilization of SEM, EDX, DSC, and XRD techniques.

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THE INVESTIGATION OF SPIN-ORBIT EFFECT ON THE SUPERCONDUCTIVITY PROPERTIES OF ThSn3

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The actinide-containing AuCu3-type compounds show interesting physical properties due to the 5f electrons of the actinides. One of these compounds, ThSn3, has been the subject of some theoretical and experimental studies in the past due to its superconductivity. Therefore, the structural, electronic, elastic, dynamical, and superconducting properties of ThSn3 have been investigated by performing scalar relativistic and full relativistic ab initio pseudopotential calculations based on the density functional theory. The calculated lattice parameters of ThSn3 with (4.767 Å) and without (4.768 Å) spin-orbit coupling (SOC) are in good agreement with the experimental value of 4.719 Å. The calculated elastic properties suggest that this material is mechanically stable and ductile for both calculations. It has been observed that the effect of SOC on the electronic band structure and density of states for ThSn3 is negligible. Both phonon dispersion curves neglecting and including SOC are very similar and indicate the dynamical stability of ThSn3 in cubic AuCu3-type crystal structure. Using the calculated electronic and phonon properties of ThSn3, the electron-phonon coupling parameter is 0.754 with SOC and 0.737 without SOC. Finally, the Tc values of ThSn3 were calculated as 3.462 K and 3.358 K, with and without SOC, respectively, in agreement with the experimental data of 3.33 K.

Keywords: Density-functional theory, electronic structure, mechanical properties, elastic properties, superconductivity, electron-phonon interaction, phonons, spin-orbit coupling

THE STRUCTURAL, ELASTIC AND ELECTRONIC PROPERTIES OF THX3 (X:In, Sn, Sb AND Pb)

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We have studied the structural, elastic and electronic properties of ThIn3, ThSn3, ThSb3 and ThPb3 by using density functional theory, the planewave pseudopotential method within the generalized gradient approximation (GGA) and strain-stress method. All the studied compounds have mechanical stability according to obtained elastic constants, and therefore, they are mechanically stable in their cubic AuCu3-type crystal structure. The lattice parameters of ThIn3 (4.751 Å), ThSn3 (4.768 Å), ThSb3 (4.794 Å) and ThPb3 (4.925 Å) are in very good agreement with the experimental values of 4.694 Å, 4.719 Å, 4.783 Å and 4.853 Å, respectively. It has been seen that the value of C11 is greater than the value of C44 for all the studied compounds, signaling that these compounds present a weaker resistance to pure shear deformation compared to resistance to unidirectional compression. The order of ductility of these compounds is ThSb3, ThPb3, ThSn3, and ThIn3, from smallest to largest, respectively, according to Poisson's ratio, GH/BH ratio, and Cauchy pressure. The mechanical properties obtained from elastic constants of studied compounds have been investigated and discussed in detail. The calculated electronic structure and density of states results reveal that all compounds have metallic properties and are mainly composed of X (5p), Th (6d) and Th (5f) states.

Keywords: Density-functional theory, structural properties, elastic properties, mechanical properties, electronic properties.

DIELECTRIC BARRIER DISCHARGE AND DC DISCHARGES IN MICRO DISTANCE PLASMA

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This study was done to explore DC and Dielectric Barrier Discharges (DBD) [1] to increase knowledge about energy efficiency, which is a critical issue for many applications. The discharge is driven by a sinusoidal alternating high voltage power supply at 50 Hz [2] mains frequency 1 kV, which is valid for DBD in many countries. In this paper, DBD is simulated under various discharge pressures. Plasma patterns vary widely with changing plasma conditions. Analyses are made with the COMSOL simulation program [3,4] on a large scale with 269 elements. The results were obtained by finite element analysis. Different solution methods (MUMPS, PARDISO, Dense matrix) [5] were used for simulation solutions. Due to the rapid development and innovation in computational technology, researches based on the recognition of plasma patterns have been intensified. Calculations are done by solving many equations for different time domain intervals. GaAs is a very important material for high efficiency energy conversion process which is needed in optoelectronic systems [6] due to its high electron mobility and direct narrow band gap. Average electron energy graphs, migrating electron fluxes, surface charge densities, space charges and surface electron current densities have been calculated for both discharges, and experimental studies are carried out for DC discharge.

Keywords: Plasma Physics, Gas Discharge Systems, Photodetectors, DBD (Dielectric Barrier Discharge)

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SUBSTRATE TEMPERATURE EFFECTS ON PB-BASED PEROVSKITE THIN FILMS PRODUCED VIA ULTRASONIC SPRAY PYROLYSIS

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MAPbI3 perovskite thin films were deposited on fluorine-doped tin oxide/titanium dioxide (FTO/TiO2) substrates at different substrate temperatures (100 °C, 125 °C, 150 °C, 175 °C, 200 °C, and 225 °C) by the ultrasonic spray pyrolysis (USP) method. The structural, morphological, and optical properties of the thin films obtained were investigated. The main peak of MAPbI3 was observed at ~14° from the X-ray diffraction (XRD) analysis. The change in peak intensities was observed with the change in substrate temperature. The peak belonging to PbI2 occurred at ~12.5° at substrate temperatures of 175 °C, 200 °C, and 225 °C. It was seen from scanning electron microscope (SEM) images that the grain sizes of the films produced at 150 °C substrate temperature were larger than the other films. Ultraviolet-visible region (UV-Vis) measurements were used to examine the optical characteristics of MAPbI3 thin films. The forbidden band gap values (Eg) were obtained from the Tauc plots. The band gap of the MAPbI3 thin films was changed by changing the substrate temperature.

ELECTRONIC COMPRESSIBILITY OF GRAPHENE

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Graphene is a superlative two dimensional material with rich new physics and many potential uses in electronic devices. The high magnetic field strongly affects the electronic behavior of graphene. As a direct consequence of Landau quantization and the locally varying electrostatic potential, the electronic system is separated into two distinct regions: i) The metallic compressible region, where the Fermi energy coincides with the energy of a Landau level leading to a high density of states at the Fermi energy. ii) The insulator like incompressible region, where the Fermi energy falls in-between two subsequent eigenenergies and no states are available. To explain these quantities, we use self-consistent calculation methods of electrostatic potential and electron density in thermal equilibrium. In conclusion, this study will lead us to understand the transport mechanism of compressibility.

INVESTIGATION OF THE EFFECTS OF CERIUM DOPING AT DIFFERENT CONCENTRATIONS ON TL GLOW CURVE IN BAB4O7: DY POLYCRYSTALLINE

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In recent years, researchers have been continuing their researches by adding different impurities at different ratios into polycrystalline materials to enhance its Thermoluminescence (TL) signal and get suitable dosimetric peaks. In this study, the effects of doped cerium impurity at different concentrations on the TL glow curve of the BaB4O7: Dy polycrystalline were investigated. Four different samples were prepared by keeping the dysprosium concentration at 5% and taking the cerium concentration as 1%, 3%, 5% and 7%. These four samples together with the undoped BaB4O7 sample were exposed to beta dose and TL luminescence curves were obtained. As a result of this study, the BaB4O7: Dy doped with 5% Ce gives best TL glow curve in terms of clear TL glow curve and biggest TL peak intensity. Its TL glow curve includes two distinct peaks at 105 oC and 215 oC.

DETERMINING THE THERMAL PROPERTIES OF TERMINATED TI2C MXENE STRUCTURES WITH QUASI-HARMONIC APPROXIMATION

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MXene materials are two-dimensional materials consisting of transition metal carbide/nitride or carbonitride structures. These materials generally exhibit metallic properties and are ideal for battery and filtration technologies. Therefore, it is important to determine the specific device properties of these materials. Thermal expansion, especially at the device operating temperature, can affect the performance of the device due to thermal strain or stress, and may even degrade the device. In this study, phonon dispersions, density of states, phonon thermal expansion and heat capacities for pristine and terminated Ti2CTX (Tx= S, Se, O, OH, F, Cl) MXene structures were calculated by density functional perturbation theory to determine the appropriate parameters for device fabrication. In the calculations, the quasi-harmonic approximation was used including the free electron energy. At constant volume, part of the temperature effect through the phonon (Helmholtz) free energy can be included in the total energy of the electronic structure. Since the volume dependences of the energies are different for phonon and electronic structures, even at 0 K the energy changes only by shifting from the value calculated from the electronic structure. With increasing temperatures, the volume dependence of the phonon free energy changes and thus the equilibrium volume also changes at different temperatures. Based on this quasi-harmonic approximation, thermal expansion calculations were performed. The thermal expansion calculated in the temperature range 0-1000 K is compared and reported for Ti2CTx structures with different surface terminations. In the results obtained, it was determined that the thermal expansion coefficients of Ti2CTX (Tx= S, Se, O, OH, F, Cl) MXene structures are suitable for making devices that will operate at room temperature. Among these materials, the lowest thermal expansion coefficient at room temperature was found to belong to Ti2CSe2 structure with a value of 1.08x10-5 K-1 and the highest value was found to belong to Ti2CO2 structure with a value of 2.50 x10-5 K-1. The low thermal expansion coefficients of MXene crystals may be advantageous in electronic device applications that require structural stability at different temperatures.

INVESTIGATION OF FREQUENCY DEPENDENT ELECTRICAL PROPERTIES OF MULTILAYER METAL OXIDE STRUCTURES

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Metal oxide structures, which have technological uses such as sensors, diodes, and transistors, are among the subjects that have been studied extensively by scientists in the past and today. TiO2 is an intrinsic n-type semiconductor, which is a very popular material for photocatalysis, economical, environmentally friendly, and has a wide band gap energy band gap. MoO3 is a p-type semiconductor with many properties likewise TiO2. In this study, a multilayer metal oxide structure was obtained by using MoO3 and TiO2 metal oxides. Frequency dependent capacitance and conductivity measurements were taken with the help of suitable contacts. As a result of the measurements, the electrical properties of the device were examined.

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NANOSTRUCTURE EXAMINATE BY ELECTRON DIFFRACTION USING PRECESSION OF ELECTRON BEAM

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Electron diffraction is an additional technique in electronic microscopy studies. Since the XRD or neutron diffraction techniques was used intensely for crystalline structure determination, electron diffraction has potential for special cases were even this technique fails. Due to several factor the electron diffraction is not suitable for crystal structure determination, but with hardware and software improvement we can transform this technique in useful one. We show here an example of analysis of some different samples using combined technique, such as TEM/HRTEM image, electron diffraction without and with improvement provided by a precession system. We highlight the cases were electron diffraction succeed and the cases were failed, even the precession system is used. The precession system for electron diffraction is an electronic system that on coils in the microscope column to perform the operations of rotating the electron beam. The rotation of the fascicle is done with the help of an alternative signal applied to the deflections coils terminals (used to tilt the fascicle in normal working mode), respectively to the DESCAN coil terminals, to refocus the fascicle in the direction of the optical axis. To highlight the improvement of the results obtain by using the applied precesion system electron diffrction (PED) we performed a study on a series of some samples, having different compositions and crystal structures. The first sample shown is a thin film of amorphous carbon.Two to come materials having a face-centred cubic structure, Au, and Al. The sample with Au is in the form of nanoparticles, while Al, is in the form of a polycristaline film. Two tests with structure follow different from cubic: CdS(hex) and hidroxyapatite. I chose CdS also becouse it has two phases predominant, hexagonal and cubic. We will also try to highlight phase separation using precession electron diffraction sistem (PED).

Keywords: TEM, HRTEM, electron diffraction, Scherrer, precession

INVESTIGATION OF HgCdTe PHOTODETECTOR IN PLASMA MEDIA BEYOND ATMOSPHERIC PRESSURE

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The rapid development of semiconductor materials in recent years has enabled semiconductors to be used in many different fields [1]. One of these areas is the using of semiconductor compounds as detectors in the plasmic environment and IR Infrared applications [2]. The HgCdTe compound outweighs the detector aspect with its optoelectronic structure and the formation of different elements in the related compound [3]. In the closest IR region [4], HgCdTe provides a benefit in remote sensing systems with its high quantum efficiency, high sensitivity, high photon detection, minimal photon loss and long wavelength heterojunction photodiode feature [6]. HgCdTe compound semiconductor continues to be intensively developed and used in different fields with its synthesis [7] in 1958. We investigated the quantum efficiency of the material in these conditions, the conditions of withstand the gas used, and the ideal operating range by simulating the material at different distances between electrodes, at different values above atmospheric pressure, and at DC voltages using a [8] HgCdTe semiconductor compound in a microplasma environment [9] by investigating different areas such as binoculars, night vision systems, renewable energy, space researches are explored and it can also support and develop studies based on the plasma systems. In our study, the electron density of semiconductor, space charge density, gas ions moving between electrodes, electron velocities etc. are examined [10]. HgCdTe devices have increased their popularities in nanotechnology and solar cell device applications as well as plasma related studies.

Keywords: Plasma Physics, Gas Discharge Systems, Photodetectors

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NbMnVAl AND NbFeCrAl FULL HEUSLER ALLOYS (QHA) TEMPERATURE DEPENDENT HYSTERESIS BEHAVIOUR

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NbMnVAl and NbFeCrAl full heusler alloys have 6.049, 5.971 lattice parameter respectively. These alloys magnetic properties investigated hard-soft magnet properties, saturation magnetization, remanent magnetization around curie temperature. Alloys examinated (0,0,0), (0.25, 0.25, 0.25), (0.5, 0.5, 0.5) and (0.75, 0.75, 0.75) wyckoff positions with space group F-43m. EFT M-H calculations performed 250, 500, 750, 1000 K due to alloys curie temperatures for NbMnVAl and NbFeCrAl 797K 611K respectively. Temperatures cheesed Because of the temperature dependence magnetism changes can be observed clearly. Curie temperatures of this alloy package obtained pressure dependent studies [1]. Hysteresis lines getting closer eash other above the curie temperature. Above and below the curie temperature alloys behave soft magnet [2]. Around the curie temperature alloys shows hardness and characterized like hard magnet. M-T calculations performed 1-1000 K temperatures. DFT calculations in the literature of these alloys magnetic moments also obtained and confirmed with our EFT calculations (2.0000 μB/f.u) [3]. Partial magnetic contribution of these alloys elements also investigated. Remanent magnetism values obtained NbMnVAl and NbFeCrAl 1.68734μB/f.u., 1.6866 μB/f.u. at curie temperature respectively. Keywords: EFT, Heusler alloys, Spintronics, Magnetism

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CALCULATION OF SURFACE PROPERTIES OF Ti, Fe AND V NEAR THE MELTING POINT

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The structure and some surface properties such as surface tension and surface entropy have been calculated for liquid 3d transition metals, Ti, Fe and V, near melting temperatures. We used the parameters of the Wills-Harrison (WH) approximation in conjunction with the Bretonnet-Silbert (BS) local model pseudopotential, which is suggested separate description of the s- and d—electron states are calculated using Dubinin procedure [1]. Transition and transport properties of Ti, Fe and V are calculated using extended Mayer's empirical formula in terms of packing fraction which calculated using Waseda's formula [2]. In this paper, unlike previous studies, all values of the surface entropy is defined only as a function of packing fraction, we have achieved our results with a new mathematical expression. Overall, our results for the considered parameters of transition metals are in good agreement with experiments and better than those of several available theoretical data. References [1] N. E. Dubinin, Act. Phys.Pol.A, 115 783 (2009). [2] Y. Waseda, Mcgraw-Hill Publ. Co., New York, (1980).

CADMIUM OXIDE (CDO) THIN FILM DEPOSITION BY THE THERMIONIC VACUUM ARC

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Cadmium Oxide is an n-type semiconductor with a relatively low optical energy band gap. Cadmium Oxide thin films were deposited onto glass substrates in a high vacuum environment by using the thermionic vacuum arc (TVA) technique. The structural and morphological properties of CdO thin film samples were investigated with X-Ray diffraction (XRD), Raman spectroscopy, energy-dispersive X-ray spectroscopy (EDS), field emission scanning electron microscopy (FE-SEM), and atomic force microscopy (AFM). The thin films produced showed high homogeneity and good adhesiveness to the substrate.

MOLYBDENUM (MO) THIN FILM DEPOSITION BY THE THERMIONIC VACUUM ARC

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Molybdenum is a transition metal known for its exceptionally high melting point of 2896 K. This unique characteristic presents challenges when attempting to deposit thin films of molybdenum using conventional techniques. In this study, we successfully deposited molybdenum thin films onto glass substrates using the thermionic vacuum arc method within a high vacuum environment. The morphological and structural properties of these Mo thin films were investigated using Raman spectroscopy, X-Ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDS), atomic force microscopy (AFM), and field emission scanning electron microscopy (FE-SEM). The resulting Mo thin film samples exhibited a high level of homogeneity and demonstrated low roughness values.

INVESTIGATION OF THE EFFECT ON ELECTRICAL AND MECHANICAL PROPERTIES ADDITIONAL FE ELEMENT TO AL–32.5 Wt % CU EUTECTIC ALLOY

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The aim of this study is to examine the effect on the electrical and mechanical properties of Fe element added to Al–32.5 wt% Cu eutectic alloy. In the first step of the experimental stages, Al–32.5 wt % Cu– X wt % Fe (X=0.3, 0.8 and 1.0) alloys were prepared using high purity metals (>99.00%) in a specially designed vacuum furnace. Al–Cu–Fe alloys, which started to attract more attention with the discovery of stable quasi-crystalline phases in the literature, were carried out directional solidification experiments under an argon atmosphere using Bridgman-type directional solidification apparatus at a constant growth rate (8.47 μm s-1) and different temperature gradients (7.65, 8.76, 9.17 K mm-1). The samples were solidified up to 10-13 cm in length to ensure that the steady-state condition was obtained and then quenched. After the solidification experiments, each sample was examined metallurgically, and electrical resistivity (ρ), microhardness (HVT), and ultimate tensile strength (σ) values were measured. Phase characterization was performed with the Bruker-D8 DISCOVER X-ray diffraction (XRD) instrument. As a result, considering the ternary eutectic point (L=>(Al) + Al2Cu-Al7Cu2Fe) given in the phase diagram, it was seen that the distance between the Al2Cu and Al7Cu2Fe phases decreased and a more complex microstructure emerged. Moreover, measurements showed us that the Fe element improves the mechanical properties in the ternary eutectic alloy, but the conductivity decreases due to the increase in electrical resistivity. The resulting data were compared with previous Al-based and Al-Cu-based alloys that solidified under similar growth conditions.

SYNTHESIS AND CHARACTERISATION OF C/Ti/C/Al/C/Si MULTILAYER AND C+Ti/C+Al/C+Si COMPOSITE THIN FILMS

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The purpose of this work is to obtain different kinds of advanced nanostructures with four material of interest: graphite, titanium, aluminum and silicon (C, Ti, Al and Si), deposited by Thermionic Vacuum Arc (TVA) technology on the Si substrate.The final thickness of the structures was 300 nm in the too cases: C/Ti/C/Al/C/Si multilayer film (34nm C, 66nm Ti, 35nm C, 65nm Al, 31nm C, 69nm Si) and C+Ti/C+Al/C+Si composite film (100nm C+Ti, 100nm C+Al, 100nm C+Si). Also, for each type of samples there are some parameter varied: substrates temperature (Room Temperature, 200oC, 300oC, 400oC) and bias voltage applied on substrates (-400V). SEM and Elemental composition studies show a dependence of the atomic percentage of the elements on the substrate deposition temperature. XPS depth profiles reveal the atomic percentages of Si2p, C1s, Al2p, Ti2p, O1s peacs. The tribology measurements show that the minimum values of the friction coefficient in the case of composite thin films are larger compared with the minimum values in the case of multilayer thin films. Based on nanoidentation studies, Young modulus and Hardness are measured.

Oral Presentations
Energy and Applications

CALCULATION OF ENERGY CONVERSION EFFICIENCY IN PARABOLIC TROUGH SOLAR COLLECTORS

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Solar energy has become one of the most significant energy sources for the beginning of human. Solar energy systems can be divided in to two sections in terms of both technology and application area. One of them are photovoltaic systems, characterized by their ability to directly convert solar radiation into electricity through the utilization of photovoltaic cells. The other are solar energy collecting systems, capable of harnessing the sun's rays and transferring them to a working fluid, such as water, molten salt, air, or oil, through the utilization of solar collectors. In terms of mirror type, mirror steering, mirror coating type, etc., there have been various studies done to improve the converting efficiency of solar collectors. In this study, a parabolic mirror with an effective radiation area of 0.5 m^2 for parabolic trough collector was designed using the ZEMAX optical design program. After, the radiation-heat efficiency analyzes were calculated by Fourier heat transfer equations and Engineering Equation Solver (EES) software for the absorber pipes made of different materials, located at the focus of the designed parabolic trough collectors. Our calculations for similar geometry of pipes show that the efficiency of Rubby pipe is 40.25%, Carbon pipe is 38.73% and Copper pipe is 36.49% under the same ambient conditions.

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INVESTIGATION OF TEMPERATURE DEPENDENCY OF THE DAMPING CONSTANT (FWHM) BY MEAN FIELD THEORY IN MAPbBr3 AND FAPbBr3

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Organic and inorganic hybrid perovskites have developed as highly innovative optoelectronic semiconductors that hold great promise for a wide range of applications, particularly in the fields of photovoltaics and light-emitting diodes. MAPbBr3 and FAPbBr3, which refer to perovskite materials containing methylammonium (MA) and formamidinium (FA) respectively, have garnered significant interest among researchers in recent years due to their promising potential in optoelectronic and electrical applications. These perovskites are agreed as a good members of coordinate polymers. It has been reported in the literature that both of these compounds exhibit double phase transition near 236 and 155 K, MAPbBr3 shows also an extra anomaly at 148 K. Owing to this extra-ordinary behaviour of MAPbBr3 and FAPbBr3, taken an extra attention by scientists, nowadays. Although the some experimental works made by scientists conducted to understand dynamics of the structural phase transitions, a comprehensive theoretical solution of the dynamics of these transitions have not yet been presented in the literature. In this study, we calculated the damping constants (FWHM) of δ(NH2) and δ(CN) Raman mode as a function of temperature for both compounds by using the observed data from the literature. The Full Width Half Maximum (FWHM), corresponding to the damping constant, of the selected Raman modes was determined by using two models for both MAPbBr3 and FAPbBr3: the pseudospin-phonon coupled (PS) model and the energy fluctuation (EF) model. My results show that the orderness of crystal structure for both compounds are still sustained between 155 K and 236 K, and also the molecular field theory can be used to explain the dynamics of the structural phase transition in organic–inorganic lead halide perovskites.

KEYWORDS: Raman frequency. Pseudospin-phonon coupled (PS) model. Energy fluctuation (EF) model. Phase transition.

THE EFFECTS ACETIC ACID DERIVATIVES AS Co-ADSORBENTS ON THE DYE-SENSITIZED SOLAR CELLS

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In dye-sensitized solar cells (DSSCs), it is important that the dyes are adsorbed in a single layer without coalescence or aggregation on the photoanode material to prevent self-extinguishing of dye electrons excited by sunlight. In this study, TiO2 semiconductor material, which is widely used in DSSCs, was chosen for the construction of photoelectrodes. A ruthenium-based dye known as N719 was used for sensitization. By adding 1-naphthalenetic acid (NAA) and Indole-3-acetic acid (IAA) at a ratio of 10:1 to the N719 dye, it was aimed to improve the coating on TiO2 and increase the sensitivity of the dye. When the basic parameters of the produced solar cells were examined comparatively, power conversion efficiencies of 9.05, 17.73, and 3.8 were obtained for N719, N719/NAA and N719/IAA, respectively. In this study, it was understood from the results obtained that NAA binds to the TiO2 surface more effectively than IAA from the increase in the basic parameters and that NAA also increases the sensitivity of the dye.

INVESTIGATION OF LIQUID CRYSTAL DOPED ELECTROLYTES IN DYE SENSITIVE SOLAR CELLS

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In direct proportion to the increasing human population, the need for energy is also increasing. Sun, the largest source of renewable energy, is the best solution that comes to mind to meet this need. Dye synthesized solar cells (DSSCs) are extremely promising for the next generation of photovoltaics. Although the efficiency of dye-sensitized solar cells is not very high yet due to their easy production and cheapness, studies on such solar cells are increasing. Efficiency can be improved depending on the material to be added into the solar cells. In general, small organic molecules have better transport properties than polymer materials. These disadvantages of polymers can be overcome by using liquid crystals instead. In the literature, the use of liquid crystals in dye-sensitized solar cells is quite new and there are not many studies, but it has been observed that the use of commercial liquid crystals increases the efficiency of solar cells [1,2,3]. In this study, calamitic liquid crystals were added as an additive to the electrolyte and it was aimed to increase the performance of dye sensitive solar cells. [1]- Ahn et al, S. H. Development of dye-sensitized solar cells composed of liquid crystal embedded, electrospun poly (vinylidene fluoride-co-hexafluoropropylene) nanofibers as polymer gel electrolytes. Appl. Mater. Interfaces 4, 2096–2100 (2012). [2]- M.A. Kamarudin, et al., Self-assembled liquid crystalline nanotemplates and their incorporation in dye- sensitised solar cells, Electrochim. Acta (2016), http://dx.doi.org/10.1016/j.electacta.2016.11.021. [3]- Chen R, Weng Q, An Z, Zhu S, Wang Q, Chen X, Chen P, Investigation of 4- pyridyl liquid crystals on the photovoltaic performance and stability of dye sensitized solar cells by the co-sensitization, Dyes and Pigments (2018), doi: 10.1016/j.dyepig.2018.07.035.

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PERFORMANCE INVESTIGATION OF PHOTOVOLTAIC POWER SYSTEMS BY MANUAL CLEANING AND ANTI-SOILING COATINGS IN VAN REGION

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The need for energy in world increases day by day and the perception of the environmental considerations takes a fundamental role in the production of this energy need. So, the importance of producing the energy in a greener and/or efficient way takes more attention. As the global attention on renewable energy systems increases the importance of use of these system in a more efficient way increases. Photovoltaic energy production is a glowing star in the renewable energy era. But nevertheless, PV systems has its own problems as all of the other systems. In photovoltaic systems, one of the problems is the accumulation of dust (or pollution) on the surface of the panels, which reduces energy efficiency. There are several options for cleaning solar panels: Gravity, manual cleaning or robotic systems. Gravity and manual cleaning have a negative impact on the energy conversion of photovoltaic panels. On the other hand, the cost of robotic system is higher compared to other methods. The silica-based hydrophobic and hydrophilic coatings are not only the best solution for solar module cleaning, but also improve optical transmission and reduce power loss due to several contaminations. In this study, the effects of anti-soiling coatings and manual cleaning were investigated compared to the reference module which was not cleaned throughout the investigations. For this, three TYPE SLX 36 P40 model PV panels (675x480x20 mm) were used for 7 months in Van region. Power calculations were performed by measuring the open circuit voltages and short circuit currents of each of three panels at certain times in the morning, noon and evening every day, and the values were recorded. It was concluded that the short-circuit current and power parameter of the panel coated with silica-based material are higher than the other two panels.

PEROVSKITE SOLAR CELL DESIGNS BY BASED ON MACHINE LEARNING

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Machine Learning makes predictions by processing datasets using mathematical and statistical approaches and identifying patterns in the dataset. Models built using machine learning can analyze new information much more efficiently. In this study, we will try to achieve the best efficiency with the machine learning algorithm created by using the experimental data shared by The Perovskite Database Project. For this, we will use different machine learning models to determine which model will give the best results. Our important output data for our project are Voc, Jsc, FF and PCE values. It is aimed to design an optimum solar cell structure with these output parameters obtained as a result of our model.

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Keywords: Perovskite solar cell, machine learning General area of research: Photonics

Oral Presentations
High Energy, Particle and Plasma Physics

INVESTIGATION OF THERMODYNAMIC PROPERTIES OF YO AND ScO MOLECULES

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In this study, the thermodynamic properties of YO and ScO molecules were investigated by using the relation giving the bound state energy eigenvalues obtained by solving the Schrödinger equation in the presence of Deng-Fan Potential. The vibrational partition function is derived in a closed form which is a function of temperature, is usually regarded as the distribution function and if it is known, other thermodynamics properties can be obtained from such as vibrational mean energy U, vibrational mean free energy F, vibrational entropy S and vibrational specific heat capacity C. The variation of these functions with temperature and potential parameter is presented graphically.

MACHINE LEARNING FOR CHERENKOV AND SCINTILLATION LIGHT SEPARATION IN A HYBRID NEUTRINO DETECTOR

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For many years, neutrino research centered on applying water-based Cherenkov detectors and scintillation detectors. Researchers have been actively diving into novel detector techniques, to improve the sensitivity of neutrino detection. The detector medium is essential to this research, which employs a water-based liquid scintillator capable of producing both Cherenkov and scintillation light simultaneously. The RAT-PAC simulation program was used to model a cylindrical tank with dimensions of 3 meters in height and 3 meters in length. In this detector construction, 174 PMTs with high quantum efficiency are positioned on the wall. The goal of creating this detector is to gather data on the scintillation and Cherenkov light emissions it produces, which will then be used. As a result of this research, we were able to achieve an AUC of 86\% for the separation of Cherenkov and scintillation light. For this research, we will discuss the simulation and machine learning results, as well as the parameter that produces the best results for this goal.

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ANALYSIS OF DIRECT AND INDIRECT DETECTION OF FERMIONIC DARK MATTER OF 6-DIMENSIONAL EFFECTIVE FIELD THEORY

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Dark matter is responsible for approximately $\%85$ matter density of the universe. Although its existence is inferred from the cosmological and astrophysical data, there is not much information about its particle content. In context of particle physics lots of candidate has been proposed so far. WIMP candidate is one of the powerful candidate which proposes massive particle interacts via weak interaction. In this study, we present an analysis of fermionic dark matter (DM) as a WIMP candidate in the context of 6 dimensional Effective Field Theory (EFT). The parameter region for Fermionic DM of 6 dimensional EFT has been constrained according to DM relic density data of WMAP. In this work, we compared the result generated via the 6-dimensional EFT analysis with the current experimental results for dark matter searches. These experiments are methodically categorised as direct and indirect search and present some constraints on dark matter model parameters of 6-dimensional EFT. Fot the purpose of constraining and analysing DM we constructed a new set of tools ensuring DM researches in various platforms. The model parameters are presented to guide DM production in colliders by taking account of the upper limits at direct and indirect searches. In this paper we apply our approach for fermionic case to test the verification of the method. There are various type of search methods for DM, each depends on type of interaction of dark matter with SM particles. Finally we analysed fermionic DM candidate of 6-dimensional Effective Field Theory (EFT) at the platforms of DM searches. A new set of numerical tools is specified for 6-dimensional fermionic DM model, and these tools are also tested.

THE RESPONSE OF THE IONOSPHERE TO DIFFERENT LEVELS OF GEOMAGNETIC STORMS OF CME ORIGIN

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The Earth's ionosphere, a natural plasma, is located at an altitude of about 60 km to 1100 km above the earth's surface. The ionosphere varies depending on many factors such as solar activity, sunspots, phase of the solar cycle, geomagnetic storm, geographic location, season, time of day. The response of the ionosphere to the formed geomagnetic storms manifests itself as a positive or negative ionospheric storm, which is determined depending on the changes in the Total Electron Content (TEC) of the ionosphere. The effects of ionospheric storms, which are strong at high latitudes and weaker at mid latitudes, are seen at all latitudes. In this study, the changes in the ionosphere caused by CME origin geomagnetic storms at different G1, G2, G3 and G4 levels that occurred on 04.11.2021, 31.03.2022, 3.10.2022, 23.03.2023 within the scope of the 25th solar cycle were investigated. TEC changes before the storm, during the storm and after the storm were examined through the station data of DB049, RO041, RL042 and PQ052 real-time Giro Lowell ionosonde located in the mid-latitude region, these obtained data were analyzed with the designed GIRO Analysis v1.03 program and revealed that they formed in the ionosphere. By determining the ionospheric anomaly types and levels, the ionospheric storm types and their effects that occur depending on the geomagnetic storm intensity and geographical location are discussed in detail.

*This study was produced from the Graduate Project ID 5624, FYL-2023-5624.

Keywords: Solar wind, Geomagnetic Storm, Ionospheric Storm, Space Weather

THE INVESTIGATION OF SPATIO-TEMPORAL DYNAMICS OF PLANAR DC FIELD EMISSION-DRIVEN GAS DISCHARGE-SEMICONDUCTOR MICROPLASMA SYSTEM (GDSμPS)

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Recent studies were reported on the theoretical and experimental investigation of planar DC-driven gas discharge-semiconductor systems (GDSS) [1-3] for modelling high-efficiency infrared-to-visible image converters and advanced microplasma devices dimensioned in microscale to utilize in diverse fields of science and engineering applications [4-10]. In this manuscript, a number of key operational characteristics of an exclusively-designed DC-driven microplasma cell are broadly investigated in a 2D simulation platform based on the mixture-averaged diffusion-drift theory of gas discharges using the Maxwellian electron energy distribution function. The dedicated microplasma cell is basically built of planar-layered anode/cathode electrodes that are seperated by a gas discharge microgap, which is coupled to a high-Ohmic semi-insulating AlGaSb cathode material featuring either simple-planar or digitated-planar surface models in two case studies. Argon/Helium gas mixture is introduced to the microgap at subatmospheric pressure level, and the cell is driven by a stationary power supply at various dc voltage levels in order to simulate transitions from field emission state toward self-sustained normal glow gas discharge state, respectively. Preliminary results, obtained by this simulation study, are evaluated and reported based on the graphics, single-frame images and full-frame animations exhibiting time-dependent computations of electron density, electron temperature, space charge density, electron current density, migrative electron flux and mean electron energy distributions in 2D medium. The computed discharge parameters reveal that the modified microplasma cell with digitated-planar cathode model has higher electron emission efficiency, more stabilized and homogeneous plasma pattern formation and faster discharge transition regime than the basic microplasma cell with simple-planar cathode model has. It is concluded that cathode surface modification in microscale can be utilized as an effective design tool to precisely regulate and control the key operational parameters and intrinsic characteristics of the intended gas discharge-semiconductor microplasma system (GDSμPS) for modeling the application-specific microplasma device.

Keywords: Gas-discharge plasma, cathode patterning, spatio-temporal dynamics of microplasma, electron field emission efficiency, subatmospheric microplasma, gas breakdown, infrared image converter, infrared detector.

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COMMENTS ON THE RESULTS OF EXPERIMENTAL SEARCHES FOR VECTOR-LIKE LEPTONS AT CERN

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There are strong phenomenological arguments favoring the existence of vector-like leptons and quarks in nature. In spite of extensive studies conducted in search of VLQs, there are only a limited number of experimental studies on VLLs. However, these searches do not include all possible decay modes of VLLs. Therefore, the analyses done so far are incomplete. In this presentation, we discuss decay channels that are not covered by different experimental analyses, with a focus on L3, ATLAS, and CMS results. We argue that experimental analyses should be redone considering these shortcomings.

SPECTRAL DENSITY OF PSEUDOSCALAR CURRENTS IN A HOT AND DENSE MEDIUM

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In this work, we present spectral density for pseudoscalar currents containing different quarks at finite temperatures and baryon chemical potential. These spectral densities are needed to determine the spectroscopic parameters such as mass and residue of pseudoscalar mesons in the framework of the thermal QCD sum rule method. For this aim, we use quark propagator in a hot and dense medium and show that spectral density decreases by increasing the temperature at a fixed different chemical potential. On the other hand, the spectral density increases to a certain chemical potential, after which it remains stable.

PHENOMENOLOGICAL STUDY OF LEPTON FLAVOR VIOLATION OF TAU DECAYS IN THE CONSTRAINED MSSM SEESAW TYPE-I MECHANISM

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The Lepton flavor violation in Tau into three muon decays is studied in the context of the constrained minimal supersymmetric standard model (CMSSM) extended by Seesaw type-I model. Assuming that the mass scale of Majorana neutrinos is much larger than the scale of supersymmetry (MR >> MSYSY). So that right-handed Majorana neutrinos do not have any contribution to MSUSY. This in turn leads to obtain Weinberg operator which is suppressed by the large energy scale MR ~ 10^14 GeV which generates the light neutrinos masses. The decay rates calculation is performed in the realization given by the type-I Seesaw mechanism. The best obtained value of the branching ratio of Tau into three muon decays is around 1.1 × 10^−9 at Yukawa UPMNS case. It corresponds to the sensitivity of the future colliders (FCC-ee).

DUAL-FREQUENCY PLASMA AT LOW PRESSURE

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Some parameters must be examined for an ionized gas to become a plasma. Different methods can be used to generate plasma under laboratory conditions. In this study, capacitive-coupled plasma at low-pressure will be discussed. Dual-frequency capacitively coupled plasma can be generated by using a power source with two different frequencies. Studies have shown that dual-frequency plasma can have several advantages over single-frequency plasma, such as improved process uniformity, better control over ion energy, and reduced plasma damage. To efficiently generate capacitive-coupled discharges, considerations of what physical effects need to be considered and what simplifications can be applied are helpful. Therefore, modeling of the plasma will be useful to us. In this study, it is aimed to calculate the electron temperature of dual-frequency capacitive-coupled plasmas at low pressure with kinetic and fluid plasma models.

COHERENT ELASTIC NEUTRINO-NUCLEUS SCATTERING BY USING ARTIFICIAL AND NATURAL NEUTRINO SOURCES

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Coherent elastic neutrino-nucleus scattering process was recently observed after it had been predicted for a few decades. This channel plays a novel role as intersection of particle and nuclear physics. Neutrinos of the process can come from artificial and natural sources. In this work, we review the process using neutrinos from stopped-pion, nuclear reactor (artificial), and solar neutrino (natural). From these sources, we check within the process prediction of the standard model (SM) and look for new physics beyond SM (BSM).

REACTOR NEUTRINO DETECTION WITH GADOLINIUM LOADED PLASTIC SCINTILLATORS: SIMULATION AND ANALYSIS

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Reactor neutrino detectors play an important role in exploring neutrino properties and interactions. They are also important tools for reactor monitoring, which provide information about the reactor power, operational status and fuel composition. In this study, we use Geant4 simulation toolkit to design a reactor neutrino detector. We consider gadolinium loaded plastic scintillators as detector material. Firstly, we determine detector properties and we construct the detector according to these properties. Then, for the generation of our signal events we use a program we developed called ERNIE, which generates inverse beta decay events using Monte Carlo simulation method. By using the output of ERNIE with Geant4 we conduct detector simulation of our signal event. After that, we conduct detector simulations for background events considering cosmic ray induced backgrounds at sea level. Afterward, we analyse the result obtained from the detector simulations. For the analysis, we explore and optimize a range of discriminating variables, such as event energy, spatial distribution, and timing information. Applying these variables as cut parameters, we quantify their effectiveness in enhancing signal-background discrimination. The results of this study demonstrate the potential of detectors with gadolinium loaded scintillators in neutrino physics and reactor monitoring.

DEUTERON GRAVITATIONAL FORM FACTORS WITHIN HARD WALL MODEL ADS/QCD

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We calculate deuteron gravitational form factors within the hard wall model of AdS/QCD. We write bulk interaction lagrangian, then present momentum dependence of the deuteron gravitational form factors within the hard wall model of AdS/QCD

PRELIMINARY X-RAY SPECTRAL ANALYSIS OF THE SUPERNOVA REMNANT 0509-67.5

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We report on the preliminary results our spatially resolved spectral analysis of the supernova remnant (SNR) 0509-67.5 in the Large Magellanic Cloud. Based on deep ∼525 ks archival Chandra data, we perform a detailed spatially resolved spectral analysis of SNR 0509-67.5. We analyze spectra extracted from thin-sliced regions along the northwest part of the SNR to reveal elemental abundances for O, Ne, Mg, Si, and Fe, and plasma parameters. Our elemental abundance measurements indicate that an asymmetrical spatial distribution of metal-rich ejecta gas. Si is enhanced in the ejecta while O and Ne abundances are generally negligible. This finding confirms the Type Ia origin of SNR 0509-67.5.

DETERMINATION OF ELECTRON TEMPERATURE OF RADIO-FREQUENCY HYDROGEN DISCHARGES

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There are some advantages and disadvantages of using hydrogen plasma for different application fields. This makes the formation processes of hydrogen plasma important. One of the theoretical approaches that studies low-pressure hydrogen plasma is one that studies the plasma as a continuum fluid rather than as individual particles. In this approach, plasma can be modeled as charged and neutral fluids defined by a set of equations that determine their motion, energy exchange, and interaction with external fields. Fluid theory is often used in conjunction with numerical simulations such as Computational Fluid Dynamics to predict the behavior of plasma in complex geometries and various operating conditions. The properties of the plasma to be obtained because of electrical excitation of pure hydrogen gas with a radio-frequency power source can be determined by means of a mathematical model. In this study, the electron temperature, which is an important parameter of the hydrogen plasma obtained by radio-frequency power sources, can be tried to calculate with a theoretical model.

ELECTROMAGNETIC PROPERTIES OF NEUTRINOS WITH COHERENT ELASTIC NEUTRINO-NUCLEUS SCATTERING

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The coherent elastic neutrino-nucleus scattering (CEvNS) is a novel framework in low energy physics. The Standard Model (SM) process offers plentiful possibilities of advancing physics, especially beyond the standard model (BSM). Neutrino electromagnetic properties are the type of possible topics to be investigated in this channel. The subject is a direct implication of the observed non-vanishing neutrino mass from experimental evidence to describe solar neutrino problem. In this work, we provide the cross-section of the CEvNS using solar neutrinos including effect of their electromagnetic properties. The behaviors are presented for several nuclei, compatible with recent as well as future laboratory advancement to observe the intriguing phenomenon.

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LEPTON FLAVOUR VIOLATION OF TAU DECAY TO MUON/ELECTRON & GAMMA IN THE CONSTRAINED MINIMAL SUPERSYMMETRIC TYPE-I SEESAW MODEL

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Experiments have shown that the violation of the lepton flavor so far is only in the neutrino sector (neutrino oscillation). Therefore, we predict it to happen in the charged lepton sector. We presents a study of the lepton flavor violation (LFV) of Tau decays in two channels Tau into muon-gamma and Tau into electron-gamma. The prediction is performed in the Minimal Supersymmetric Standard Model extended by Seesaw Type-I Model (MSSM-Seesaw Model). The predicted calculations of the branching ratio of the two channels are of the order of ~ 10-8 - 10-9, which is in coincidence of the sensitivity of the future colliders.

Keywords: The Standard Model of Particles Physics (SM), Beyond the Standard Model of Particle Physics (BSM), The Minimal Supersymmetric Standard Model (MSSM), Supersymmetry (SUSY).

SENSITIVITY OF THE HIGGS-GAUGE BOSON COUPLINGS AT FUTURE COLLIDERS

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We have investigated CP-conserving and CP-violating dimension-six operators of Higgs-gauge boson couplings using the Standard Model Effective Field Theory (SMEFT) in a model-independent way. The existence of anomalous couplings is discussed in future colliders. All signal and relevant background events are generated in MadGraph and detector effects are evaluated via detector cards tuned in Delphes. We have shown the kinematic distributions of signal and relevant background processes to determine a cut-based analysis. We have obtained the 95% C.L. limits on the Wilson coefficients cγ, cHB, cHW, tcγ, tcHB, tcHW and compared them with current experimental limits.

SEARCH FOR PRODUCTION OF FOUR-TOP QUARKS IN PROTON-PROTON COLLISIONS AT CENTER-OF-MASS ENERGY OF 13 TEV IN THE SINGLE-LEPTON FINAL STATE

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The production of four top quarks (tttt) is studied in the single-lepton final state, where lepton refers only to prompt electron or muons. Events consistent with production of four top quarks, where one of the four top quarks decays leptonically, and remaining three top quarks decay hadronically, are analyzed. The analysis utilizes LHC proton-proton collision data samples collected by the CMS experiment at a center-of-mass energy of 13 TeV, and corresponding to an integrated luminosity of 138/fb during 2016, 2017, and 2018. A baseline selection is used to select events with exactly one lepton, six or more hadronic jets, of which at least 2 jets are b-tagged. We then perform a multivariate analysis using Boosted Decision Tree (BDT)-based approach to optimize the discrimination between signal and background. Following a small correction to the shape of BDT distributions, derived in 2 b-tag control region and applied to higher b-tag regions, the data are classified in bins of lepton flavor (e and μ), jet multiplicity (6, 7, 8, 9, and 10 or more jets), b-tag multiplicity (3 and 4 or more b-tagged jets), and resolved top quark tag multiplicity (0 and 1 or more t-tagged jets). The BDT distributions in all event categories are fitted to obtain the signal strength (the ratio of the measured cross section to the prediction), the measured cross section, and the expected and observed significance of tttt production. The results are also combined with the other final states with no leptons (all-hadronic) and two opposite-sign leptons as well as earlier CMS results with other final states.

LEPTON FLAVOR VIOLATING HIGGS BOSON DECAYS IN MINIMAL SUPERSYMMETRIC HIGH SCALE SEESAW MECHANISM

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In the context of the Minimal Super Symmetric Satandard Model (MSSM), we have evaluated the lepton flavor violation (LFV) of Higgs boson decays H → L1 L2 where L1, L2 are different flavor charged leptons (tau, muon, electron). The decay rate of LFV processes is calculated in supersymmetric high scale seesaw Type I model. The lepton flavor violation processes are generated via renormalization group equations (RGE) from the GUT scale down to electroweak scale. The obtained results of the branching ration of Higgs LFV decays for the three channels are in the order of 10^-5 - 10^-3, which corresponds to the sensitivity of the future colliders.

Keywords: Beyond the Standard Model of Particle Physics (BSM), The Minimal Supersymmetric Standard Model (MSSM), Supersymmetry (SUSY), Seesaw Modles

LEPTON FLAVOR VIOLATING OF Z BOSON DECAYS IN NON-UNIVERSAL GAUGINO MASSES SEESAW MECHANISM

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In the Minimal Super Symmetric Standard Model (MSSM) which is extended by adding three generations of a singlet supersymmetric right-handed neutrino field, we have evaluated the lepton flavor violation (LFV) of Z boson decays Z → L1 L2 where L1, L2 are different flavor charged leptons (tau, muon, electron). The decay rate of LFV processes is calculated in non-universal Gaugino masses scenario at the grand unified scale. The obtained results of the branching ration of Z boson LFV decays for the three channels are in the order of 10^-9 - 10^-13, which corresponds to the sensitivity of the future colliders.

Keywords: Supersymmetric Right-Handed Neutrino Field, The Minimal Supersymmetric Standard Model (MSSM), Non-Universal Gaugino Masses, Z Boson Decays, Seesaw Mechanism.

Oral Presentations
Material Science and Applications

HYBRID PROPULSION OF POLYDOPAMINE FUNCTIONALIZED NANOMOTORS

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Nanomotors, which are one of the latest achievements in nanotechnology, are nano-scale devices known for their ability to efficiently convert energy into motion [1]. Nanomotors are preferred in various applications such as imaging, drug delivery, and release in the biomedical field, and they have also gained popularity in different fields [2]. In this study, a gold (Au) - nickel (Ni) magnetic nanomotor functionalized with polydopamine (PDA)-copper (II) sulfate (CuS) was fabricated. The nanomotor was synthesized electrochemically using a triple electrode system. The synthesized Au-Ni nanomotor was functionalized with PDA-CuS to make its surface more functional. CuS, which has a narrow bandgap, plays a significant role in the photocatalytic degradation of organic dyes. Additionally, the active functional groups in PDA (phenolic hydroxyl, imine, and amino groups) and aromatic rings can facilitate the adsorption of dyes through host-guest interactions such as π-π stacking and electrostatic attraction. The π-π* electron transition between PDA and CuS is highly effective in reducing the recombination of photo-generated electron-hole pairs in CuS[3]. The synthesized nanotube structure was examined under scanning electron microscopy (SEM), and velocity and fluorescence intensity measurements were conducted under an optical microscope. After the imaging processes, the nanomotors were analyzed by electrochemical characterization for stability studies. The SEM results were confirmed the homogeneous and tubular synthesis of the Au-Ni nanomotor, with an approximate length of 10 μm and a diameter of 2 μm. According to the mapping analysis of the Au-Ni nanomotor, it contains 4% Au and 4% Ni. The velocity measurement of the Au-Ni nanomotor under an 18 mT magnetic field was measured 24,6 μm/s. By optimizing different parameters, the speed of the motor incubated with PDA-CuS was measured as 2,454 μm/s under an 18 mT magnetic field, while under near-infrared (NIR) light with a wavelength of 808 nm and a laser power density of 1.8 W/cm2, the speed was measured as 1,479 μm/s. When the same motor was driven by the magnetic-NIR dual mechanism, its speed was measured as 2,164 μm/s. The synthesized Au-Ni-PDA-CuS nanomotor is planned to be used as a sensor for organic dye determination in future studies.

Keywords: Nanomotor, Polydopamine, Copper(II) sulfate, Magnetic propulsion

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DEVELOPMENT OF CONDUCTIVE PVA/AGAROSE BIOCOMPOSITE

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The properties of Polyvinyl alcohol (PVA) and Agarose (AG), such as their mechanical and controllable biodegradability, have made the use of these polymers in artificial tissue scaffolds attractive. In spinal cord injuries, it is necessary to develop new generation electroactive polymers materials to protect undamaged neurons, support lost cells and promote axonal growth (neuroregeneration) in order to eliminate dysfunctions. For this purpose, PVA/agarose based conductive substitute tissue has been developed. Mechanical behaviour and conductivity measurements of the developed materials were performed. The artificial tissue scaffold to be produced from bio-material should have good mechanical properties, biocompatibility and electrical conductivity that can transmit bioelectric signals for axonal growth. Although there are studies on artificial scaffold tissue prepared using conductive filler materials, the number of studies on conductivity behaviour especially under mechanical load is insufficient. In this study, PVA/agarose composite materials were prepared by crosslinking citric acid (CA) with varying agarose concentrations. The composites exhibited improved mechanical strength and stiffness with higher agarose concentrations. They were characterised to evaluate their electromechanical properties including stress-strain, stress-relaxation tests and electrical conductivity properties.

A DFT STUDY ON THE MODIFICATION OF ANATASE TIO2 SURFACES WITH VARIOUS METAL AND LANTHANIDE ATOMS

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TiO2 has attracted increasing interest due to its high performance in photocatalytic applications. All polymorphs of TiO2 are very important because of their interesting properties, but the anatase form is often more prominent due to its relatively high surface catalytic activity. In this study structural, electrical and optical properties of the (100) and (101) surfaces of the anatase TiO2 structure processed with various metal and lanthanide atoms were calculated by DFT+U methods. By investigating how metal and lanthanide atoms adsorbed at different adsorption points in various configurations change the initial properties of the original surface, the potential technological applications of these new structures have been tried to be determined.

OPTIMIZATION OF THE CO2 LASER PARAMETERS ON DIMPLE TO OBTAIN THE DESIRED GEOMETRY ON AL2O3 CERAMIC SURFACE

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Dimples on Al2O3 ceramic plates were created with a CO2 laser using different laser parameters. The effects of the laser parameters used on the dimple geometry were investigated and the necessary laser parameters were optimized to obtain the desired dimple geometry. Taguchi method was used in the optimization process. The effects of laser power, scan speed and laser frequency from laser parameters were investigated. Optimum laser parameters were determined as a result of the Taguchi Optimization method. In addition, the laser parameter with the highest effect on the result was determined.

FABRICATION OF AZO/CUO HETEROJUNCTION BY ULTRASONIC SPRAY PYROLYSIS

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Copper oxide (CuO), a non-toxic and p-type metal oxide semiconductor, is considered a suitable material for photovoltaic devices due to its excellent advantages, such as an adjustable optimum band gap (1.2–1.9 eV) and a high absorption coefficient. To examine their properties and reveal the potential of the ITO/AZO/CuO heterostructure, AZO and CuO layers were deposited onto ITO-coated glass substrates, respectively. Structural analysis also confirmed the successful formation of the ITO/AZO/CuO heterostructure. Moreover, Hall effect measurements confirmed that the deposited AZO and CuO layers exhibit n-type and p-type electrical conductivity, respectively. Based on optical transmittance and absorption spectra, it was observed that the characteristic absorption edge for AZO and CuO occurred around 370 nm and 700 nm, respectively.

ENHANCING TIN OXIDE FILMS: EFFECTS OF W ELEMENT DOPING ON MORPHOLOGY AND ELECTRICAL PROPERTIES

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SnO2 films hold significant technological importance due to their excellent properties as transparent conductive materials. They are widely used in various applications, such as touchscreens, solar cells, and gas sensors, where their combination of transparency and electrical conductivity is crucial for optimal device performance. Therefore, improving their physical properties is a valuable scientific pursuit. It is well-known that doping with a foreign element is the most common method to adjust their physical properties. In this study, the effects of W element doping on the morphological and electrical properties of SnO2 films were discussed. SEM images revealed that the surfaces of the films consist of grains with geometric shapes. However, AFM images showed that the surface roughness, which was 5.9 nm for undoped films, increased with W doping. Furthermore, Hall-effect measurements revealed that the sheet resistance decreased from 126.06 ohm/sq to 52.00 ohm/sq with W doping.

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INVESTIGATION OF PHOTOCATALYTIC PROPERTIES BASED ON GRAPHENE OXIDE AND REDUCED GRAPHENE OXIDE

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Methyl violet (MV) is widely utilized a cationic azo dye for dye processing, and up to 50% of the dyes are used in textile industries and utilized in dyeing of wool, cotton and so on. MV is harmful to human health and causes various diseases like dyspnea, skin irritation, heart palpitations and seizure, in addition to having negative influences on the environment and ecological systems. Thus, it is significant to remediate the water dye pollutant matter. Carbon-based materials are generally investigated as a supporting component in diverse photocatalytic applications. Among the carbon-based compounds, graphene oxide (GO) and reduced graphene oxide (rGO) can be utilized as promising metal-free photocatalysts to extract aqueous dye pollutants under light illumination [1,2]. In this study, GO and rGO were prepared using the modified Hummer's method and a simple hydrothermal method, respectively. Scanning electron microscopy energy-dispersive X-ray (SEM-EDX), X-ray diffraction (XRD) analysis and Fourier-transform infrared spectroscopy (FTIR) were utilized for GO and rGO characterization. Photocatalytic performances of the GO and rGO were evaluated through the degradation of cationic azo dye like MV.

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DESIGN AND MECHANICAL PROPERTIES OF A NOVEL AUXETIC METAMATERIALS

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Metamaterials, possessing distinct properties from traditional materials, are designed to attain exceptional multifunctional qualities. One of the metamaterials is auxetic materials, which exhibit a negative Poisson's ratio. The exceptional mechanical properties of auxetic metamaterials, such as shear resistance, fracture toughness, energy absorption, acoustic absorption, compressive strength, and more, have drawn attention. Auxetics should be understood based on their deformation mechanisms or structural patterns. Various models are exhibiting auxetic behaviour due to design differences in patterns. Furthermore, the design of auxetic metamaterials allows for the exploration of lighter structures with higher strength. This study investigates the mechanical and deformation properties of a novel auxetic metamaterial produced with additive manufacturing technology.

INVESTIGATION OF TMD AND TMM 2D MATERIALS FOR PLASMONIC APPLICATIONS IN THE TERAHERTZ FREQUENCY REGION

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The development of novel 2D materials has attracted significant attentions because of their unique optical and electronic properties in the THz frequency region due to their extraordinary carrier dynamics. Electrical resistance or inverse conductivity of 2D materials is dependent on charge carrier concentration. The issues behind sensor development with well-known materials such as graphene show that the conductivity and mobility of the 2D material is very important for generation of plasmons. Furthermore, the interaction of the plasmons with the long wavelength radiation are dependent on the parameters of the 2D material device structure as such as that when they are changed, the performance of the sensor will also change. Special wavelength resonant structures must be used to realize the interaction of plasmons in the 2D material layer with this radiation. Towards this goal the interaction of THz frequency waves is analysed and reported with respect to varying electrical and structural parameters of various 2D materials in resonant architectures. In this study we provide new insights into development of novel biosensor devices based on TMD (Transition Metal Dichalcogenide and TMM (Transition Metal Monochalcogenide) 2D materials where surface plasmons can interact with biomaterials in the infrared and terahertz frequency ranges. Our efforts are concentrated in developing a sensing platform that can generate plasmons in a very wide frequency range.

SAMPLE PRODUCTION BY LOST FOAM CASTING METHOD

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The Lost Foam Casting Method is a casting method using ceramic coated polymeric foams as a model and was first tried in a wet sand mold in 1958. H.F. In his first experiments, Shroyer made foam models by processing from polystyrene insulation plates, filled these models with binding sand and made the casting. In the first years when it started to be used, the area of use was extremely limited due to the hand processing of models and the production of too much gas and liquid waste of polystyrene used as a model material, and it was able to find use in the production of only a few simple cast parts. In addition, the gas and liquid wastes generated during casting could not be discharged from the mold and therefore porous cast parts were obtained. although many companies aimed to use it in the 1980s, success was not achieved in most applications. This method, which has gained importance with the studies carried out in the following years, has come to the fore with its advantages such as high dimensional accuracy, low cost, better casting quality and less casting errors compared to other casting methods. The importance of the method has increased with the use of the lost foam casting method by important companies such as General Motors, BMW, Mercury Marine and Kohler in their production. In the study, sample production was carried out using the lost foam casting method, which requires little processing and is environmentally friendly, and the casting and model parameters were examined. In addition, mechanical tests of these samples were performed and comparison with other casting methods was provided. In our study, it is aimed to provide maximum efficiency by reducing problems such as waste pollution, spade errors caused by casting, while on the other hand, process improvement has been achieved. It is planned to save time and cost by eliminating steps in production and assembly processes with the lost foam method, which is suitable for complex designs in automotive, marine and agricultural applications.

INVESTIGATION OF THERMAL PROPERTIES OF CYCLING CLOTHING FABRICS WITH DIFFERENT RAW MATERIALS AND PHYSICAL PROPERTIES

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Because of their busy working lives and for a healthy life, people have turned to sports more especially after the pandemic. Accordingly, it is desired that sportswear have different characteristics from casual clothes and make them feel more comfortable. Considering that comfort in clothing is related to comfort, it is seen that the most important feature expected from sportswear is comfort. The most important factor of comfort, which is defined as the feeling of satisfaction resulting from the physiological, psychological and physical harmony between the body and the environment, is thermal comfort. Thermal comfort is satisfaction with the thermal conditions of the environment. As can be understood from the definition, there are many factors that affect thermal comfort. The most important of them are; air permeability, water absorbency, water vapor permeability, heat and moisture transfer ability, static electricity tendency and heat retention ability. Cycling is the sport with the most physical activity among sports. Therefore, thermal comfort is most sought after in cycling clothing. In addition, surveys show that comfort while cycling is a concern and is compatible with performance. For this reason, it is important to examine the change in thermal properties according to physical properties in cyclist clothing. The aim of this project is to investigate the thermal properties of fabrics that can be used in the production of cycling clothing, taking into account the physical properties and raw material effects. For this purpose, knitted fabrics with different raw materials and constructions were systematically produced. The physical properties of the fabrics such as weightiness, thickness, density, air permeability were measured. The apparel process of the fabrics was carried out in accordance with the cyclist clothing form. Thermal resistance and water vapor resistance parameters were measured under different climatic conditions in the thermal mannequin system of the produced cyclist clothing. The thermal properties of the clothes were evaluated according to the measured thermal resistance and water vapor resistance findings. The results of the study are expected to be beneficial to cycling wear manufacturers and researchers in the field of sportswear comfort. The findings will be presented and shared with the physics community in the congress environment, and the outputs of the project will be determined according to the opinions and suggestions that will be formed in the discussion environment.

EFFECT OF BORON/NITROGEN (B/N) CO-DOPING ON THE STRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES OF DC MAGNETRON SPUTTERED VANADIUM DIOXIDE (VO2) THIN FILMS

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Vanadium dioxide (VO2) is a phase-change material well known for its reversible insulator-to-metal transition (IMT) near room temperature. There has been much interest in manipulating the phase transition properties (e.g., insulator-to-metal transition temperature (TIMT), transition sharpness, hysteresis width) to utilize the material for specific applications such as electrical and optical switches, sensors, and memory devices. Doping of VO2 thin films is a widely used method to manipulate the electrical and optical transition properties of the material. Until now, both single and multi-element dopants have been used to modify the TIMT of VO2 films. In this study, we investigate the effect of boron/nitrogen (B/N) co-doping on the structural, electrical and optical phase transition properties in VO2 thin films. The B/N-VO2 thin films have been fabricated by the simultaneous co-sputtering of boron-nitride (BN) and vanadium (V) targets at various applied sputtering powers in an oxygen environment. The films were sputtered onto single-crystal p-Si (100) and r-cut sapphire substrates where the substrate was set to a temperature, TS = 650 °C. Observations show that adding B/N to VO2 leads to a higher TIMT than that for high-quality, pure VO2 thin films. The temperature dependence of the optical transmittance (at a light wavelength of 2500 nm) has shown that the highest TIMT obtained is 343 K (70 °C) for the sputtering power ratio (PBN/PV) of 0.064. As the PBN/PV increases up to 0.16, the TIMT decreases to 337 K (64 °C), approximately the TIMT of pure-VO2. Also, it is observed that the IM/MI phase transitions become sharper with increasing PBN/PV. Nonetheless, the examination of the temperature dependence of the electrical conductivity has shown that the electrical transition properties of the films vary independently of PBN/PV. Furthermore, structural investigations relate the peculiarity in the variation of the transition properties to the significant change in crystalline orientation, grain size and defect states. In addition, the bandgap investigation of the B/N doped films has given a direct bandgap of around 2.6 eV, similar to that for pure VO2 films, where the indirect bandgap of the examined films has been found to lie between 0.03 to 0.38 eV, which is narrower than that for pure VO2 (0.52 eV).

INVESTIGATION OF BARIUM CADMIUM BORATE FOR DOSIMETRIC APPLICATIONS UNDER BETA EXCITATION

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Thermoluminescence (TL) studies of borate compounds are extremely attractive in radiation dosimetry because they can detect both neutron and gamma radiation. Pure borates usually show a relatively low TL efficiency. In order to improve the TL output of undoped borates, they are doped with rare-earth dopants. In our study, Tb was used as a dopant. The production method is another important effect on the sensitivity and thermal stability of the borates. This work focuses on the development of a %2 Tb doped Ba2Cd(BO3)2 powder sample by the solid-state reaction technique at a high temperature and searches the suitability of the synthesized material in dosimetry applications. X-ray diffraction (XRD) and Fourier transform infrared spectrophotometer (FTIR) analyses were performed to determine the crystal structure and the vibrational characteristic of the sample, respectively. The sample was irradiated with β source for 5, 15, 30, 60, and 90 minutes. A simple glow curve was attained for all the irradiation durations and the main dosimetric peak relevant to them was located around 100°C. Trap parameters (order of kinetics (b), activation energy (E), frequency factor (s)) associated with the glow peaks in the β-irradiated sample were obtained by the Computer Glow Curve Deconvolution (CGCD) method.

Keywords: Thermoluminescence, Borate, Solid-State Reaction, Rare-Earth, Dosimetry

SYNTHESIS AND CHARACTERIZATION OF Ce3+ DOPED Ba3CdSi2O8 FOR THERMOLUMINESCENCE DOSIMETRY

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When selecting a suitable and practical dosimetric material for luminescence research, there are numerous considerations. Due to its benefits like simple synthesis, decent thermal quenching, high chemical stability, and optimal excitation and emission wavelengths, silicates, one of the most promising compounds, are widely utilized as the matrix of inorganic phosphors. Due to their remarkable properties such as chemical stability and water resistance, alkaline-earth silicates are particularly suitable compounds as radiation detectors. In this study, Ba3CdSi2O8 doped with Ce3+ ions by different doping concentrations of 2%, 3%, 4%, 5%, and 6% were synthesized by using the solid-state reaction method. X-ray diffraction (XRD) analysis of the synthesized materials was performed to understand the crystal structure. To investigate their Thermoluminescence (TL) characteristics, samples were irradiated with β source for 5 minutes, and the glow curve of the silicate sample for each doping amount was plotted. %4 Ce-doped sample showed the highest TL intensity. Therefore, 30, 60, and 120 minutes of additional irradiation have been made to this sample. All the TL glow curves of Ba3CdSi2O8: Ce3+ were composed of more than one peak and the main peak was around 110°C. Moreover, the order of kinetics (b), trap depth (E), and frequency factor (s) determination was conducted using the Computerized Glow Curve Deconvolution (CGCD) method.

Keywords: Thermoluminescence, Silicate, Solid-State Reaction, Rare-Earth, Dosimetry

INVESTIGATION OF MICROSTRUCTURAL, MECHANICAL AND CORROSION PROPERTIES OF BIODEGRADABLE Mg-Sn-Y ALLOYS

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In this study, biodegradable Mg-4Sn-xY (x = 0, 1, 2 and 4 wt.-%) magnesium alloys were produced using high pressure die casting (HPDC) technique. The surface morphology and microstructure of the alloys were examined using scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDX), respectively. Tensile and hardness tests were carried out to examine the mechanical properties. Microstructural studies have shown that the addition of yttrium causes reduction in the grain size of the alloy and the formation of Sn3Y5 and MgSnY intermetallic compounds with high melting temperature, as well as Mg2Sn intermetallic. The values of yield strength, tensile strength and percent elongation were measured. The data obtained from the hardness measurements has shown that the addition of yttrium creates an increase in the Vickers hardness, nanohardness and reduced elastic modulus values of the Mg-Sn alloy. Biocorrosion behavior was simulated in Hanks Balanced Salt Solution (HBSS) using of potentiodynamic polarization and immersion tests for each alloy. Corrosion tests have shown that the addition of yttrium to the Mg-Sn alloy increases the corrosion resistance of the alloys due to microstructural changes. The Mg-4Sn-4Y alloy is found to be a promising biodegradable magnesium alloy especially for orthopedic applications.

SYNTHESIS OF POLYMERIC THIN FILMS FOR BIOMEDICAL APPLICATIONS

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The application areas of biomaterials have been steadily growing in modern medicine since the middle of the 20th century. Biomaterials (metals, ceramics, and polymers) are materials mediators that address problems encountered in the life sciences to treat medical conditions and diseases. In today's society introducing new materials beyond the accustomed/renowned/known organic and inorganic ones, their combinations with utilization of various methods makes the way for fulfilling everlasting need of every field especially in the healthcare and related fields. In the last few decades, implant technology had a fascinating advancement concomitant to material sciences everlasting improvement and became an inseparable part of medicine. Even though their major contribution in disease treatment (dental treatment) and tissue replacement following cancerous tissue removal (breast cancer) they still face certain issues for instance cytotoxicity, infection, nerve damage etc. in order to eliminate such problems certain methods come in sight. Surface modifications respond the need of making implants to be used for the treatment of infections, cancerous tissues, favoring possible responses of cellular structure and eradicating unwelcomed tissue responses. One of the acknowledged types of modification is functionalization of material according to environmental necessities of tissues by changing the surface composition, structure, and morphology of the material without changing its bulk properties. The advancement in the field of synthesizing interfacial layers at the nano-scale sparked off a futuristic research field in the production of biomaterials that are biocompatible, osseointegrative, have a biofouling protection against bacterial invasion problem which is currently faced in life sciences. Here in, we present the fabrication and characterization of polyethylene glycol as interfacial thin films using a homemade plasma assisted chemical vapor deposition system. The system provides covalent bonding of polymerized structures on almost any substrate in a single step and sterile approach having high-level biocompatibility, non-toxicity and anti-biofouling structure. The molecular and morphology of the synthesized thin films are investigated by FT-IR, UV-VIS, SEM, AFM and XPS.

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Oral Presentations
Mathematical Physics, Astrophysics and Applications

STATE SPACE CONSTRUCTION AND STABILITY ANALYSIS OF 2-COMPONENT FLUIDS UNDER EINSTEIN'S FIELD EQUATIONS

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In this study, we propose a novel dynamical system for a 2-component fluid within the framework of Einstein's field equations. By employing advanced dynamical system methods, we perform a comprehensive analysis of the fluid's behavior. We construct state spaces for these dynamical systems under various conditions, identifying equilibrium points and characterizing their stability. Our findings pave the way for new insights into the mathematical physics of multi-component fluids.

A NEW BI-DIRECTIONAL APPROACH IN EVALUATION OF INTEGRALS INVOLVING HIGHER TRANSCENDENTAL FUNCTIONS

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In Gradshteyn and Ryzhik's book, the solution for definite integrals involving higher transcendental functions is presented using hyper-geometric functions. Practical computation of hyper-geometric functions poses challenges. This is due to intricate nature of the infinite series defining them. These integrals and their solutions are widely employed in atomic physics to analytically evaluate the electron repulsion integrals. This research introduces a novel bi-directional approach that establishes fresh recurrence relationships for electron repulsion integrals, eliminating the dependence on hyper-geometric functions.

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INVESTIGATION OF WORMHOLE SOLUTIONS IN THE FRAMEWORK OF WEITZENBOCK GEOMETRY

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The functional shape and energy conditions of the wormhole geometry require a special type of matter called exotic matter. Alternative gravitational theory, based on Weitzenböck geometry, with zero curvature and nonzero torsion, also includes types of matter with negative energy density, such as exotic matter. In this study, wormhole solutions are discussed within the framework of alternative gravity theory by associating energy density with dark matter forms and the physical properties of the wormhole geometry are investigated.

HOLOGRAPHIC PRINCIPLE APPLICATIONS IN F(T) GRAVITY FOR THE BIG BOUNCE SCENARIO

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In our study, we defined the connection between matter and space through the holographic principle underlying the models we used, by considering surface and volume. The 3D volume is encoded in 2D on the surface of the object. Holographic Dark Energy and Holographic Ricci Dark Energy models obtained by modifying this model are alternative models that explain the universe's accelerating expansion. We attained the physical consequences of taking the holographic principle fluid in the form of holographic Ricci dark energy, resulting in a bounce that would eliminate the singularity in the Big Bang Theory. It has been demonstrated that the state parameter must violate the null energy condition. We discussed the results we obtained by examining the bounce scenario within the f(T) gravity framework in the context of the situations we mentioned and their consequences.

O-C ANALYSIS OF THE ECLIPSING BINARY SYSTEM VW CYGNI

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In this study, the eclipsing binary VW Cyg was used. TESS light curves were obtained using the Lightkurve module. Thanks to the minimum troughs in the obtained TESS light curves, all minimum times were determined. By adding the minimum times observed from the BRNO O-C Gateaway database to the minimum times we found from the TESS light curves, we analyzed O-C by phase. The resulting graph is a parabola with the arms pointing upwards. This means that there is a transfer of matter from the small component to the large component. The total mass fraction of this system is q=5.62. Orbital period increase dP/dt = -7.80x10^20 days/year. It means that the mass transfer rate from the small component to the large component is dm2/dt = 9.32x10^21 M⊙/year.

THE SPECTROSCOPIC AND PHOTOMETRIC ANALYSES OF SOUTHERN ECLIPSING BINARY STAR: V714 SCO

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In this study, we present the first analysis of spectroscopic and photometric observations of the southern eclipsing binary star V714 Sco. Spectroscopic observations of V714 Sco were made with the Cassegrain-focus-mounted "SpUpNIC" spectrograph mounted on the 1.9-m telescope at the South African Astronomical Observatory (SAAO) in 2018 and 2020. The radial velocity curves of the components were obtained by cross-correlation method. Than the ASAS light curve and the radial velocity curves of V714 Sco were analyzed using Monte Carlo (MC) method. The absolute parameters of V714 Sco were determined.

VARIABILITY EXAMINATION OF TWO OEA STARS

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Oscillating Eclipsing Algol (oEA) sytems are significant objects that allow us to investigate the evolution status and internal structure of stars by examining the binarity and oscillation structure. Due to the binarity nature of oEA systems, the fundamental stellar parameters (mass, radius) could be determined precisely. Accurate determination of the fundamental stellar parameters is essential to examine the evolution of stars. In addition, eclipsing binaries provide an efficient method to determine non-radial pulsation (NRP) modes. Therefore, in this study, we carried out photometric solutions of two selected well-known oEA stars, AB Cas and RZ Cas by using Transiting Exoplanet Survey Satellite (TESS) light curves. The fundamental stellar parameters of the systems were updated and the oscillating properties were determined by performing frequency analysis. This study is a part of the master thesis EÇ.

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SPECTROSCOPIC ANALYSIS AND CLASSIFICATION OF GALAXY SDSS J152950.65+423744.1

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This abstract presents a study analyzing galaxy 'SDSS J152950.65+423744.1' through spectroscopy and (Penalized Pixel-Fitting) pPXF fitting applied to SDSS data. The analysis classifies it as a spiral galaxy with concentrated star formation at its center, enhancing our comprehension of cosmic evolution. By meticulously examining its spectrum and leveraging the Mapping Nearby Galaxies at Apache Point Observatory(MaNGA) Integral Field Unit(IFU), we ascertain its spiral nature and concentrated star formation. These findings illuminate its dynamic characteristics and deepen our understanding of cosmic evolution.

Keywords: SDSS data, spectroscopy, pPXF fitting, MaNGA, spiral galaxy, star formation.

ORBITAL PERIOD ANALYSIS OF SOME OEA SYSTEMS

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Oscillating eclipsing Algols (oEAs) are priceless targets to determine sensitive astrophysical parameters and probe the stellar interiors through oscillation. Mass transfer and mass losses in such systems cause orbital period changes over the time. Understanding such processes is important in terms of studying the modulations between mass transfer and pulsation, as well as the study of angular momentum changes in binary stars. In this context, some oEAs type systems, which show orbital period changes over the time, were chosen to investigate the physical reasons of this changes. As a result, the most likely factors (e.g. magnetic activity, third body and/or mass transfer and loss amounts) for the period changes of the selected systems are revealed.

This study has been supported by the Scientific and Technological Research Council (TUBITAK) project through 120F330.

PULSATIONS IN A DETACHED DOUBLE-LINED ECLIPSING BINARY

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The double-lined detached eclipsing binaries are unique targets, since they are the tools to estimate precise fundamental stellar (mass, radius) parameters better than any objects. When these systems show pulsations in addition to binarity that makes them significantly valuable. In this study, we present a detailed analysis of a newly discovered double-lined detached eclipsing binary that exhibits Delta Scuti type pulsations. The high-resolution spectra of the system were taken and they used in the radial velocity and spectral analysis. The TESS light curve was analyzed with the results of radial velocity analysis to reveal the binarity and pulsational properties of the system. As a result, the precise fundamental parameters, characteristic of Delta Scuti type pulsations were found and the evolutionary status of the system was modeled.

This study has been supported by the Scientific and Technological Research Council (TUBITAK) project through 120F330.

HYPERBOLIC SCENARIO OF ACCELERATING UNIVERSE IN ANISOTROPIC UNIVERSE

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In this study, one of the anisotropic universe models, the local rotationally symmetric (LRS) anisotropic Bianchi type-V cosmology, is considered in Tsallis holographic dark energy (THDE) and Sáez-Ballester (SB) gravity theory. Furthermore, at later stages, this cosmological model tends towards isotropy and therefore enables the formation of galaxies. We have studied the different forms of deceleration parameters of several researchers. A new deceleration parameter, q, is proposed to represent the phase transition of the universe from early deceleration to current acceleration. We used the Markov chain Monte Carlo (MCMC) method to ensure that the proposed parameter has an optimal value and to verify that the model satisfies the final observational data.

SOLVING PHYSICS PROBLEMS WITH GREEN'S FUNCTIONS METHOD

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In the field of physics, solving a physics problem as much as expressing it through an equation holds utmost importance. Physicists have developed various methods and approaches to solve equations representing these physics problems. For example, we can give Variational Method, Finite Difference Methods and Green's Function Method.In this study, we are focusing on the utilization of Green's functions in solving physics problems expressed through mathematical equations. Therefore, we will primarily delve into topics such as the discovery, historical evolution, and mathematical proof of Green's functions. Additionally, by presenting examples from various physics problems, we aim to elucidate the application methods of these functions. The aim of this study goes beyond Green's functions being solely a method for solving equations; it also aims to explain the underlying physical state.

SOLUTION OF THE ANISOTROPIC RADIATIVE TRANSFER EQUATION WITH SPHERICAL HARMONICS METHOD

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The radiative transfer equation is an integro-differential equation that describes the variation of the number of photons in a certain volume in a medium with time, taking into account the behaviour of photons in a medium such as scattering, absorption, and re-emission as a result of interaction in the medium. In this study, the radiation transfer equation has been considered for finite slab which anisotropic scattering in homogeneous medium. The solution of the radiative transfer equation is done with Chebyshev polynomials from spherical harmonics. The equation is solved for anisotropic systems for many single scattering albedo. The obtained discrete eigenvalues of the equation system are tabulated in the tables. It is shown that the numerical results are in good aggrement with literatüre.

STATISTICAL STUDY ON STEVE, HILDCAA AND TWO-STEP GEOMAGNETIC STORMS ON THE 25TH SOLAR CYCLE

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Strong Thermal Emission Velocity Enhancement (STEVE) is one of the most current phenomena in atmospheric physics. It has been found to have a different mechanism than auroras. It is still a matter of research under which conditions this structure, which rarely appears regardless of the space weather, will be classified. In this study, the possibility of triggering STEVE by anomalies or events that occur during geomagnetic storms and have a direct effect on the earth's atmosphere (High-Intensity Long-Duration Continuous Auroral Electrojet Activity (HILDCAA), Two-step geomagnetic storms) is investigated. Statistical regression models were created using the computer coding programs (R and Python) and geomagnetic storms with various anomalies from the 25th solar cycle. The suitability of the models to reality and data is discussed, and the probabilities that trigger the formation of STEVE are interpreted based on data science.

GRAVITATIONAL WAVES IN MASSIVE HORNDESKI THEORY

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We present field equations corresponding to gravitational waves and their solutions of Horndeski theory with an arbitrary potential in an appropriate gauge choice in the linearized order. These solutions will help us to derive the effects of the arbitrary potential term on gravitational waves in this order. The arbitrary potential plays the role of a mass of the scalar field for this theory. We will compare the obtained solutions with the corresponding solutions of General Relativity, and various alternative gravity theories.

THE DIRAC EQUATION WITH PT/NON-PT SYMMETRIC POTENTIALS IN CURVED SPACE-TIME BACKGROUNDS

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In this paper, we have presented the Dirac equation in the frame of position-dependent mass on two-dimensional gravitational static background in the presence of PT /non-PT-symmetric potential interactions. The exponential metric component has formed the reduced Dirac operator into the general supersymmetric model within mass changing with coordinates. We have obtained the eigenvalues of the Dirac operator for the complex Morse and trigonometric complex Scarf-II potentials SL (2, C) using Lie algebras and the supersymmetric quantum mechanical approaches. Moreover, after obtaining a general Sturm-Liouville-type equation using a convenient mapping, the system has become available to be investigated within η-pseudo-Hermiticity. Within this context, the η operator is found for the examples of complex trigonometric Rosen-Morse potential and complex Morse potentials with real and complex parameters of the initial system and finally, the solutions are obtained for each model with the graphics of energy values and probability densities.

SOLUTIONS OF THE SCHRÖDINGER EQUATION WITH DUNKL DERIVATIVE FOR PÖSCHL-TELLER POTENTİAL

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"Do equations of motion determine quantum mechanical commutation relations? " In his famous 1950 paper, Wigner explored this question, analyzing the harmonic oscillator problem to find an answer. Wigner introduced the Wigner algebra to show whether the equations of motion change with the product of a Wigner parameter and the reflection operator which he included in the quantum mechanical commutation relation. Later, Dunkl-derived quantum mechanics was developed with the work of Yang, Calogero and others. In this study, we solve the Schrödinger equation for the Pöschl–Teller potential, using Dunkl derivative. The wave functions and energy spectra corresponding to this potential will be analytically derived. The obtained results will be compared with the Pöschl–Teller potential Schrödinger equations in the literature by reducing the parameters.

FIRST PHOTOMETRIC RESULTS OF TWO BINARY SYSTEMS SELECTED FROM THE TESS DATABASE

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This study aims to determine the physical and geometrical parameters of Algol type binary systems, V407 Tau and LZ Lyr by photometric analysis using TESS (Transiting Exoplanet Survey Satellite) and ASAS-SN (All-Sky Automed Survey for Supernovae) data. In the literature, there are no spectroscopic and photometric studies for these systems. In this study, the photometric modelling of V407 Tau and LZ Lyr are presented using Wilson-Devinney (WD) code for the first time. The temperature searching was made for LZ Lyr system with convective atmospheres and the temperature of the primary component fixed to be as 5700 K. While a third light contribution to the total light was found in the LZ Lyr system but not in the V407 Tau system in the photometric modelling. Mass ratio values were determined to be about 0.2 and 0.1 for V407 Tau and LZ Lyr systems, respectively. According to the estimated absolute parameters of the components of V407 Tau and LZ Lyr systems, theirs positions and evolution status in the Hertzprung-Russell (H-R) diagram are discussed.

Keywords: Binaries: eclipsing, Algols; stars: individual: V407 Tau and LZ Lyr.

PERIOD VARIATIONS AND PHOTOMETRIC ANALYSIS OF THE Y LEONIS BINARY SYSTEM

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The main objective of this study is to determine the period variations and photometric analysis of the Y Leonis binary system (O-C). For this system, all minimum times found in the literature (BRNO O-C Gateaway) and minimum times obtained with TESS were used. Period variations were determined with eclipse minimum times. The mass ratio of the system is q = 0.34. The orbital period increase dP/dt was found to be at a rate of 1.07*10^-7 days/year. This means that the mass transfer rate from the secondary component to the primary component was found to be dm2/dt = -5.13×10-8 M solar /year.

IONOSPHERIC RESPONSES OF PARTIAL SOLAR ECLIPSES AT MID-LATITUDES

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The ionosphere is a natural plasma layer consisting of ionized gases that freely move in the upper layers of the atmosphere due to solar radiation. During a solar eclipse, the Moon blocks solar radiation. The ionized molecules in the region under the shadow of the Moon combine with the free electrons in the environment. It causes short-term night conditions in the shaded area of the ionosphere. After the end of the eclipse, this region tries to return to its former ionospheric conditions before the eclipse. In this study, the dynamics of the ionospheric response to Partial Solar eclipses on January 4, 2011 and October 25, 2022, over Mid Latitude, are analyzed comparatively. The ionospheric response to two different partial solar eclipses occurring approximately one solar cycle later at the same latitude is interpreted. The total electron content (TEC), critical frequency of the F2 region (foF2), and maximum height of the F2 region (hmF2) values were compared with the averages of one month before and after the eclipse dates, as well as the values on the eclipse day. Ionosonde data was obtained by the Lowell GIRO (Global Ionospheric Radio Observatory) Data Center from stations coded AT138, DB049, EB040, FF051 and RL052 at mid-latitude. The data on the quiet day and on the day of the eclipse were compared. The relationship between the variation of the eclipse with time and the critical frequency of the F2 region (foF2) was examined for different stations and a correlation was found between the two dates.

Keywords: Ionosphere, Solar Eclipse, Total Electron Content.

GALAXY CLASSIFICATION WITH BPT DIAGRAM FOR SDSS GALAXY SAMPLE

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Baldwin-Phillips-Terlevich (BPT) diagram is a scatter plot that displays the emission line ratios of certain spectral lines in the spectra of galaxies. The BPT diagram helps distinguish between different ionization sources in galaxies, specifically between star formation and active galactic nuclei (AGN). AGN's are powered by the supermassive black hole at the galaxies center. The matter falls toward the black hole causes to emit intense radiation at center of the galaxy that could block the light emitted by the rest of the galaxy. HII regions are active star forming regions within galaxies where new stars are born. The young and massive stars in this region emits high energy photons that causes the surrounding hydrogen gas to ionize. Astronomers have been classifying galaxies based on their visual appearance, morphological features, stellar populations on the other hand the BPT diagram focuses on the ionization sources in galaxies and provides information about the ionization mechanisms and physical conditions of the gas in galaxies. It is utilizing the ratios of specific emission lines in the galaxy's spectrum. The traditional BPT diagram compares the [OIII]λ5007/Hβ ratio with the [N II]λ6583/Hα ratio also Extended BPT Diagram known as VO87 incorporates the [S II]λ6717,6731/Hα ratio. In this study we classified 40 galaxies selected from Sloan Digital Sky Survey (SDSS) by the use of BPT diagram, VO87 and WHAN diagrams. We used astroquery, astropy and numpy libraries from the Python programming language to get and analyze the galaxy sample data. Spectrums are visualized by matplotlip. We calculated emission line fluxes for the strong emission lines (SEL's) such as Hβ, OIII[5007], Hα and NII[6583] by using linear continuum and gaussian for each emission line. To compare ionized galaxies we calculated OIII[5007]/Hβ and NII[6583]/ Hα ratios for galaxy samples we selected. After that we assigned NII[6583]/Hα values on x and OIII[5007]/Hβ values on y axis. BPT diagram has two more different comparisons, so we compared (SII[6717] + SII[6731])/ Hα and OI[6300]/Hα ratios to classify Seyfert and LINER galaxies From the galaxies we've selected 40 galaxies, and found that 20 of them are HII region galaxies and the other 20 are AGN galaxies.

THE SATELLITE LIGHT-CURVE SOLUTIONS AND PERIOD INVESTIGATIONS OF THE V404 DRA AND V781 TAU

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This research aims to acquire high-sensitive light curve solutions that occur in the Transiting Exoplanet Survey Satellite (TESS) for V404 Dra and V781 Tau, as well as long-term behavior orbital period investigations for the V781 Tau. In the literature, these systems are called contact binary, and no detailed study has been done on V404 Dra yet. The Wilson-Devinney (WD) program was used to get the physical and geometric parameters of the components of binary systems. We used the MODE3 algorithm to find the best fit to the light curves of each system based on convective atmosphere approval. This might be due to star-spot activity situations; each of the systems has asymmetries in the light curves, so dark spot parameters are determined from solutions. The photometric modeling used the q search method to increase the mass ratio of the V404 Dra system by almost 0.1 steps. Radial velocities were obtained from the literature and combined with TESS photometric data for V781 Tau. Systems mass ratios are calculated as q(ph) = 1.686 (±0.003) and q(sp) = 2.413 (±0.047) for V404 Dra and V781 Tau, respectively. The systems were defined as the W-subtypes of contact binaries, so the degree of contact parameters (f) of the systems was found to be 31% for V404 Dra and 23% for V781 Tau. The absolute parameters of the components were calculated utilizing astrophysical equations for the V404 Dra, as no spectroscopic studies of the system were previously reported in the literature. By combining the radial and TESS data for V781 Tau, we found the absolute values for the system. The absolute parameters of the system were determined to be M2 = 1.78 (±0.03) M□ and, based on the mass values of the primary components of V404 Dra, M1 = 0.44 (±0.01) M□ and M2 = 1.07 (±0.03) M□ for V781 Tau. Evolutionary parameters such as mass, radius, and luminosity were discussed in the Hertzprung-Russell (H-R) diagram. The calculated photometric distances compared with the trigonometric distances of Gaia DR3 (Gaia Collaboration, 2022) were found to be acceptable in error level. In the orbital period investigations for V781 Tau, we found that it has sinusoidal behavior. Furthermore, it is likely that the long-term decrease in orbital period is due to a mass transfer of binary members or may be due to magnetic activity.

Oral Presentations
Medical Physics and Applications

EVALUATION OF 3D-PRINTED BOLUS FOR RADIOTHERAPY USING ELECTRON BEAM THERAPY

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Basal (BCC) and squamous cell (SCC) skin cancers are the most common types of skin cancer. Depending on the primary tumor, the mainstay treatment is surgery or radiotherapy (RT). Photon and electron radiation are used in skin cancer treatment and electron is a type of radiation that is used to treat superficial tumors. Additionally, the bolus is used to increase the dose for superficial tumors. However, the bolus cannot be used for the full skin surface in some areas related to the primary tumor position. Recently, the equivalent of a three-dimensional bolus can be produced for primary tumor localization with three-dimensional printers. We aimed to evaluate the skin doses by using a tool/ device that is made by a three-dimensional (3D) printer instead of a bolus on the phantom. Materials and methods: In the study, ABS (Acrylonitrile Butadiene Styrene) and PLA (Polylactic Acid) materials were chosen as an alternative to the standard bolus material. The dosimetric properties of the printing % 100 infill percentage were analysed experimentally by measuring surface and build up region. The measurements were performed using 6, 9 and 12 MeV electron energies by utilizing Varian RapidArc Linear accelerator (Varian, Palo Alto, California). Markus parallel plate ionization chamber (Markus 23343, PTW Freiburg, Freiburg, Germany) was used with RW-3 solid water phantom (SP34, PTW Freiburg, Freiburg, Germany). The irradiations were performed for a field size of 10 x 10 cm2 electron cone with SSD of 100 cm. Measurements were made at 2 mm depth intervals up to maximum dose depth (dmax) of the each electron energy using solid water slabs , to investigate the variation of surface and buid up region for 3D printed materials and standard bolus. Results: We analyzed PLA and ABS materials by comparing the bolus material. Dose differences for these materials were within ±2% beyond the build-up region for PDD values and within ±1.0% for transmittance dose values. Conclusions: 3D printed boluses are being increasingly used skin cancer radiotherapy. Regarding the current trend of developing personalized 3D printed materials, can reduce the air gap, improve the accuracy and uniformity of dose, and has advantage cost and save time. However, the clinical evidence is not strong and some questions remain unanswered. There is still no consensus on the choice of materials. With the use of any material as a bolus, there is a risk of adverse skin reactions. Further studies are needed to maximize the benefits of the 3D printed materials while reducing acute skin reactions.

This study was funded by the Scientific and Technological Research Council of Turkey (TUBITAK) ARDEB 1001 Grant No 121F335.

Keywords: 3D Printer, Electron beam, Bolus

THERMOLUMINESCENCE DOSIMETERS CALIBRATION WITH PLA CASSETTE PRODUCED IN 3D PRINTING

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Thermoluminescence dosimeters (TLDs) to be used in dose measurements should first be calibrated in order to eliminate the sensitivity differences caused by production. In this study, we used Cesium-137 radioactive source to calibrate lithium fluoride MTS-100 TLDs alloyed with magnesium and titanium. For this aim, the Harshaw 4500 TLD reader system annealed 81 unprocessed TLDs. 81 TLDs were irradiated at a dose of 5 mSv on the slab phantom in a special TLD cassette holder that was produced using 3D printing in order to choose the "calibration dosimeters" (golden dosimeters). TLDs were stored for at least 24 hours after each irradiation. 81 TLDs were read one by one with the help of WinRems® software on the Harshaw 4500 TLD® reader system, and Element Correction Coefficient (ECC) values were found. 10 dosimeters (12.35%) with a sensitivity level of 1% were then seperated from "calibration dosimeters" after reaching a saturation level. The other 71 dosimeters (87,65 %) were seperated as ‘field dosimeters’. “Calibration dosimeters" were irradiated again with a 5 mSv dosage after annealing, and the reader calibration factors (RCC) were found (at a sensitivity level of 1%) from the Calibrate Reader mode of WinRems® software. Thus, the reader was calibrated as well. To find the Element Correction Coefficient (ECC) of the dosimeters allocated as ‘field dosimeters’, they were irradiated again with a 5 mSv dose after the annealing process and the ECC factors were found from the Dosimeter Calibration mode of the WinRems® software. The ones other than ± 1% sensitivity in ECC were separated as ‘bad dosimetry’ (% 2.47). After the TLD calibration processes, 69 dosimeters (85.19%) became ready to be used as ‘field dosimeters’ to determine the critical organ doses.

Keywords: Thermoluminesance dosimeters, Calibration, 3 Dimensional printing

MEASURING THE DOSIMETRIC LEAF SPACING PARAMETER OF THE TREATMENT PLANNING SYSTEM WITH DIFFERENT EXPERIMENTAL SETUP

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Radiotherapy treatment, one of the effective treatment strategies within the fight against cancer, allows cancer cells to be targeted and destroyed with high radiation doses, while healthy tissues are kept at the lowest possible radiation dose level due to the advances and innovations in technology. The current radiotherapy treatment methods of intensity modulated radiotherapy (IART) and intensity modulated arc therapy (IAT) are the results of the application of treatment parameters such as radiation dose rate, gantry rotation and multi-leaf collimator by adjusting them with the help of computer algorithms. The calculation of the radiation dose to be delivered to the cancer cell is performed with those computer algorithms at workstations called treatment planning system (TPS). In order for these algorithms in the TPS to calculate the radiation dose correctly, the linear accelerator device to be used for treatment must be modeled in the existing TPS. Modeling is performed by taking dosimetric measurements specified by the relevant linac manufacturer for the TPS to be used. Measuring these measurements by setting up the correct experimental setups plays an important role in the accurate calculation of the radiation dose by the TPS system algorithms. In this study, "Dosimetric Leaf Gap (DLG)" measurements, one of the parameters required for modeling the Varian Truebeam linear accelerator device in Eclipse TPS, were performed. The aim of the study is to reveal the changes that will occur when the measurement method specified by the relevant company is realized with different experimental setups.

DERIVATION OF MAMMALIAN SODIUM CHANNEL FROM BACTERIAL SODIUM CHANNEL AND ENERGY CALCULATIONS

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Ion channels are proteins that play an important role in the signal transduction and electrical activity of cells. Ion channels regulate the balance between the internal and external environment of cells by controlling the passage of ions across the cell membrane. Ion channels are involved in many diseases and are therefore important targets for drug discovery. In the laboratory setting, it is difficult to find a chemical that selectively binds to ion channels with high affinity. Therefore, simulation methods are used to study the binding properties to ion channels. Using molecular dynamics simulations and free energy calculations, we can obtain an accurate shape of the protein-membrane complex at the molecular level and identify key residues involved in ion binding. In this study, homology structures of Nav1 sodium channels (1.3, 1.4, 1.5 and 1.7), which are prominent in chronic pain, were constructed. Computational results of the validated Nav1 model are compared with experimental values. Ion binding to the validated Nav1 channels was studied and binding free energy values were determined. The results of this study will contribute to the development of new drugs that bind to ion channels. Simulations were performed at the TRUBA cluster of TUBITAK (Ankara).

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INVESTIGATION OF ANTIFOULING EFFECT OF PEG-COATED URINARY CATHETER SURFACES AGAINST PROTEUS MIRABILIS

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The location of urinary catheters in the bladder creates optimal conditions for being highly susceptible to infection. While various types of bacteria (e.g. Escherichia coli, Proteus mirabilis, and Staphylococcus saphrophyticus) present in the urine cause the development of biofilm formation and infection, P. mirabilis (ATCC 15146) is one of the uropathogens produces urease enzyme that catalyzes the formation of ammonium by the breakdown of urine. That process results in the formation of struvite and carbonate apatite crystals that settle on the urinary catheter surface and eventually block the urinary catheter. It has been observed that the ability of P. mirabilis to aggregate on catheter surfaces, together with urease production, facilitates the formation of large crystalline biofilms. Here, we investigate the antiadherent and antibiofilm efficacy of polyethylene glycol thin films produced by plasma enhanced chemical vapor deposition system. Following the coating step, the urinary catheter samples were analyzed to determine whether PEGylation of surfaces was an effective tool against the P. mirabilis adherence and biofilm formation. The PEGylated and commercially available catheter were incubated with P. mirabilis standard strain at 37oC with 10% humidity for 24 hours, 72 hours, 7 days, and 30 days. At the end of predetermined incubation time, the colonization rates of the samples were analyzed. The results reflected a statistically significant rate of inhibition of bacterial colonization; surfaces with a protective PEG coating have significant bacterial inhibition compared to commercially available catheter.

A FRACTIONAL APPROACH TO THE SINGLE-TARGET SINGLE-HIT MODEL

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Radioactivity is used in many branches such as industry, agriculture and science. It is widely used in medicine, especially for medical imaging techniques and treatment of cancerous cells. In this context, radiobiology has been emerged to study the effects of ionizing radiation on living organisms. In radiobiology, the effects of ionizing radiation on living organisms relate with dose. Unit of dose in the International System of Units is Gray. Gray define as the absorption of one joule of radiation energy per kilogram of matter. The damage of this energy to the tissue or organ is defined by cell survival curves. In other words, cell survival curves describe the relationship between radiation and surviving cells. There are mathematical models available to explain this relationship. One of them and the simplest one is single-target single-hit model. In this study, single-target single-hit model is redefined with the help of the fractional calculus and the solution of fractional form of the model has been obtained in terms of Mittag-Leffler function. The relationship between amount of the dose and surviving cells has been investigated experimentally and theoretically..

THE POTENTIAL OF A GAMMA PROBE WITH ACTIVE SHIELDING IN SENTINEL LYMPH NODE DETECTION

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Advances in medical imaging and radiation detection technologies play a crucial role in improving the accuracy of diagnostic procedures. In this context, the aim of this talk is to present the details of the development of a novel active shielding gamma probe for sentinel lymph node (SLN) detection and the performance of the prototype gamma probe, which promises to improve the accuracy of SLN localization. In addition to the counting capability of conventional gamma probes, the active shielding gamma probe can be used to locate the tumor site, lymph nodes, or surrounding lymph nodes around the target lymph node. The active shielding gamma probe consists of a scintillator array, a photodetector array, data acquisition and processing electronics, and a control unit. Active shielding was performed using the veto algorithm, and a low-cost microprocessor was used for signal processing. The analog boards were designed and prototyped as part of this study. The counting and radioactive source localization functions of the gamma probe were tested using the GEANT4 simulation package, and performance parameters such as sensitivity, angular and spatial resolution, and shielding effectiveness of the gamma probe design were determined. The prototype was tested with a Tc-99m radioactive source and the same performance parameters were determined. The performance of commercial gamma probes in the literature is compared with the simulation and prototype data, and the potential of the prototype gamma probe is discussed.

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EVALUATING TARGET COVERAGE AND NORMAL TISSUE SPARING IN THE ARTIFICIAL INTELLIGENCE-BASED PROSTATE RADIATION THERAPY PLANNING

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To achieve tumor control in radiotherapy, protect organs at risk, and accurately assess RT toxicity, contouring of organs at risk and target volume is an indispensable process for creating radiotherapy treatment planning. There are individual differences in the contouring process and the processing time is long. Recently, artificial intelligence-based models have emerged that provide high accuracy in many anatomical regions in a shorter time. In study, it was aimed to dosimetrically evaluate the usability of a new generation automatic segmentation (DirectORGANS) that automatically identifies organs and contours them directly in the CT simulator before creating prostate radiotherapy plans. MATERIAL-METHOD: The CT images of 10 patients were used in this study. All patients had a diagnosis of prostate cancer and underwent radiotherapy. The prostates, bladder, rectum, and femoral heads of 10 patients were automatically contoured based on DirectORGANS deep learning auto-segmentation at the CT simulator. The CT scans were imported into the Eclipse treatment planning system (TPS) for contouring. On the same CT image sets, the same target volumes and contours of organs at risk were manually contoured by an experienced physician using MRI images and used as a reference structure. For each patient, volumetric arc therapy (VMAT) plans were generated using the reference contours (RefPlan). A prescription dose of 74 Gy in 37 fractions was used. The doses of manually delineated contours of the target volume and organs at risk and the doses of deep learning-based auto-segmented contours of the target volume and organs at risk were obtained from the dose volume histogram of the same plan. To evaluate the target volumes, CI and HI were calculated. In critical organ structures, V60, V65, V70 for the rectum, V65, V70, V75, and V80 for the bladder, and maximum doses for femoral heads were evaluated. The Mann-Whitney U test was employed for statistical comparison with SPSS ($P<0.05$). RESULTS: Compared to the doses of the manually delineated contours were compared with the doses of contours delineated by deep learning-based auto-segmented, there was no significant difference between the doses of the organs at risk. However, there were statistically significant differences between HI and CI values due to differences in prostate contouring ($P<0.05$). CONCLUSION: To evaluate the dosimetric impact of using potentially inaccurate artificial intelligence contours directly for treatment planning, the organs at risk and prostates doses were evaluated from planned RefPlan. The study showed that the need for clinicians to edit target volumes using MRI before treatment planning. However, it demonstrated that delineating organs at risk was used safely without the need for correction. DirectORGANS automatic segmentation is suitable for use in RT planning to minimize differences between physicians and shorten the duration of this contouring step.

Key Words: Prostate cancer, Radiotherapy, Deep learning, Auto-segmentation, treatment planning

INVESTIGATION OF PHYSICAL PRINCIPLES AND LAWS APPLIED TO TOMOGRAPHIC IMAGING TECHNIQUES USED IN MEDICAL SCIENCE

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The aim of this study is to examine the relationship between tomographic imaging techniques (magnetic resonance imaging, computed tomography, and positron emission tomography) used in medical science and the basic principles and laws of physical science. Magnetic Resonance Imaging (MRI) works with the interaction of radio waves and magnetic effects when examining tissues. Hydrogen atoms are aligned by the magnetic field and excited by radio waves. As a result of this excitation, the energy emitted from the atoms is detected by special coils and an image is formed. MRI is safe for non-invasive use and does not use ionizing radiation. Computed Tomography (CT) is an imaging method that provides cross-sectional images obtained using X-rays. In CT, a cross-sectional image of certain parts of cells is made using X-rays. CT is used with or without contrast agent. In contrast-enhanced CT, the pathological area can be examined in more detail by using a special chemical substance called contrast agents. Positron Emission Tomography (PET) is a nuclear medicine imaging technique based on the detection of positrons with 511 keV energy by detectors. PET, a physiological imaging method, makes imaging assessments of biological perception on the planet. Since PET provides imaging at the molecular level, PET image gives better quality images compared to other tomographic imaging techniques. This review has been made according to various sub-disciplines of physical science. For example, CT uses thermionic emission for X-ray generation, magnetic resonance imaging uses electromagnetic theory, and PET uses nuclear physics principles. In addition, subjects such as the interaction of the beam with the tissues and the detector systems are closely related to the laws of physics. This study is an important study to understand how and the basic principles of scientific imaging techniques in medicine act with the laws of physics.

Oral Presentations
Nuclear Physics

ISPARTA RADON LABORATORY-RADON CONTROL SYSTEM

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Radiation measurement networks with electronic radon detectors enable real-time indoor atmospheric radon concentration monitoring. For a radon monitoring system, it is desired to have a mitigation feature that can automatically reduce radon-related radiation exposure in indoor environments when needed. In this study, IRL-RKS (Isparta Radon Laboratory-Radon Control System), which was developed to control indoor atmospheric radon concentrations without the need for human intervention, is introduced. IRL-RKS is an IoT-based indoor radon control system that can measure and monitor indoor atmospheric radon levels continuously and simultaneously and can activate the ventilation unit automatically in places where radon concentrations above the pre-assigned reference levels are detected. IRL-RKS architecture and the operation of the system are presented in detail in this work. The proposed automation, which can be operated online from a control centre, is suitable for use in all enclosed spaces with internet access.

RADIOLOGICAL EFFECTS OF PHOSPHOPHYPS RELEASED BY PHOSPHATE FERTILIZER PRODUCTION

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Earth crust origin rocks contain different concentrations of 226Ra, 232Th and radioactive potassium according to their mineralogical and geological structures. It is known that the concentration of 226Ra is high in phosphate rocks. Phosphogypsum is created when phosphate rocks are chemically reacted with sulfuric acid (H2SO4). The resulting phosphogypsum contains a high concentration of radium. In this study, the radioactivity analysis was performed on phosphogypsum samples, which is formed as a by-product during the production of phosphate fertilizer. Gamma spectrometric method was used for measurements. The radioactivity concentrations of 226Ra, 232Th and 40K were determined as 1131.2 ± 24.9 Bqkg-1, 25± 4.9 Bqkg-1and 140.45 ± 11.2 Bqkg-1, respectively. According to the UNSCEAR 2000 report, the average gamma dose rate worldwide is 60 nGyh-1. The value calculated by considering the activity concentrations in this study is approximately 9 times the world average.

Keywords: Radioactivity, Phosphate Fertilizer, Phosphophyps, Radioactivity, Gamma Spectrometry

DETERMINATION OF NATURAL POTASSIUM CONTENT OF HAZELNUT SAMPLES BY GAMMA SPECTROMETRIC METHOD

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Potassium element is vital importance for human health. The best way to get enough potassium is to eat a healthy diet with a variety of foods. Therefore, it is important to know the amount of potassium contained in foods. Optical spectroscopy methods are the common method used to determine the mineral content of foods. This requires special devices and very complex operations. Potassium, an essential element, makes up 2.6% of the earth's crust. While the unstable 40K isotope constitutes 0.0117% of natural potassium, 39K is 93.26% and 41K is 6.7238%. The half-life of the 40K radioisotope is 1.28x109 years. With the Gamma Spectrometric method, the radioactivity of 40K from the γ peak at 1460 keV is measured and the natural potassium amount in the relevant sample can be determined by utilizing the known half-life of 40K. In this study, total potassium amount in hazelnut samples, which are known to be rich in potassium, was calculated by gamma spectrometric method with NaI (Tl) detector. In three different samples measured, the 40K activity was 137.76 Bq/kg, 127.06 Bq/kg and 86.31 Bq/kg, respectively. Taking advantage of the activities, the natural potassium content of the relevant samples is 4430 mg/kg, 4090 mg/kg and 2770 mg/kg, respectively. With the gamma spectrometric method, the amount of potassium contained in the food consumed can be directly measured. This method is easier, faster and more sensitive than other methods.

Keywords: Gamma Spectrometry, health, hazelnut, 40K, potassium

PROGRESS IN PROTECTIVE GLASS SHIELDING FOR MAMOGRAPHY SCANS

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Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer-related deaths in women. The most effective and accurate method for detecting breast cancer is through mammography screening. However, there is a risk of unnecessary radiation exposure to the other breast due to the high sensitivity of the glandular tissues in the breast to radiation and the scattering of X-rays during the mammography procedure. Therefore, it is important to have a shielding structure placed between the two breasts to protect the other breast from excessive radiation dose. The primary characteristic of the shielding material is to attenuate the incident X-ray flux, which can be achieved through some high-density materials such as composites and, nowadays, glasses. Glass shields can be employed as a means to prevent the transmission of radiation to the other breast and reduce the unnecessary radiation dose. This study aims to present the recent developments and applications of glass shields for medical purposes.

SYNTHESIS AND CHARACTERIZATION OF DY3+ DOPED BA3CDSI2O8 FOR THERMOLUMINESCENCE DOSIMETRY

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When selecting a suitable and practical dosimetric material for luminescence research, there are numerous considerations. Due to its benefits like simple synthesis, good thermal quenching, high chemical stability, and optimal excitation and emission wavelengths, silicates, one of the most important compounds, are widely utilized as the matrix of inorganic phosphors [1,2]. Due to their remarkable storage luminescence qualities for dosimetry and water resistance and chemical stability, alkaline-earth silicates are particularly suitable compounds as radiation detectors [3-6]. In this study, Ba3CdSi2O8 phosphor doped with Ce, ions with different doping concentrations as 3%, 4%, 5%, and 6% was sensitized by using solid state method. X-ray diffraction (XRD) of the synthesized phosphor was obtained to understand crystalline structure, nature of the phase, lattice parameters and crystalline grain size. To investigate its thermoluminescence (TL) characteristics glow curve of the phosphor was evaluated. Moreover, the order of kinetics (b), trap depth (E) and frequency factor (s) has been conducted using computerized glow-curve deconvolution (CGCD) method.

FINITE TEMPERATURE DENSITY FUNCTIONAL THEORY: INVESTIGATION OF PAIRING AND NORMAL DENSITIES IN CA HYPERNUCLEUS

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In this study, we explore the ground state properties of the Ca hypernucleus under varying temperatures through a density functional theory framework. The investigation involves an analysis of both normal and pairing densities. For the nuclear aspect, Skyrme-type interactions are employed, while the hyperon sector is approached using the Brueckner-Hartree-Fock theory. Our findings reveal a noteworthy pairing phase transition as the system shifts from a superfluid state to a normal state. This critical shift materializes precisely at distinct temperature thresholds, providing intriguing insights into the thermodynamic properties of Ca hypernucleus and the underlying mechanisms governing phase transitions in such complex system.

DETERMINATION OF GOLD SETTING BY ED-XRF ANALYSIS

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Gold can be found in different proportions in the content of jewelry or jewelry. The ratio of gold in jewelry is known as the golden carat. Also called imitation or fake: There are also non-golden, gold-looking jewelry and jewelry inside. Some historical artifacts obtained during historical excavations also contain gold, and in some cases their health also needs to be examined. The aim of this study is to determine whether the jewels and precious artifacts containing or made of gold are real gold and the setting of the gold used is determined without destroying the material. To determine a new "standardized" analysis method with ED-XRF spectrometer for the determination of gold tuning and counterfeit, imitation gold materials used in various fields. Energy-differentiated X-ray spectrometer (ED-XRF) will be used to determine the amount of gold and other elements in the gold jewelry. ED –XRF was chosen because it is a suitable method for high-precision elemental analysis across a wide range of elements. The ED – XRF test setup to be used has a silver-targeted X-Ray tube with a maximum power of 4 W, capable of operating with a voltage of 10 – 50 kV and current in the range of 5 – 200 μA. The system provides detection with SDD (Silicon Drift Detector) with a resolution that detects X-rays in the range of 1 - 25 KeV with an efficiency of over 25% and can provide 125 eV YYTG (Full Width at Half Height) at 5.9 KeV.

CHARACTERIZATION OF GAMMA-RAY TRANSMISSION FACTOR VALUES FOR SOME BOROSILICATE GLASS SAMPLES THROUGH MCNPX CODE

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As a significant component of radiation, gamma rays are utilized in numerous industrial and medical applications. For the development of radiation shielding systems and the preservation of human health, the accurate calculation of the gamma-ray transmission factor is crucial. The Monte Carlo method is extensively used to model the interaction between gamma rays and matter. This investigation used Monte Carlo simulation to determine the gamma radiation transmission properties of the 7B2O3-50SiO2-38X-5BaO (X = Sb2O5-Rb2O-Cr2O3-Co3O4) glass structure, which are marked by BSBaSb2O5, BSBaRb2O, BSBaCr2O3, and BSBaCo3O4 codes. This factor represents the interaction of gamma rays with materials in the glass structure and the quantity of radiation that passes through the glass structure. Additionally, radiation shielding parameters, such as linear attenuation coefficients (LAC), mass attenuation coefficients (MAC), mean free path (MFP), effective atomic number (Zeff), effective electron density (Neff), half-value layer (HVL), and tenth-value layer (TVL), were determined for 0.015–15 MeV gamma-ray energies by utilizing the Py-MLBUF software. These parameters represent the protective measures used to reduce the effect of the gamma rays of the investigated glass structure on human health. Radiation shielding parameters were computed using the material composition, thickness, and other characteristics of the investigated glass structure. This study presents findings indicating that BSBaCo3O4 glass material exhibits greater resistance to gamma rays compared to other glass structures that were examined, thereby contributing to the existing literature on the topic.

GROUND-STATE MAGNETIC MOMENTS OF 237,239NP ISOTOPES

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In this study, we utilized the Quasiparticle Phonon Nuclear Model (QPNM) approach to determine the magnetic moments of the ground state with a 5/2+ [642] configuration in the 237,239Np isotopes. Our calculations revealed that the ground state of 237Np and 239Np, with a spin of 5/2+, possesses magnetic moments of μ=2.90 μN and μ=2.88 μN, respectively. These results were obtained by consistently employing the Z/A value for the rotational gyromagnetic ratio (gR). Remarkably, our theoretical findings are in good agreement with the experimental values of μ=+3.14±0.04 μN [1] for the 237Np ground-state magnetic moment (an estimation of μ=+2.8 μN [2] was also reported) and μ=+2.03±0.25 μN [3] for the 239Np ground-state magnetic moment (an estimate of μ=+1.45 μN [4] was previously suggested). The consistency between our theoretical and experimental results demonstrates the accuracy of the QPNM approach in predicting nuclear magnetic moments, providing valuable insights for future experimental investigations.

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AN OVERVIEW OF LANTHANIDE DOPED GLASSES THROUGH CHARACTERISTIC MATERIAL PROPERTIES IN RADIATION SHIELDING APPLICATIONS

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Lanthanides which take part in the 4f block of periodic table are known as rare-earth elements. Lanthanides which have relatively high densities are the preferred elements in radiation shielding applications. Glasses exhibit outstanding physical, structural, and optical properties in wide range of applications when they are doped with lanthanide group element's oxides. Furthermore, glasses have been attracting significant interest in scientific, technological and industrial efforts due to properties such as; relatively easy to be synthesized, optically transparent or translucent appearance and high chemical and mechanical stability. In this study, the process of synthesizing of lanthanide doped glasses (in the range from 0% to 20% mol) and analysis of physical and shielding performances of them would be reported.

Keywords: Glass science, lanthanides, rare-earth elements, radiation shielding.

INVESTIGATION OF GIANT DIPOLE RESONANCE (GDR) IN PSEUDO-MIRROR 168HF AND 160ER NUCLEI

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Pseudo-mirror nuclei with particle-hole symmetry have the same NpNn numbers. It has been showed that nuclei with equal NpNn values in various mass regions exhibit symmetrical features at low energy excited states. The NpNn number is a symmetry indicator and depends on the number of valence nucleons (or holes) from the nearest closed shell. This work examined whether GDR, the high energy excitations, show symmetrical properties for nuclei with the identical NnNn number. E1 dipole strengths, photo-absorption cross sections up to 20 MeV and GDR properties of 168Hf and 160Er have been calculated in this work using Translational and Galilean Invariant Quasiparticle Random Phase Approximation (TGI-QRPA) and have been compared for 168Hf-160Er pseudo-mirror nuclei. The photoabsorption cross-section results show two-peak shape occurs that K = 0 and |K| = +1 modes split since deformation for each nucleus furthermore the centroid energies and the widths of these peaks are also reproduced well. Theoretical calculations were also compared to TALYS code results because no experimental data existed. GDR properties (cross-section, energy, and width) of these pseudo-mirror pairs nuclei were found to show similarities. *This study was supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK) under Grant No. 122F317

NEUTRON ABSORPTION PROPERTIES OF ZIRCALOYS AS FUEL ROD AND FUEL COATING MATERIALS IN NUCLEAR REACTORS: A MONTE CARLO SIMULATION STUDY

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Zircaloy is a highly prevalent zirconium alloy utilized in nuclear reactors, primarily composed of zirconium with additional minor alloying elements. The choice of a zirconium alloy and its specific composition is determined by the requirements of the intended use and the surrounding environmental conditions in which it will be utilized. This study presents a comprehensive examination of zirconium alloys, specifically Zircaloy-2 and Zircaloy-4, utilizing mechanical properties analysis and advanced Monte Carlo simulation techniques. The utilization of MCNPX (version 2.7.0) is employed for the design of fuel rods and radiation sources. The fuel rod slab is utilized as a means of reducing the intensity of radiation between two F4 Tally Meshes. The neutron transmission factor (nTF) and gamma-ray transmission factor (TF) are assessed across different energy values. Zircaloy-2, one of the alloys under investigation, is being discussed in relation to its properties of minimum neutron attenuation. Based on research, it has been observed that Zircallloy-2 and Zircaloy-4 demonstrate comparable neutron transmission characteristics. This similarity is noteworthy as it pertains to the neutron chain reaction occurring within the reactor involving Zircallloy-2 and Zircaloy-4. When comparing the hydrogen absorption capabilities of Zircaloy-4 and Zircaloy-2, it is evident that Zircaloy-4 exhibits significantly lower absorption rates, amounting to less than half of those observed in Zircaloy-2. This notable difference in hydrogen absorption between the two alloys positions Zircaloy-4 as a noteworthy material, particularly due to its favorable absorption and mechanical properties. Despite the fact that Zircaloy-4 demonstrates a notably reduced propensity for hydride formation when compared to Zircaloy-2, it remains employed as a material for nuclear fuel cladding. The incorporation of sophisticated research methodologies may potentially yield a decrease in neutron absorption properties exhibited by alloys utilized in the manufacturing of materials necessitating elevated levels of durability and resistance to corrosion. The endeavor to reduce hydrogen absorption is of particular significance.

INVESTIGATION OF SOME OXIDE COMPOUNDS IN GLASS SYNTHESIS ON SHIELDING PROPERTIES FOR COSMIC RADIATION THROUGH THE OLTARIS PROGRAM

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OLTARIS is a program developed by NASA to assess the effects of cosmic radiation in space. The OLTARIS code is a program that aims to provide effective shielding against cosmic radiation. This study aims to provide better protection against cosmic radiation by investigating the shielding properties of oxide contributions. Oxide contribution is a topic being studied for cosmic radiation shielding. In glass sciences, oxide contribution can be used to enhance or optimize the radiation absorption properties of shielding materials. This study aims to analyze the contribution of different oxides to shielding properties against cosmic radiation through OLTARIS code.

OVERVIEW OF CRITICAL MATERIAL PROPERTIES OF GLASS IN RADIATION SHIELDING APPLICATIONS

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Radiation shielding is of great importance in a variety of applications, including nuclear power plants, medical imaging and space exploration. Radiation shielding is essential to minimize exposure to harmful radiation. Traditional shielding materials such as lead and concrete are widely used, but their limitations have led to conduct the scientific and technological research and development efforts for alternative materials. Glasses have emerged as promising candidates for radiation shielding due to their advantageous properties such as high density, good mechanical strength and excellent transparency as well as the easy synthesizability with many elements. Glasses are synthesized with high atomic number elements to improve effective radiation shielding potential. While this study aims to provide a comprehensive overview of the critical material properties expected from glass materials in radiation shielding applications, it also presents its potential as radiation shielding material, particularly highlighting the unique properties and advantages of telluride-based glasses.

ASSESSMENT OF GLASS SHIELDING FOR COSMIC RADIATION AND SPACE APPLICATIONS USING OLTARIS CODE

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The OLTARIS code, developed by NASA, provides information about the per day or per year dose values, radiation values of habitats, rovers, and spacesuits etc, radiation protection provided by materials exposed to cosmic radiation, the equivalent dose amount caused by this radiation protection on an organ basis, and the risk assessment resulting from this dose amount. Optical, structural, electrical and chemical properties of glass materials together with easy manufacturability, and synthesizability have been attracting significant research and technological efforts on the use of glass materials to be employed as radiation shielding materials in the past couple of years. In this study, the protective properties of the C40 glass sample and Soda borosilicate, Soda lime, and "Pyrex" borosilicate glasses under Mars atmosphere conditions were analyzed using OLTARIS code and the results were compared. It is shown that Soda Borosilicate glasses provide the best protection against space radiation among the studied samples.

A CLOSER LOOK AT SHIELDING APPLICATIONS OF GLASSES FOR VARIOUS PURPOSES: A METHODOLOGICAL REVIEW

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The significance of radiation shielding is paramount across multiple fields, encompassing nuclear power facilities, medical imaging procedures. The implementation of radiation shielding is imperative in order to mitigate the potential risks associated with exposure to hazardous radiation. Glass materials that have been synthesized using elements with high atomic numbers demonstrate significant potential for effective radiation shielding. Glass materials have recently gained attention as potential contenders for radiation shielding owing to their favorable characteristics, including high density, strong mechanical properties, and exceptional transparency. The primary objective of this study is to offer a thorough examination of the methodological highlights such as simulation phases, caracterization stepts and other crucial information on shileding studies through glass materials.

Keywords: Monte Carlo simulations; Radiation Shielding, glass materials, tellurite glasses

ZINC-TELLURITE GLASSES: A BETTER UNDERSTANDING OF THEIR ROLE IN ALPHA-PROTON STOPPING APPLICATIONS: A COMPREHENSIVE STUDY

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Incorporation of Indium (In) and Tantalum (Ta) for various zinc-tellurite glass groups such as TZI and ZTT for nuclear applications, we present the behavioral changes and symmetric enhancement on KERMA, mass stopping power and projected range parameters against heavily charged particles by Indium (In) and Tantalum (Ta) incorporations. For the determination of the investigated attenuation parameters for alpha and proton particles, SRIM and PAGEX codes are used. Due to the increase in kinetic energy, KERMA calculations indicate that the ZTT7 sample has the highest release of charged particles. All absorbent glass materials increase their mass stopping power from 0 MeV to 0.1 MeV. At a kinetic energy value of 0.1 MeV, TZI and ZTT reached their maximum mass stopping power. The ZTT7 sample exhibited lower mass stopping power and projected range values against proton particles than that of the other samples, although comparable behaviors are observed for different energy values on the energy scale examined. It can be concluded that zinc telluride glasses can be considered as a promising material for the stopping of protons and alpha particles due to the maximum Ta reinforcement. In addition, the Ta enhancement can be considered as a monotonic tool in the sense of providing a symmetry for the enhancement of the attenuation against heavily charged particles.

IBM-1 CALCULATIONS ON SOME STRUCTURE PROPERTIES OF EVEN-EVEN HG ISOTOPES

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The Interacting Boson Model-1 (IBM-1) is actively used to calculate the nuclear structure properties of even-even nuclei. In this study, IBM-1 calculations were performed for some properties such as the energy levels, electromagnetic transition states of even-even Hg isotopes. Their energy ratio, R_(4⁄2)=E(4_1^+)/E(2_1^+) in the ground state band were analyze to see their behavior along isotopic chain. The parameters of model Hamiltonian were fitted to the recent experimental data to calculate the energy levels for each isotopes. Later, their B(E2) transition values were calculated by fitting the boson effective charges. The calculated results were compared with the experimental data and they are well agreement. Finally, the ratios of R_L=E (L+)/E(2_1^+) in the ground state band were investigated as a function of angular momentum (L) by comparing and we obtained good agreement results with the experimental data.

Keywords: Hg isotopes, energy levels, B(E2) values, IBM-1 model.

DETERMINATION OF GAMMA RADIATION SHIELDING CHARACTERISTICS OF SOME TIC-BASED NANOCOMPOSITE POLYMER MATERIALS

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In this study, it is aimed to develop an shielding material to be used as an alternative to lead in order to reduce the harmful and deforming effects of gamma radiation for living things. Absorption tests of TiC-containing polymer material were performed at different photon energies. The material was exposed to gamma rays emitted from Cs-137 gamma radioisotope with 661.62 keV energy and Co-60 (1173.2 and 1332.5 keV) radioactive sources. Measurements were taken with a thallium-doped NaI detector. By using Beer lambert's law, shielding parameters such as linear attenuation coefficient (μ), half-value layer (HVL), tenth-value layer (TVL), and effective atomic number (Zeff), mean free path, effective atomic number were calculated.

EXPLORING LEAD-FREE SHIELDING MATERIALS: GAMMA AND NEUTRON SHIELDING PROPERTIES OF LITHIUM BORATE-NEODYMIUM OXIDE DOPED SILICON DIOXIDE GLASS

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In recent years, researchers have been focusing on discovering and designing lead-free materials to replace the conventional protective material, lead. The primary reasons for this shift are its toxic effects on the human body, its potential to cause postural imbalances due to its weight, and its contribution to environmental pollution. When selecting a suitable shielding material, key parameters include atomic number, density, cross-section, cost-effectiveness, and application flexibility. In this study, the gamma and neutron shielding properties of silicon dioxide (SiO2) glass materials doped with various ratios of lithium borate-neodymium oxide (Li2B4O7-Nd2O3) have been investigated at different energy levels. The results obtained from the GATE simulation modelling were compared with XCOM values. Neutron effective removal cross sections (ΣR) were also calculated using the MRCsC and Phy-X/PSD programs, and the obtained results were compared with materials such as water, concrete, paraffin, and steel.

DEVELOPING RADIATION DETECTION SYSTEM FOR OIL AND GAS INDUSTRY

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Naturally Occurring Radioactive Material (NORM), comprising radionuclides from the U-238 and Th-232 decay series, is present in natural materials. Natural radioactive sources are found in the Earth's crust, soil, water, air, human body, and environment, emitted also from high-energy cosmic rays originating in space. Uranium, thorium, potassium, radium, and radon radioactive elements are continuously found within the Earth and atmosphere. NORM radiation affects various industries including oil, gas, fertiliser, construction, coal and metal mining, and the recycling sector. Crucially important is the safeguarding of both the environment and the well-being of workers, while also preventing the surpassing of their annual radiation dose limits. Some NORM materials have the potential to pose significant health risks to workers and result in radioactive contamination in the environment. Therefore, it is essential to establish and enforce radiation control measures and regulations within these industries. In this study, a Geant4-based GATE simulation program is utilised to create a model for the advancement of a cutting-edge radiation detection system, aimed at efficiently measuring NORM radiation. To achieve this, new-generation scintillation materials with multiple layers are optically combined with flexible silicon-based electronics. Consequently, this device can be easily integrated into the pipelines, especially within the oil and gas industry, to measure NORM radiation.

APPLICATION OF HIGH ENTROPY ALLOYS (HEAS) IN NUCLEAR REACTOR TECHNOLOGY

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Nuclear reactors have parts with different functions and materials with different properties are needed in these parts. Material used in a nuclear reactor should basically have three properties. These; high radiation shielding, high corrosion/oxidation resistance, high creep resistance. In the next generation reactors, the life of the reactor is longer than in old type reactors. For example, the residence time of the fuel in the reactor has increased from 3 to 5 years. This is completely related to the performance of the materials used. It will be possible to prolong the life of nuclear reactors, minimize their damage to the environment, and develop new generation materials. A recently discovered new alloy class, high entropy alloys (HEA), has attracted the attention of many researchers. HEAs are obtained by adding equimolar elemental fractions of 5 or more elements. It exhibits excellent properties in HEAs compared to conventional alloys. HEAs has high strength, excellent wear resistance, unusual fatigue resistance, low temperature resistance, good corrosion resistance, antioxidation and excellent microstructural stability. In the last ten years, numerous scientific studies have been conducted on the properties of HEAs. Their superior performance compared to conventional alloys has shown that HEAs have a high potential for use in nuclear reactors. Although there are many studies on the creep and corrosion/oxidation behavior of HEAs in the literature, there are very few studies on their radiation shielding properties. Further studies examining the radiation shielding properties of these alloys are needed before HEAs can be used in nuclear reactors. It is thought that HEAs will be higher performance alternative alloys instead of Zirconium and Titanium alloys used in nuclear reactors. In this study, considering the previous studies, the potential of using HEAs in nuclear reactors will be discussed.

A STUDY ON THE HEIGHT DEPENDENCE OF INDOOR RADON

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Inhalation of radioactive radon and its decay products is associated with the formation of lung cancer. Radon tends to accumulate in buildings with poor ventilation and higher radon concentrations can be observed in enclosed spaces near the ground. In the present work, the variation of indoor atmospheric radon concentration according to the height is investigated at IRL (Isparta Radon Laboratory), which is located on the ground floor of the Physics Department at Süleyman Demirel UNIVERSITY. For this purpose, 3 electronic radon detectors (Wave Radon detectors by Airthings) were placed at IRL on the measurement points with different heights (the one at the bottom; 15 cm above the laboratory floor, the one in the middle; 120 cm above the floor and the one at the top; 240 cm above the floor). Hourly radon measurements were carried out between November 1, 2021, and December 21, 2021. When the averages obtained from the 52-day measurements were examined, it was found that the radon level on the laboratory floor was 303Bq/m3, the radon level at the respiratory level was 220Bq/m3 and the radon concentration on the ceiling of the laboratory was 212Bq/m3. Thus, it has been shown that the indoor radon concentration decreases as the height increases. Additionally, all the data obtained during the measurement process were statistically analysed using SPSS 29.0. According to one-way analysis of variance (one-way ANOVA) tests, it was revealed that the radon concentration on the floor had a statistically significant difference compared to the radon levels both in the respiratory level and the ceiling ($p<0.05$). Thus, this provides a piece of statistical evidence that radon accumulates more on the ground since it is heavier than air.

DETERMINATION OF MULTIPLICATION FACTOR WITH ENRICHMENT FOR AN ENRICHED URANIUM REACTOR

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The criticality of a nuclear power reactor is one of the most important factors to consider in any nuclear world. The multiplication factor, k, sometimes called the survival factor f, is the crucial parameter for achieving criticality. There are many factors affecting the criticality and the calculation of k: The thermal fission factor (η), the resonance escape probability (p), and the thermal utilization factor (f) are some of them. Implicitly, the moderator-to-fuel ratio (NMF) and the uranium-235 enrichment percent are what all these factors depend on. In order to determine the effects of these various parameters and to illustrate the relationship between these implicit factors and their impact on nuclear reactor criticality, a computational method is applied, and the uranium-235 enrichment from 0.7 percent (uranium percent in nature) to 5.0 percent by weight (the maximum allowable in LEU) is examined to calculate the multiplication factor with the corresponding size and mass of the system under investigation. The minimum enrichment for a range of NMF as well as the minimum NMF ratio for a range of enrichment have been considered for criticality as an optimization problem. Results are presented in Tables and Graphs, and the optimum conditions for criticality have been discussed.

Oral Presentations
Physics Education and Applications

WIRELESS COLOR CONTROL FOR RGB LED WITH BLUETOOTH AND ARDUINO

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The aim of this study is to utilize Bluetooth and Arduino to control colors in both RGB LED and different colored LEDs, with the objective of achieving a wide range of colors. The study intends to showcase the wireless control capabilities of both RGB LED and LEDs through an Android application and Bluetooth connectivity. The decision regarding which color to activate will be based on the acquired data. To accomplish this, we have designed two circuits. The first circuit comprises Bluetooth, 3 Mosfets, an RGB LED, and the Android application. The second circuit consists of Bluetooth, 3 Mosfets, various LEDs, and the Android application. Our research will demonstrate the seamless exchange of information wirelessly through Bluetooth using the Android application. It will provide insights into primary, intermediate, and secondary colors, highlighting the composition of intermediate colors using primary colors.

DRUNK DRIVING PREVENTION SYSTEM

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When individuals consume alcohol above a specific threshold, they experience intoxication and exhibit involuntary behaviors, posing a risk of accidents when operating vehicles. In order to prevent intoxicated individuals from driving, traffic police officers conduct alcohol tests and prohibit them from operating vehicles. Our study introduces a distinctive aspect wherein a specialized circuit installed in vehicles measures the alcohol levels of drivers. If the alcohol level exceeds a predetermined limit, the system provides both audible and visual alerts to the drivers. Additionally, an LCD screen within the driver's field of vision displays the alcohol level, serving as a warning. The primary objective of our study is to enhance awareness regarding the hazards of alcohol consumption and foster the promotion of responsible driving by avoiding alcohol impaired situations.

VILLAGE SCHOOL EXPERIENCES AND OBSERVATIONS OF A PHYSICS ACADEMICIAN

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In this presentation, it is aimed to draw attention to the advantageous aspects of new situations as the changing teacher characteristics, the decreasing number of students in village and town schools that arise due to the intense migration from rural to urban areas. The positive and negative aspects of village schools will be discussed in the light of the observations made during the school visits. Despite the declining population and the negativities related to bussed education in rural settlements, it is seen that there is an opportunity to provide one-to-one education to a relatively small number of students. It is also observed that the advantageous aspects of these schools have increased thanks to the diversity in the equipment of the new generation teachers and the facilities offered by the communication technologies. Advanced academic studies are becoming more and more common in today's society. Accordingly, the importance of subjects such as science literacy, technology literacy, health literacy, and mathematical literacy for schools in rural areas is increasing day by day. It is clear that the interviews made by academicians with students and teachers in villages, towns and districts will fill an important gap. It has been observed that the academicians introduce leading scientists, especially in basic sciences such as physics, chemistry, biology and mathematics, to students at an early age and answer their questions by mentioning their studies, keeping students' interest in science stronger. In the presentation, the "Village College" approach will be discussed, in which practices that encourage and arouse curiosity to learn new concepts in the field of science together with basic concepts even at primary school level, support recognizing and understanding the methods of scientific studies. Additionally, it will be tried to put forward a perspective for the future by including a critical evaluation of the current situations.

VARIATION OF MEMRISTIVE BEHAVIOR OF BST THIN FILM GROWN BY RF SPUTTER TECHNIQUE ACCORDING TO SUBSTRATE TEMPERATURE

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Passive circuit elements in electronics are four basic variables; It is defined by the binary relations between current, voltage, charge and magnetic flux. Although it is accepted that it consists of three basic elements in electronics, Leon Chua theoretically foresaw the existence of the memristor in his article titled "missing circuit element found" with the prediction of a relationship between magnetic flux and charge from these binary relations [1]. In 2008, after HP employees announced that the I-V features of the TiO2-based device belong to the memristor, the interest in the memristor is increasing due to its potential usage areas [2]. BST film is a metal oxide dielectric material with ferroelectric and paraelectric properties, consisting of a combination of BaTiO3 and SrTiO3 materials. The ferroelectric and paraelectric properties of the material are changed by changing the Ba-Sr ratio in the structure. And again, depending on the effect of the change in this ratio, the efficiency of the structure in the resistance switching circuits is changed. In addition, a study by Waser et al. shows that oxygen vacancies in the structure, cause resistance deterioration in the structure [3]. BST-based studies that are structurally memristive are limited in the literature. Ba0.5Sr0.5TiO3 composition was the subject of this study because different compositions of BST film exhibit different memristive behavio. BST thin films were grown using RF sputter technique at three different substrate temperatures at 300, 400 and 500C. After the growing process, annealing was done at 100 and 300C and I-V(t) measurements were taken. Before and after heat treatment, I-V(t) measurements were made and the changes in the memristive behavior of the samples were examined. As a result of the measurements, only memristive behavior is observed for the annealed state of sample 991 at 300C, while memristive behavior is observed for both samples 992 and 993 for all conditions. It was observed that sample number 993, which was grown at 400C, had the best memristive properties. Although sample 995 exhibited memristive properties, it was noted that the hysteresis opening was less than sample 993. Thus, it was observed that the samples grown at different substrate temperatures exhibited different memristive behavior. Structural analyzes of the samples were made by making optical spectrum measurements, AFM measurements and EDX measurements. As a result of the structural analysis measurements, it was observed that the substrate temperature had an effect on the structure of the grown film and the memristive behavior was associated with the substrate temperature.

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THE HISTORY OF TURKISH ASTRONOMY'S PIONEERING A NAME: DR. HASAN TAYŞİR (1923-1984)

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He was born in 1923 in Rhodes Island. He graduated from Kabataş Boys High School and Higher Teacher's School, Department of Mathematics and Astronomy. He started his doctorate in Istanbul UNIVERSITY, Faculty of Science, Department of Astronomy in 1945 and then he was awarded the title of doctor in 1949. He is the first doctoral student to graduate from Ord. Professor Dr. Wolfgang Gleissberg and the owner of the fourth doctoral thesis in the department of Astronomy. With the UNIVERSITY reform since 1933, the interaction of Turkish people with foreign staff coming to our UNIVERSITY has provided the development of department students in astronomy. Dr. Hasan Tayşir is one of the first astronomers to work with a foreign lecturer. He was appointed to the Kandilli Observatory in 1949. He worked as Mülazım, Chief Assistant and Deputy Director for 18 years. He played an important role in launching the first scientific and pioneering march in the field of astronomy in Turkey. He produced three works from Kandilli Observatory Time Department publications. He is the first person to calculate Turkey's latitudes and longitudes and prayer times. He is also one of the twelve founding names of the Turkish Astronomy Association (TAD). He resigned from his post in 1962 and went to Germany. Between 1962 and 1983, he worked at Siemens in the field of computing and programming and he retired. Dr. Hasan Tayşir's life and public service are just vaguely, inaccurately, or very little recognized. His life, activities, professional life, and contribution to the history of Turkish astronomy were all covered in this study, which was put together using material from his register, other sources, and information from his offspring.

Poster Presentations
Atomic and Molecular Physics

SPECTROSCOPIC (FT-IR, RAMAN, NMR AND UV/VIS) AND QUANTUM CHEMICAL CALCULATIONS ON 5-BROMOSALICYLALDEHYDE

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We are interested in the 5-Bromosalicylaldehyde (99,5%), which was acquired from the Sigma-Aldrich firm and utilized without any purification, from the perspective of biological activities. The single bonds C4 - C10 and C5 - O2 in the structure of the mentioned molecule were rotated by the angle at 10o changes from 0 to 360o using the Molecular Mechanics Force Field methodology in the Spartan computer software. The four (4) alternative conformations emerged at the conclusion of the computations. The geometry optimization of modifications for each conformation was computed using the DFT/B3LYP technique and the Gaussian 09 program's 6-311++G(d, p) basis set. The energy and dipole moment of the molecular 5-Bromosalicylaldehyde's most stable form was determined to be -1879057,42 kcal/mol and 1,454909 Debye, respectively. In the current investigation, we offer the theoretical bond lengths, bond angles, and dihedral angles by considering the most stable form or structure of the established molecule. The FT-IR and Raman vibrational frequencies were estimated within the same framework, and the outcomes were compared to experimental spectra to confirm peak assignments. Furthermore, the hydrogen and carbon 13 NMR chemical shifts were computed using the gauge–invariant atomic orbital (GIAO) method both in vacuum and in the solvent (DMSO-d6), and the obtained results were compared with the experimental results. Likewise, the UV/vis spectrum calculations (both in vacuum and in the solvent ethanol) were verified by the TD-SCF method and then, using these obtained results, the calculated gap value between HOMO-LUMO levels was compared with the UV/vis transition. In addition to all of these, the thermodynamical properties of the most stable structure were computed and the map of the electrostatic potential (MEP) was obtained.

SYNTHESIS, STRUCTURAL AND SPECTROSCOPIC PROPERTIES OF CARBOXYLATE BRIDGED MANGANESE COMPOUND

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A new dinuclear Mn(III) compound, C42H62Mn2N2O10·C2H6O (1) synthesized and characterized by single-crystal X-ray diffraction, IR and UV spectroscopy measurements. The crystal structure of 1 was determined at 107 K. Compound 1 crystallized in the orthorhombic Pbca space group. The crystal structure determination result showed that compound 1 has a bis(alkoxo)(carboxylato)-bridged. The two Mn atoms had doubly bridged by the alkoxy group of two ligands and one syn-syn carboxylate group. Mn atoms exhibited an axially elongated octahedral coordination because the axial bond lengths were distinctly longer than the equatorial bond lengths, which is consistent with the expected Jahn–Teller distortion of the coordination of a d4 Mn(III) ion in an octahedral ligand field. The absorbance intensity of 1 was stronger than the free ligand, supporting that the metal ion played a role in stabilizing the ligand in the compound. The functional groups in the molecular structure of 1 were determined by infrared spectroscopy.

ELECTRONIC STRUCTURE CALCULATIONS OF LIQUID CRYSTALS HAVING SOME NEMATIC STRUCTURE

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In this study, theoretical studies on molecular electronic structures and properties of 4′-(Hexyloxy)-4-Biphenyl Carbonitrile and 4'-Octyl-4-Biphenylcarbonitrile compounds with nematic liquid crystal structure have been done by using quantum chemical calculations. The molecular structure of the studied molecules and some quantum chemical parameters such as HOMO-LUMO energies, MEP (Molecular Electrostatic Potential) and SAS (Solvent Acceptance Surface) have calculated using the DFT (B3LYP) / 6-311G ++ (d, p) method and basis set. In addition, some molecular properties such as dipole moment, polarizability and ionization potential, electron affinity, electronegativity, molecular softness, electrophilic index and molecular hardness structure were calculated and interpreted. The energy band gap (ΔE (ELUMO-EHOMO)) of 4HB and 4OB in the gas phase was calculated as 0.16 eV and 0.13 eV, respectively. The dipole moments of the 4HB and 4OB molecules in the ground state are calculated as 4HB = 7.3112D and 4OB = 6.3583D. It can be seen that 4HB has a higher dipole moment.

SOLVATOCHROMISM OF 4'-BROMO METHYL-2-BIPHENYL CARBONITRILE AND 4-PHENYLBENZONITRILE COMPOUNDS

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Liquid crystals have been very interesting compounds because they can be used in different fields such as imaging technology. In this study, solvatochromic properties and electronic structure of liquid crystal compounds with biphenyl carbonitrile and benzonitrile structures were investigated in detail. In these studies, ultraviolet absorbance and fluorescence spectra for 4' bromomethyl-2-biphenylcarbonitrile (4TB) and 4-phenylbenzonitrile (4F) were measured at room temperature in 27 different solvents with different polarities. We observe that absorbance and florescence spectra for 4TB and 4F molecules in polar protic, polar aprotic and apolar solvents medium have different absorbance and fluorescence wavelength values. In addition, it is seen that the solvent change of the molecule shifts the fluorescence spectrum to the larger wavelength region (bathochromic shift). By interpreting the electronic absorbance and fluorescence spectra of the studied compounds, both intramolecular and intermolecular interactions were investigated.

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OBTAINING THEORETICAL CHARACTERIZATIONS OF CA+2 ATOM DOPED NORADRENALINE BY DFT

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The primary focus of the research was to investigate and optimize the interaction between the neurotransmitter hormone Noradrenaline (also known as norepinephrine) and Ca+2 atoms at a molecular level. The researchers employed GaussView 6.0.16 software to construct the molecular structure and then used Gaussian 09: AS64L-G09RevD.01 programs to optimize the molecular structures of Noradrenaline using the Density Functional Theory (DFT) method and SDD basis set. For introducing the Ca atom, they utilized the HF method and the LanL2MB basis set. Numerous quantum-mechanical calculations were conducted on the molecule, including an examination of the HOMO-LUMO structure through the energy level diagram as well as an analysis of the Molecular Electrostatic Potential (MEP) and Nuclear Magnetic Resonance (NMR). These calculations provided valuable insights into the behavior and characteristics of the Noradrenaline Ca+2 complexes at the molecular level.

QUANTUM CHEMICAL CHARACTERIZATION OF MG+2 ATOM DOPED NORADRENALINE

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The primary objective of the research was to explore and optimize the interaction between the neurotransmitter hormone Noradrenaline (also known as norepinephrine) and the Mg+2 atom at a molecular level. The researchers utilized GaussView 6.0.16 software to construct the molecular structure. Subsequently, they employed Gaussian 09: AS64L-G09RevD.01 programs to optimize the molecular structures of Noradrenaline using the Density Functional Theory (DFT) method and SDD basis set. To introduce the Mg atom to the molecule, they utilized the DFT method and the LanL2MB basis set. Several quantum-mechanical calculations were conducted on the molecule, including the analysis of the HOMO-LUMO structure through the energy level diagram, as well as an investigation of the Molecular Electrostatic Potential (MEP) and Nuclear Magnetic Resonance (NMR). These calculations yielded valuable insights into the behavior and characteristics of the Norepinephrine-Mg+2 complexes at the molecular level.

STRONG COUPLING OF CARBON QUANTUM DOTS

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Carbon quantum dots (CDs) have garnered significant attention recently due to their appealing optical properties. However, these CDs typically exhibit red emissive characteristics with an exceptionally narrow line width (~75 meV), along with broad absorption and emission spectra, which impose limitations on their potential applications. In this study, we present a compelling demonstration of the robust coupling between CDs and plasmon polaritons within liquid crystalline mesophases. Through the application of ultrafast transient absorption spectroscopy, we delve into the excited state dynamics of CDs. Remarkably, our findings reveal that CDs display remarkably stable and potent photoluminescence emission, boasting a high quantum yield of 35.4% and a notable lifetime of approximately 2 ns. Of utmost significance, we conduct a comprehensive comparison between J-aggregate dyes and CDs, evaluating parameters such as absorption line width, photostability, and capacity for achieving strong coupling. This comparative analysis leads us to a promising conclusion: highly luminescent CDs hold a promising trajectory within the realm of mixed light-matter states, thereby ushering in new avenues for their integration into future quantum technologies.
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EFFECT OF EXTERNAL ELECTRIC FIELD ON HALOGEN AND HYDROGEN BONDS IN PY XF (PY= PYRIDINE; X=CL, H) COMPLEXES

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In this study, ab initio calculations (MP2) with the aug-cc-pVDZ basis set are used to investigate the effect of an external electric field (EEF) on the nature of halogen and hydrogen bonds interactions in Py XF (Py= pyridine; X=Cl, H) complexes. The electronic properties of the complexes have been analyzed using molecular electrostatic potential (MEP), symmetry adapted perturbation theory (SAPT), natural bond orbital (NBO), quantum theory of atoms in molecules (QTAIM) methods. We show that the effect of the EEF on the title interactions strongly depends on the direction as well as the strength of the applied EEF. Very good linear correlations are also established between the MP2 interaction energies and the molecular parameters of the studied complexes.

CONFORMATIONAL ANALYSIS OF THE BLEOMYCIN

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Bleomycin (BLM), a glycopeptide antibiotic, has drawn considerable attention for its potent anticancer properties. There are several bleomycins that differ in the terminal amine part, such as Bleomycin A2, B2, and B3 [1,2]. Its glycopeptide backbone incorporates crucial residues like α-aminoisobutyric acid, valine, and cysteine, enabling the generation of reactive oxygen species (ROS) and inducing DNA damage in cancer cells, leading to apoptosis [3-5]. The energetically preferred conformations of Bleomycin molecule have been determined by using MM-SYBYL method with Spartan program. The variations in dihedral angles of the obtained conformations were visually compared, and the most stable conformation was identified by tabulating their molecular energy values.

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MOLECULAR DOCKING STUDIES ON LIGAND D4476: A POTENT INHIBITOR OF CASEIN KINASE

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Casein kinases are the general name for enzymes that catalyze the phosphorylation of proteins. they play significant roles in intracellular signaling pathways, cell cycle control, cell growth, and proliferation [1]. A casein kinase L inhibitor is a chemical compound that inhibits the casein kinase L (CKL or CK1) enzyme [2]. CKL inhibitors are used in research laboratories to investigate intracellular signaling mechanisms. Additionally, they have been explored in medical research and drug development due to their potential therapeutic properties [3]. One member of this family is CK1, which represents serine/threonine protein kinases [4]. They can be further categorized into CK1a, CK1b, and other subtypes [5]. Ligand D4476, on the other hand, is a potent and specific inhibitor of CKL, involved in protein phosphorylation and intracellular signaling pathways. By targeting CKL, D4476 regulates processes such as cell cycle control. It binds to the active site of CKL, inhibiting its activity and thus regulating protein phosphorylation and cellular functions. The inhibitory properties of Ligand D4476 on CKL and its potential therapeutic effects are currently being investigated [6]. The relative energy values of D4476's likely conformations were estimated in this work, and the most stable conformation was discovered. The interactions of D4476 with the Casein Kinase were demonstrated using molecular docking simulations. The receptor's most active ligand interaction sites were investigated, and binding affinities were calculated.

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Poster Presentations
Applied Physics

PRODUCTION OF COMPOSITE MATERIAL USING LIGNIN AND WASTE FABRICS, AND COST ANALYSIS

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In today's world, energy saving and insulation have become increasingly important for ecological conditions, economic situations, and the future of our planet. This study focuses on the development of energy-saving composite structures by combining lignin and waste textiles with boron. A boron-modified insulation material has been produced using waste lignin, which is generated as a byproduct during paper factory production, and waste fabrics that are unusable in textile factories, repurposed as reinforcing elements. During the production of this composite material, lignin was combined with three different waste fabrics: a navy blue fabric with Lycra content, a pink polyester fabric, and a black fabric made of 100% cotton. Samples were created using these three different types of waste fabrics. Furthermore, the effect of boron additives and their quantities on the samples was tested using various samples. Lignin was used to create three-layered samples, with each layer made from a different waste fabric using a placement method. The boron-reinforced versions of these three different samples were also examined. As a result of our experiments, we determined the optimum values for the material parameters used. As a result, the advantage of our 10 mg boron-modified sample with 100% cotton fabric was clearly observed. A cost analysis of 1 m2 of the composite insulation material has been conducted. Based on the results obtained, it is possible to produce a cost-effective and environmentally friendly insulation material in the future, which can contribute to mitigating climate change.

DIFFERENT DOPING EFFECTS ON TIO2 THIN FILM PHYSICAL PROPERTIES

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In this work, undoped and doped different crystalline phased titanium oxide thin films were prepared following a sol-gel route Effects of doping on the optical properties, crystalline structure, and morphological properties of titanium oxide thin films were determined with UV-Visible spectrometer, X-ray diffraction patterns, and scanning electron microscopy, respectively. The effects of doping titanium oxide thin films on the photovoltaic performance of solar cells have been investigated.

CO2 MEASUREMENT IN THE SPECTRAL RANGE OF 2-5UM BY OPTICAL METHOD

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Continuous monitoring of gases in many areas where toxic, flammable and suffocating gases are used or released is of great importance in terms of both human health and environmental safety. Since most of the gases do not have odor and color, it is not possible to detect them with the human senses. Even in gases with a distinctive odor, the sense of smell disappears in a very short time due to the sensitivity of the human nose [1]. For this reason, the detection of dangerous gases is a very important issue. Carbon dioxide is an example of a dangerous gas. Carbon dioxide is a tasteless, colorless and odorless gas in its pure state, which is formed during respiration, combustion and organic decomposition. It is also heavier than air and it is the most common suffocating gas. It can destroy the oxygen in the environment. The areas where it is used must be very well ventilated. In case of overexposure to carbon dioxide gas, headache, fatigue, distraction, weakness, breathing frequency, ringing in the ears, loss of consciousness and coma can be seen [2]. Carbon dioxide is typically measured using infrared spectroscopic and chemical reaction method. Most chemical reaction sensors are unreliable as they can interact with multiple gases and erode due to this interaction. IR sensors have no gas contact, which makes them more reliable and are made for specific gases so they are not affected by other gases. Compared with chemical sensors, the IR sensor has a longer lifetime and provides high accuracy and fast response time. IR sensors are the most reliable method for detecting carbon dioxide gas [3]. In this study, the detection of carbon dioxide gas in the spectral range of 2-5um was carried out by using various receiver, emitter and optical cells using the IR method.

Keywords: Gas Sensing, CO2, IR Method, Detection

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VISUAL DEFECT DETECTION IN SMARTPHONE MANUFACTURING: A COMPARISON OF LIDAR TECHNOLOGY AND IMAGE PROCESSING METHODS

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In smartphone manufacturing, the detection of visual defects during the production process is a critical factor that can significantly impact customer satisfaction and brand reputation. The purpose of this study is to explore the feasibility of applying LIDAR (Light Detection and Ranging) and traditional image processing methods for identifying visual defects such as scratches and cracks in the products. Image processing is a branch of computer science that involves extracting, analyzing, manipulating, and interpreting information from digital images. It is used to compare the product with a known model of a flawless item and detect defective areas. Image-based methods have the advantage of being adaptable to specific requirements; however, their efficiency in detecting deep visual defects remains debatable. On the other hand, LIDAR technology is used for remote sensing and distance measurement. It operates by emitting laser light toward the target, detecting the light waves reflected back from the target using sensors, and measuring the distance traveled by the light to determine the distance to the target. This provides valuable information about the object's distance, shape, and surface properties, making it efficient in detecting deep visual defects. As a result, this study aims to compare LIDAR and image processing methods for detecting visual defects in smartphone manufacturing. While image-based methods excel in detecting less-depth flaws, it is speculated that LIDAR's access to 3D data can make it more effective in detecting defects with greater depth, such as cracks and scratches. The applicability of both methods for identifying visual defects like cracks and scratches has been investigated. As recommendations, smartphone manufacturers should consider integrating image processing and LIDAR technology into their quality control processes and explore hybrid approaches. Such developments can lead to a more comprehensive and accurate visual defect detection, ultimately enhancing customer satisfaction and brand reputation in the smartphone production process.

PORTABLE NUCLEAR MAGNETIC RESONANCE (NMR) SPECTROSCOPY SYSTEM OPERATING IN EARTH'S MAGNETIC FIELD FOR HIGH RESOLUTION CHEMICAL ANALYSIS

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High-resolution NMR spectroscopy is a method used for the chemical analysis of matter and utilizes the precession motion of the magnetic dipole moments of atomic nuclei under a magnetic field. Often, expensive and bulky superconducting magnets and cooling systems to cool them are required to achieve high resolution. For this reason, it lacks the opportunity to be used at outdoors, i.e. in field studies. In this study, the design and production of a microcontroller-based system that can operate under a very low magnetic field (earth's magnetic field = 0.5T) and therefore in the low frequency region (around the sound frequency region) but has a resolution below mHz, suitable for field studies, will be introduced.

THE CHARACTERIZATION OF SILICON SOLAR CELLS AND DETERMINATION OF OPTIMAL DEVICE PARAMETERS THROUGH NUMERICAL SIMULATION ASSISTANCE

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The aim of this study was to achieve energy conversion efficiencies of silicon solar cells that are comparable to the existing levels reported in the literature, and then conduct research that would enable the attainment of higher values for the obtained results. Scientific research on silicon-based solar cells, which target high efficiency and low production costs, is increasingly widespread in universities and the photovoltaic industry due to advancing solar cell technology. Producing photovoltaic solar cells with more economical, larger surface areas and acceptable energy conversion efficiencies on cheaper substrates is a priority research area in Europe, America, and Japan, considering their significant position among environmentally friendly renewable energy sources. The key parameters of the solar cells are open-circuit voltage (Voc), short-circuit current (Isc), fill factor (FF), and energy conversion efficiency (η). Current-voltage curves, open-circuit voltage (Voc), short-circuit current (Isc), and the conversion efficiency (η) of solar energy to electrical energy were measured on the multi-layered solar cell using a quartz halogen lamp under both dark and light conditions. Numerical simulations were performed on the obtained solar cell characteristics to model the detailed contributions of the parameters that influence the variation in efficiency.

PRODUCTION OF ANTIMICROBIAL NANOFIBERS FROM POMEGRANATE AND ORANGE OIL EXTRACTED PVA-CHITOSAN SOLUTION BY ELECTROSPINNING METHOD

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In this study, in order to contribute to the recycling of waste, which is one of today's problems; Orange and Pomegranate peels from the recyclables of qualified herbal wastes in the fruit juice factories in the region, essential oils will be obtained by using hydrodistillation and cold pressing methods, and essential oil profiles will be determined by chemical techniques. Antioxidant, antifungal and anti-aging activities of the essential oils to be obtained will be revealed by using different methods. In this study, PVA (polyvinyl alcohol) synthetic polymer and essential Pomegranate and Orange oils, which are prepared by distillation from Pomegranate and Orange, which are abundant in Muğla and its region were added to the chitosan solution obtained from chitin which is a natural polymer obtained from shellfish such as crabs and shrimp. In this manner, PVA/Chitosan-Pomegranate and Orange nanofibers were produced by electrospinning method, which allows nanofiber production with the help of electrostatic forces. Solution parameters and electrospinning process parameters were optimized in order to determine the optimum fiber production conditions. Morphological evaluation of the fibers was made with SEM and optical microscope images. In line with the findings obtained, in addition to ensuring the recycling of herbal wastes, it will contribute to the field of use of the industry, especially cosmetics.

CRYSTAL STRUCTURE AND HIRSHFELD SURFACE ANALYSIS OF COPPER (II) COMPLEX INCORPORATING 6-BROMOPICOLINIC ACID LIGAND

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Picolinic acid, or 2-pyridinecarboxylic acid, is a heterocyclic organic compound with the chemical formula C6H5NO2. It is a derivative of pyridine and belongs to the family of carboxylic acids. Picolinic acid has a functional significance because of having important roles in various chemical reactions, coordination chemistry, or as a building block for the synthesis of more complex compounds. In addition, picolinic acid, which can be used as a ligand in coordination chemistry, is also frequently used in pharmaceuticals, agricultural chemicals, and materials science. This study presents the crystal structure analysis of a copper complex incorporating the picolinic acid ligand, denoted as C12H9Br2N6CuO4. The Cu(II) complex crystallizes within the triclinic space group P-1, with a singular molecule contained in the asymmetric unit. In the crystal lattice, the pyridine rings exhibit a dihedral angle of 66.95 (3)°. The molecules are interconnected through intermolecular C–H···O and C–H···Br hydrogen bonds, generating a layered arrangement parallel to the bc plane. Aromatic π–π stacking interactions further contribute to the packing of the title compound. To gain deeper insights, Hirshfeld surface analysis was conducted to explore the spatial distribution of atoms with potential for hydrogen bond formation, along with a quantification of these interactions within the Cu(II) complex. The outcomes of this analysis highlight the pivotal role of specific interactions in the crystal packing. Notably, the predominant contributions include O···H interactions (32.3%), H···H contacts (20.2%), Br···H associations (11.8%), and C···H connections (6.5%).

THERMAL NEUTRON IRRADIATION EFFECTS ON CAPACITANCE-VOLTAGE AND CONDUCTANCE-VOLTAGE CHARACTERISTICS ON AU/N-SI SCHOTTKY DIODES

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Au/n-Si Schottky diodes were fabricated by evaporation of Au on n-Si wafer which were exposed to wet chemical cleaning procedure. The capacitance-voltage (C-V) and conductance-voltage (G-V) measurements were taken at 1 MHz and room temperature. The measurements were repeated after 10 s and 30 s of thermal neutron irradiation. The capacitance for all voltage range decreased after the irradiations. The conductance in reverse bias increased with the increasing dose. The conductance in forward bias decreased after first dose and increased after second dose.

OPTICAL, MORPHOLOGICAL, STRUCTURAL AND ELECTRICAL PROPERTIES OF BORON DOPED CU-SB-S THIN FILMS PRODUCED BY DIP-COATING METHOD FOR NO2 SENSOR APPLICATIONS

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In this study, the properties of Cu-Sb-S thin films doped with boron (B) at different rates (0-5 mg/ml) for NO2 gas sensor applications were investigated. Boric acid, which is very low cost, was used as a boron source. Undoped and B doped Cu-Sb-S thin films were grown on Indium tin oxide (ITO) by dip-coating method. To determine the potential of the produced thin films for NO2 sensor applications, their optical, morphological and structural properties were examined using UV-Vis spectrophotometer, Scanning electron microscope (SEM)/energy dispersive spectroscopy (EDS), stylus profilometer, X-ray diffractometer (XRD), fourier transform infrared (FTIR) spectroscopy and Raman spectroscopy analyzes. I-V measurements of the thin films were carried out using the Keithley 2400 Source Meter with a two-point measurement method. Sheet resistances were determined from the I-V curve and their electrical conductivity was calculated with the following formula: $\sigma=1/((\text{Sheet resistance}\times\text{Film thickness}))$ (1)
It has been reported by the studies that the boron doping exhibits excellent sensitivity in the detection of NO2 gas. This study proposes a new low-cost and easy-to-manufacture material for the development of NO2 sensors with high response, good selectivity, room temperature operation, low cost and easy fabrication properties.

FABRICATION AND CHARACTERIZATION OF POLYCRYSTALLINE SILICON SOLAR CELLS CREATED ON CERAMIC SUBSTRATE THROUGH ALUMINUM-INDUCED CRYSTALLIZATION

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The aim of this study was to grow all layers of polycrystalline silicon (poly-Si) solar cells, using advanced thin film deposition techniques such as Plasma Enhanced Chemical Vapor Deposition (PECVD) and Chemical Vapor Deposition (CVD), onto a low-cost aluminum oxide (Al2O3) substrate in a vacuum environment, without exposure to air. The dark and photoconductivity measurements of the light-absorbing layer, measurements of the dark and photo transfer properties of minority charge carriers, characterization of the degradation characteristics of the produced absorber layer under light, and analysis of the graded structure of the multilayer were conducted in detail. The dark and photoconductivity measurements of the light-absorbing layer, measurements of the dark and photo transfer properties of minority charge carriers, characterization of the degradation characteristics of the produced absorber layer under light, and analysis of the graded structure of the multilayer were conducted in detail. Multilayer solar cells were produced in a vacuum environment, without exposure to air, by sequentially growing all layers onto an aluminum oxide substrate using the conditions for producing absorber layers with the best optoelectronic quality and properties. After the production of the solar cells, measurements were conducted on the multilayer solar cell using a standard Solar Simulator. The measurements included current-voltage curves under both dark and light conditions, open-circuit voltage (Voc), short-circuit current (Isc), quantum efficiency (spectral response) with respect to the wavelength of solar light, and the conversion efficiency (η) of solar energy to electrical energy.

DEVELOPMENT OF A MULTI-PACKAGE PROGRAM FOR PHOTOVOLTAIC ANALYSIS OF SOLAR ENERGY MEASUREMENTS (CURRENT-VOLTAGE AND POWER-TIME EXAMPLE) USING PYTHON

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A functional, free package program has been created for all users to use in photovoltaic analysis of solar energy data in order to find alternatives to packages/programs in foreign languages sold in large quantities commercially. The current-voltage and Power-time data from various universities, which are open source, were collected before the program was written. The package program was created using the Python software language. The current-voltage data was first studied. The retrieved data is originally in the txt file type. In Python, the file has been converted to a csv-type file so that this data can be used. Python's pandas library was used to make use of all current-voltage data in the received csv type of the package program. Thanks to the Pandas library, data obtained using csv data has been translated into the DataFrame. In DataFrames, current data is then organized in one column, with voltage data in another column to create graphs such as the desired line, column and histogram. Subsequently, instead of the Matplotlib library, Python's old library of type graphic modeling, the Plotly library's plotly,graph_objects module was used, which enables the new generation to create interactive graphics even when there is no internet access. Python's go.Through the Figure module, an interactive and generic Current-Voltage chart has been created. After the current-voltage chart has been created, the power-time chart is requested. For the purpose of generating this graph, the layout containing power data per 5 minutes was used. This editing stores the data obtained at the end of the day in the txt file type. As one of the data taken differently from the current-voltage graph was time data, the txt file was converted to a csv file, then the time data was perceived as String using the filter module of Python's pandas library. This allows errors in the graphs created to be removed as the power-time graph should be. Specifically, three columns were created to create this graph. This is because the integer data is converted to a string and processed into a new column. After the dataframe was created, several two-dimensional graphics were interactively created using the Plotly library. After these steps, the codes forming 2 graphs were converted into a single file for the purpose of creating the Package Program. Python's PySimpleGUI library is designed to make the program user-friendly and easy to understand. The most important feature of this interface is that users can instantly select a CSV file on their computers and create a graph. It is also an interface that offers users the ability to create both current-voltage and

power-time graphs with a single interface. After the interface was created, tests were carried out and the Multi-Package program proved to work. After the package program was created, an FF analysis was requested using the Current-Voltage chart. Therefore, the values that are the most important factors in the FF calculation are derived from pre-generated DataFramers. Thanks to Python's maximum module, the point where the current value has the greatest collisions with the voltage value has been found. The maximum current value is then matched with the maximum voltage value in order to calculate the yield. To sum up the ratio of these two numbers, the FF value is 0.74. The accuracy of the operations and measurements performed at this value is as evidence. The easy-to-use and accessible Multi-Package Program facilitates the creation of calculations and graphs related to this subject. Thus, this project will allow for faster processing of experimental data on the subject, and will significantly reduce previous impossibilities. It will also not financially force researchers, and especially students who want to do this type of work at the UNIVERSITY level. So one of the major obstacles facing science has been lifted. The multi-package program, which is intended to increase the user base in the future, will be available on a website.

Poster Presentations
Condensed Matter Physics

CHANGE OF MORPHOLOGY OF ELECTROSPUN CHOLESTERIC LIQUID CRYSTALS DEPENDING ON SPIRAL PITCH LENGTH

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In cholesteric liquid crystals, namely chiral nematics, molecules with nematic order overlap in layers. In each layer, the direction vector n, which expresses the molecular director, does not lie in a single direction but varies from layer to layer at a certain angle. Thus, a spiral pitch is formed between the molecular layers. In our study, liquid crystal-polymer fibers with different spiral pitch lengths were spun by an electrospinning system. Depending on the pitch length of the cholesteric liquid crystal, the viscosity of the material varies, which changes the thickness and homogeneity of the spun fibers. In this study, the change of fiber morphology of cholesteric liquid crystal with five different spiral step lengths was investigated depending on the spinning voltage. For this purpose, polarized optical microscopy in transmission mode and scanning electron microscopy images of each fiber sample were compared. Acknowledgment: This work was supported by the TUBITAK 2209-A - Research Project Support Programme for Undergraduate Students
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THE EFFECT OF MIXED SPINEL FERRITES ON THE IMPEDANCE SPECTRA OF CHITOSAN FILMS

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Mixed ferrite nanoparticles are used in many fields from industry to medicine since they have tunable physical, magnetic, and dielectric properties depending upon the doped metal ions and the synthesis conditions. On the other hand, composites of these particles with polymer matrix have lots of potential applications, especially in electronics, automotive, and medicals. In today's technology, renewable biopolymers are frequently preferred as a matrix material for these composites. Among them, chitosan takes much attention because it is antibacterial, eco-friendly, non-toxic, can make a good film, and has biocompatibility properties. In this study, we aimed to investigate the effects of mixed spinel ferrite nanoparticles on the impedance spectroscopy behavior of the chitosan films. The structures of the composites were investigated by FTIR and XRD techniques. Frequency-dependent impedance measurements were performed for different ratios of ferrite nanoparticles in the matrix and the variation of impedance and dielectric properties of the composites were determined in the low and high-frequency regions. In the light of the study, high dielectric nanocomposite structures were discussed which are promising for energy storage devices such as supercapacitors.

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INTERACTION OF CARBON-BASED 2D STRUCTURES WITH VARIOUS GAS AND DRUG MOLECULES: A DFT STUDY

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Since the discovery of graphene, the 2D structures of many elements in the periodic table have been investigated. Because these structures are one or a few atoms thick, their electrical and optical properties vary considerably with the atoms or molecules attached to their surfaces. Due to this feature, the technological potentials of these 2D structures have being investigated in a wide spectrum from drug delivery to sensor design. In this study, graphene and doped graphene surfaces were chosen as substrate. 3A and 4A group elements were taken into consideration as dopant. The interaction of these substrates with some prototype drug and gas molecules such as allylamine, CO and NO was investigated and their structural and electronic properties were determined. The research was carried out using Density Functional Theory which is a quantum mechanical modeling method.

OPTIMIZATION OF ACTIVE LAYERS BASED ON GRAPHENE-LIKE MATERIALS FOR BINDING BIOMARKERS USED IN RESPIRATORY DISEASE DIAGNOSTICATION

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Rapid diagnostication of respiratory diseases is of major interest for reducing both time and resources for clinical investigations. Groups of biomarkers in form of volatile organic compounds (VOCs) have been identified for specific diseases such as tuberculosis, nosocomial infections, Aspergillus fumigatus, influenza and SARS-CoV-2 virus. Focusing on the former class of biomarkers, the VOC detection (e.g. cyclohexanone) can be achieved by creating binding centers in the active layers of 2D graphene-like materials such as phosphorene (BP) and MoS2 placed on an insulating hexagonal boron nitride (hBN) substrate. The active layer modifications consist in the substitution on the P and Mo atoms in the host materials with group-IV (C, Si, Ge), group-VI (S, Se) and transition metal (Mn, Fe, Co, Ni, Cu) elements. We perform density functional theory (DFT) calculations at GGA level, using Grimme's D2 van der Waals correction in a supercell approach. These point out the changes in the electronic structure induced by VOCs attached to the substrate, which could be observed by changes in the electrical conductance, capacitive effects or optical absorption. This is further supported by the calculation of the binding energies of the biomarkers to the modified substrate.

STRUCTURAL, ELECTRONIC, HALF-METALLIC AND MAGNETIC PROPERTIES OF HF2RHGA FULL-HEUSLER COMPOUND VIA AB-INITIO METHOD

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In this study, the electronic, structural, magnetic and elastic properties of Hf2RhTl and Hf2CrTl full alloys were investigated using Density Functional Theory (DFT). The lattice parameters and magnetic moment values were found to be 6.805 Å and 6.736 Å and 2.029 μB/f.u. and 0.995 μB/f.u. for Hf2RhTl and Hf2CrTl alloys, respectively. The electronic band structures and density of state graphs of the structures were drawn according to spin orientations. In the studies conducted, while both Hf2RhTl and Hf2CrTl alloys cut through Fermi energy levels in a spin-up situation, in a spin-down situation it was observed that there were band gaps, and these alloys are half-metal ferromagnetic. In addition, with the Generalized Gradient Approximation (GGA) and with the help of the DFT theory, structural and elastic features of Hf2RhTl and Hf2CrTl alloys were calculated. Through the elastic features obtained, the B/G ratio, Shear modulus (G), the Poisson's ratio, and Young's modulus were calculated. In accordance with these results, Hf2RhTl and Hf2CrTl alloys were found to be ductile and to have a mechanically stable structure.

A DFT STUDY ON 2D HEXAGONAL ZNS STRUCTURE

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Zinc sulfide (ZnS), a naturally occurring salt and has two common crystalline forms (polymorphs): Sphalerite ("zinc blende"), with a cubic crystal structure, is the form that predominates in nature. Wurtzite, with hexagonal crystals, is scarcer, but it can be made by heating sphalerite to ≈1020 ºC. The most common use of ZnS is as a pigment for paints, plastics, and rubber also of sensor applications. The interest on ZnS and its modification as ZnS based composite for solar cell based material has been exponentially increasing. During the past three decades, ZnS has been successfully prepared from conventional synthetic routes such as one pot synthesis, sol gel formation, hydrothermal preparation as well as solid state reaction. Up to the present time, ZnS has been further developed as ZnS based composite materials in order to extend the quality of utilization. In this study 2D hexagonal ZnS structure is examined under the shed light of Density Functional Theory. We found that hex-ZnS has direct band property with the band gap 2.09eV. We further investigated phonon property of the structure and determined the free energy, entropy and the specific energy of the structure.

MECHANISMS OF PROTEIN FOLDING AND CALCULATION OF CRITICAL EXPONENTS

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Determining the three-dimensional natural structure of biological molecules theoretically and experimentally and identifying the folding mechanism of these molecules under different conditions is one of the important objectives of many disciplines. Generalized Statistical Thermodynamics, which has found a wide field of application recently, has been proposed for the appropriate handling of non-extensive physical systems. In this study, the zipper model made for proteins has been made Generalized Statistical Thermodynamics a new application area. It has been revealed that the calculations made after the generalization of the zipper model within the framework of Generalized Statistical Thermodynamics, fit better with the experimental data than the results obtained with the mean area solution. Thus, selecting the entropy index q appropriately has provided convenience to the expected value calculations. After the zipper model was generalized within the framework of Generalized Statistical Thermodynamics, the value of q=0.9856 was able to explained the experimental data, and the entropy index of q was taken into account in long-range interactions as a result of taking a value different from 1; this shows that the problem was fitted better with the experiment and thus the all structural properties of the protein were also taken into account for the zipper model. Critical exponents of the system has been also calculated.

TEMPERATURE DEPENDENCE MAGNETIC PROPERTIES OF ZRRHXY (X =HF, LA; Y =AL, GA) QHA WITH EFT EXAMINATION

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The ZrRhXY (X= Hf, La Y=Al, Ga) full heusler alloy has a cubic symmetry and belong to F-43m space group no 216. Wyckoff positions of this alloy is (0, 0, 0) (1/2, 1/2,1/2) (1/4, 1/4, 1/4) and (3/4, 3/4, 3/4) respectively. The exploration of this article main aim is according to obtained DFT calculations temperature dependance magnetization changes with Effective field theory. In the literature many sitokiyometric variations of ZrRhYZ querternary alloys have shows interesting results. Total magnetic moments of ZrRhXY (X= Hf, La Y=Al, Ga) full heusler alloys 1.999, 2.000, 0.955 and 0.999 μB/f.u respectively. ZrRhXY (X= Hf, La Y=Al, Ga) alloys have lattice parameter in their natural form 6.61 A, 6.60 A, 6.87 A and 6.84 A, respectively. Curie temperatures of these alloys also respectively 491, 468, 377 and 240 K. M-T examinations performed with program between 1 to 1000 K. The process of this step system choose best result in 50 calculations for Each M-T value. In a 1000-step analysis, when one of the top 50 results is selected at each step, a total of 50000 scans are made, which allows us to obtain precise results. The more precise the calculations of the interaction of each atom in the unit cell with each other, the more natural will be the results of the supercell to be created in terms of accuracy. Depend on the alloys curie temperature this investigation can be reduced to lower temperatures. In the unit cell of a compound consisting of 4 elements for QHA, there should basically be 4 interactions repeating each other in series. Effective Field Theory (EFT) stands as a fundamental and versatile framework in modern physics, enabling the seamless integration of quantum mechanics and general relativity with diverse phenomena at both microscopic and macroscopic scales. In particle physics, EFT has played a crucial role in understanding the Standard Model and Beyond-the-Standard-Model physics. It provides a framework for analyzing scattering processes and particle interactions at energies much lower than the characteristic scale of new physics, thus allowing the extraction of relevant information even in the absence of a complete theory of high-energy phenomena.

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Poster Presentations
Energy and Applications

ENERGY EFFICIENCY

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The aim of the project is to double or triple the efficiency of a solar panel. To use one panel instead of two or three panels and to save both space and energy. While doing this project, we were inspired by the sunflowers, we wanted the panels to follow the sun just like the sunflower, and for that we set up a device consisting of motors under it. In our first project, we made a single-axis solar tracking system using a single motor and we managed to increase the efficiency by an average of one and a half to two times. We wondered how many times the efficiency would be if we used two motors, that is, if we made two axes, and we made a two-axis solar tracking system and we managed to increase the average efficiency two and a half to three times.

DEVELOPING A HOST STRUCTURE FOR THE GLASSIFICATION OF RADIOACTIVE WASTES BASED ON ANCIENT GLASSES: THE EXAMPLE OF THE ULUBURUN SHIPWRECK

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Vitrification is a process used for the treatment of hazardous waste, which includes the conversion of the waste into a glass-like substance that is stable and resistant to environmental degradation. The resulting product does not leak, that is, the hazardous materials are chemically bound to the glass matrix and cannot be released into the environment. Uluburun Shipwreck dates back to 1300 BC and is considered to be one of the most important marine archaeological discoveries of the 20th century. Inspired by the glass that remained intact under water for hundreds of years, it is about encapsulating the final residue in silicate-glass mesh structures that provide durability and low volume forms in the vitrification process.

Poster Presentations
High Energy, Particle and Plasma Physics

PRELIMINARY RESULTS FOR THE ELECTRON CLOUD BUILD-UP STUDIES IN THE DIPOLE MAGNETS OF DAΦNE COLLIDER AND FCC-EE DAMPING RING

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DAΦNE is a collider which is currently in operation in Frascati, Italy. The accelerator complex consists of 2 rings with an approximate circumference of 100 m. High-intensity electron and positron beams circulate and collide in two interaction points with a total energy of around 1.02 GeV. The FCC-ee is an ongoing Project and its current injector complex design consist of a damping ring which is needed fort emittance cooling especially for positron beams. Electron cloud is one the most important collective effects and can be a bottle-neck in the performance of an accelerator. The electron-cloud instability mostly arises for e+ beams. Some undesired effects such as transverse instabilities, beam loses, emittance changes, energy deposition, vacuum degradation may be caused due to interaction of the circulating beam with the ecloud. The aim of this presentation is to provide preliminary results of the electron cloud build-up studies in the dipole magnets of DAΦNE main ring and FCC-ee damping ring

Poster Presentations
Material Science and Applications

A PROMISING APPROACH TO THE PRODUCTION OF APPROPRIATE DRESSING MATERIAL BY ELECTROSPINNING METHOD FOR DIABETIC FOOT WOUND TREATMENT

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The Diabetic Foot Ulcer (DFU) represents a significant complication of Diabetes Mellitus, arising from a combination of complex pathophysiological changes that impair the wound healing process and lead to infections. DFU, an acute wound, often necessitates amputation due to inadequate treatment. Nanofiber scaffolds offer an optimal microenvironment for cell therapy, particularly in pancreatic β-cell transplantation and pancreatic tissue engineering. Our approach utilized the electrospinning technique, a versatile, scalable, controllable, and cost-effective method for producing nanofibers. We present current trends highlighting the versatility of nanofibrous scaffolds as innovative platforms for incorporating bioactive agents to enhance diabetic wound healing. Acknowledgments: B.Oğuz Meral would like to thank TÜBİTAK 2247-C STAR program and all authors thank TÜBİTAK (Grant No. 221M075) for financial support..

UTILIZING CHATGPT FOR NANOMATERIAL MODELING: AN OVERVIEW OF COMMANDS, EXAMPLES, AND EXPANDING LIMITS WITH API USAGE

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ChatGPT is a software with limitations as artificial intelligence. Accurate results may not always be obtained when parameters of material lattice and bond lengths are given. Obtaining correct results with ChatGPT is possible with the correct use of prompts. In this presentation, commands needed for modeling nanomaterials with ChatGPT will be introduced and examples will be provided. The use of the API to expand the character and word limits encountered during modeling will also be demonstrated.

THE EFFECT OF THE SHAPE CHANGE OF MICROPHONE SPONGE ON MOBILE PHONES

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The microphone sponge found in mobile phones plays an important role in ensuring optimal sound recording and call quality. This study investigates the impact of changing the shape of the mobile phone microphone sponge on sound performance. The sponge acts as a protective barrier around the microphone, aiming to enhance the clarity of recorded sounds by reducing environmental noise and the effects of wind. Through controlled experiments, various microphone sponge shapes and conditions were tested to examine their effects on sound recording and call quality. Sound samples were recorded in controlled environments and real-life scenarios to simulate typical user experiences. The recorded sounds were analyzed using objective criteria, and changes in sound quality, noise reduction capabilities, and sensitivity were evaluated quantitatively. The preliminary findings indicate a clear relationship between the shape of the microphone sponge and sound performance. Different sponge shapes can negatively affect noise reduction capacity and sensitivity, leading to a decrease in the clarity and comprehensibility of recorded sounds. Additionally, changes in sponge shape can affect the microphone's ability to block wind noise, resulting in a decline in call quality during outdoor use. This research emphasizes the importance of maintaining the integrity of the microphone sponge in mobile phones to achieve optimal sound performance. The findings provide valuable information for manufacturers, users, and designers, serving as a significant resource for the future development of mobile phone microphone technologies. Understanding how changes in the shape of the microphone sponge affect sound quality may contribute to the industry's efforts to provide better audio communication and multimedia experiences to mobile phone users.

INVESTIGATION OF ION BEAM ETCHING FOR MICRO DEVICE FABRICATION

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Research has been conducted on the fabrication of of multilayered thin film-based microdevices, focusing on shaping and etching processes using photolithography and Ion Beam Etching (IBE) to create sharp and angled edges. Angled ion beam etching was used to create stepped geometries on the substrate. By varying the angle of incidence of the ion beam to the sample, beveled edges of 0°, 15°, 30° and 45° were obtained. After these processes, detailed surface and profile examinations of the samples obtained were performed by Atomic Force Microscopy (AFM). In the final stage of the study, the surface topography, etching depth, edge sharpness and bevel angle obtained by AFM were determined. Within the scope of this study, thin films were coated using magnetron sputtering method, one of the thin film production techniques. Photoresist was used in the shaping stage of the thin film coated substrate. After the shaping stage was completed, the thin film coated on the substrate was etched using the ion beam etching technique. The etch rates of thin films consisting of ITO, SiO2, IGZO thin film layer and produced entirely at room temperature at different tilt angles were found. Since these structures are used in the fabrication of some specific devices (Josephson junctions, SQUIDs, thin-film transistors, etc.), we have tried to contribute to the micro-nano device fabrication technology.

NEW 3D NANOFIBER SCAFFOLDS FOR CARTILAGE REGENERATION

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Articular cartilage has a low self repair capacity due to the lack of vessels and nerves. Tissue engineering and regenerative medicine is a promising strategy to repair articular cartilage defects and rehabilitate joint functions by focusing on the optimal combination of cells, material scaffolds. We designed 3D electrospun scaffolds using the electrospinning technique. As a result, homogeneous nanofibers without beads in the size range of 300 - 600 nm were obtained. We performed the biodegradability tests of the tissue samples we prepared in pbs and plasma. 60% deterioration occurred in the 21 day test. Cell viability test results of the samples were in the range of 83 -90%. Accelerated tissue healing potentials in rats will be determined with the full-thickness cartilage defect model. Acknowledgements: Fatma Kuru would like to thank to YOK 100/2000 for the PhD scholarship, TUBITAK 2211-A National PhD Scholarship Program and 2250-Performance Program for Graduate Scholars..

FABRICATION AND CHARACTERIZATION OF ELECTROSPUN PCL/CS NANOFIBROUS SCAFFOLDS FOR DIABETIC FOOT WOUND HEALING

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"Diabetic Foot Ulcer", which is still a global health problem, occurs when a small wound on the feet of Diabetes mellitus (DM) (type 2 diabetes) patients becomes easily infected. 3D Polycaprolactone (PCL)/Chitosan (CS) nanofibers doped dental follicle mesenchymal stem cell exosomes with a high immune regulatory and regenerative effect on DA wound healing problem. As a result of the characterizations, the average fiber diameter of the nanofibers was 1450 µm and the average pore size is 11.3 µm. Its tensile strength is 1.335 MPa and compressive strength is 0.1821 MPa. According to the literature, degradation was achieved within 21 days. According to these results, it is aimed to find a solution by creating a new wound healing system to shorten healing with the development of highly effective scaffolds.
Acknowledgements: The authors are grateful to TUBITAK (Grant No. 221M075) for financial support.

DETERMINATION OF ACCELERATED WOUND HEALING POTENTIALS IN RATS WITH TYPE 1 DIABETIC FOOT WOUND MODEL USING 3D PCL/GEL NANOFIBER TISSUE SCAFFOLDS

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Delayed wound healing in diabetic patients poses a significant challenge in clinical medicine, carrying heightened risks of gangrene, amputation, and even mortality. Addressing this, the development of functional tissue scaffolds with distinct physicochemical and biological properties holds paramount importance for diabetic foot ulcer (DFU) treatment. Our main objective in this present study is to produce 3D Polycaprolactone/Gelatin (PCL/GEL) electrospun nanofibers infused with dental follicle mesenchymal stem cells, tailored for DFU-specific wound management. The wound-healing potential of these engineered nanofiber scaffolds was assessed using streptozotocin-induced diabetic rats. In vivo experiments revealed noticeable and histopathological evidence of rapid and complete healing of diabetic foot wounds in the rats. Aknowledgements: The authors are grateful to TUBITAK (Grant No. 221M075) for financial support.

GEL/CS/DF-MSC 3D NANOFIBER-BASED SYSTEMS INTENDED FOR DIABETIC FOOT ULSER

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Diabetic foot ulcer is a cause of infection in type 2 diabetes patients. GEL-CS 3D nanofibers doped with dental follicle mesenchymal stem cell exosomes biocompatible, biodegradable with a immune regulatory and regenerative effect on DA wound healing problem. Characterization results revealed that the average fiber diameter of the nanofibers was 1750 µm, and the mean pore size was 11,8 µm. The tensile strength was 0,05304 MPa and the compressive strength was 0,3040 MPa. The contact angle was determined as 7,04º. Cell Viability Rate was observed as 72% at 24h, 65% at 7th day and 59% at 14th day. With the development of scaffolds, it is aimed that a solution can be found by creating a new wound healing system in order to shorten the healing time and prevent complications such as infection by both regulating inflammatory responses in the local wound area and performing tissue regeneration.

THE TEMPERATURE EFFECT ON DIELECTRIC PROPERTIES OF ((S)-4-(3,7- DIMETHYLOCTYLOXY)PHENYL 6-(4-DODECYLOXYPHENYL)PYRIDINE-3-CARBOXYLATE) LIQUID CRYSTAL

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Liquid crystals, one of the most important states of matter, are in a form between solid and liquid. They have fluid properties like liquids, and their molecules are in regular form like solids. They have also been used in a wide variety of technological applications. Chiral liquid crystals are getting more attention in recent research. In this study, the dielectric properties of chiral liquid crystal ((S)-4-(3,7-Dimethyloctyloxy) phenyl 6-(4-dodecyloxyphenyl) pyridine3-carboxylate) (LC) was investigated. This LC exhibits SmC* mesophase [1]. Dielectric properties of LC has been investigated by Dielectric Spectroscopy (DS) method. In order to analyze phase transition temperatures of the LC, the temperature dependences of the real and imaginary parts of the dielectric constant of LC have been calculated. By these DS measurements, phase transition temperatures of the liquid crystal, which were characterized by Differential Scanning Calorimetry (DSC), have also been verified.

This research has been supported by Yildiz Technical UNIVERSITY Scientific Research Projects Coordination Department with the Project Number: FYL-2023-5676.

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MICROELECTRONIC SWITCH BASED ON SEMICONDUCTOR (IN2TE3)0.97(MNTE2)0.03

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It has been found that the switching effect occurs in the In2Te3 semiconductor compound and solid solution crystals based on it. With this in mind, a thin-film microelectronic switch was created based on the (In2Te3)0.97(MnTe2)0.03 solid solution crystal, and its important characteristics were studied. It has been established that the switching mechanism in a semiconductor material has an electronic-thermal character and varies with temperature. The opening and closing of the circuit was achieved by applying a potential to the active thin semiconductor layer. The switching time of this microelectronic switch is ~0.00001 s, the switching voltage is 98 V, the size of the contact area is 2x2 mm2, and the area of the active semiconductor layer is 5x5 mm2.

PCL/GEL/CS NANOFIBER SCAFFOLDS FOR DIABETIC FOOT WOUND HEALING: PHYSICOCHEMICAL AND MECHANICAL CHARACTERIZATION

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Supercapacitor technology, which has great development potential in energy storage, has promising applications of the future. Electroactive materials such as carbon fibers, carbon nanotubes, graphene, metal oxides and conductive polymers are widely used to make supercapacitors more lightweight and more flexible. Supercapacitors are energy storage devices that are more preferred than batteries with their fast charge-discharge features. Therefore, the development of high capacitance, low-cost, environmentally friendly electrode materials for supercapacitor applications has become an important research area today. In this study, NH4F and Ni(OH)2 structures were synthesized by hydrothermal synthesis as electrode active material on graphite substrates and PPy synthesis by electropolymerization method. Equivalent circuit models were used to directly simulate the physical structure and electrochemical characteristics of the supercapacitor with charge storage mechanisms, and to determine both its dynamic and long-time behavior. Equivalent circuits were prepared and fitted to the experimental impedance curves. Thanks to the use of graphite, an increase in the electrical conductivity of the PPy structure has been achieved, and quite high capacitance values have been obtained compared to the capacitance values shown in the literature studies. Considering the studies and the efficiency of the materials planned to be synthesized and added, it is predicted that supercapacitor components and supercapacitors with higher values than similar studies in the literature can be produced.

CHARGE STORAGE MECHANISMS AND MODELING IN SUPERCAPACITORS

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Supercapacitor technology, which has great development potential in energy storage, has promising applications of the future. Electroactive materials such as carbon fibers, carbon nanotubes, graphene, metal oxides and conductive polymers are widely used to make supercapacitors more lightweight and more flexible. Supercapacitors are energy storage devices that are more preferred than batteries with their fast charge-discharge features. Therefore, the development of high capacitance, low-cost, environmentally friendly electrode materials for supercapacitor applications has become an important research area today. In this study, NH4F and Ni(OH)2 structures were synthesized by hydrothermal synthesis as electrode active material on graphite substrates and PPy synthesis by electropolymerization method. Equivalent circuit models were used to directly simulate the physical structure and electrochemical characteristics of the supercapacitor with charge storage mechanisms, and to determine both its dynamic and long-time behavior. Equivalent circuits were prepared and fitted to the experimental impedance curves. Thanks to the use of graphite, an increase in the electrical conductivity of the PPy structure has been achieved, and quite high capacitance values have been obtained compared to the capacitance values shown in the literature studies. Considering the studies and the efficiency of the materials planned to be synthesized and added, it is predicted that supercapacitor components and supercapacitors with higher values than similar studies in the literature can be produced.

ELECTROSPINNING FABRICATION AND PERFORMANCE EVALUATION OF POLYACRYLONITRILE AND ACTIVATED CARBON NANOFIBER FOR AIR FILTER APPLICATIONS

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Indoor air pollution has recently become a major concern, especially related with human health. In this study, the electrospinning method was employed to produce polyacrylonitrile (PAN) nanofibers with activated carbon (AC) additives, aiming to create nanofibers capable of removing indoor air pollutants, thereby improving indoor air quality. These fibers were employed leveraging the porous structure of activated carbon and the air-filtering capabilities of PAN nanofibers. SEM analysis revealed smooth structures ranging from 528 to 577 nm. Mechanical analysis indicated satisfactory tensile strength (2.907 and 1.388 MPa) and strain percentage (33.45% and 29.28%) decreasing with AC incorporation (15% and 10% respectively). Air permeability and filtration performance assessments showcased PAN/10%AC with the highest air resistance at 589.3 Pa and a filtration efficiency of 99.29%, classifying it within the F9 filter category (ISO standard).

SYNTHESIS AND CHARACTERIZATION OF POROUS AND NON-POROUS MNFE2O4 NANOPARTICLES

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In this study, we investigated the structural and magnetic properties of porous and non-porous manganese ferrite nanoparticles (MnFe2O4) to understand the porosity effect on the magnetism at nanoscale. Both nanoparticles were synthesized by solvothermal method. The morphology and structure of the nanoparticles were examined by using x-ray diffraction (XRD) and high-resolution transmission electron microscopy (HRTEM). Thermogravimetric analysis (TGA) was done to determine the thermal stability of the nanoparticles. The magnetic measurements were performed using a physical property measurement system (PPMS). The effect of porosity defect mechanism in the nanoparticle system is discussed.

INVESTIGATION OF OPTIC PROPERTIES OF GZO THIN FILMS

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In this study, the optical properties of GZO layers grown on three different sapphire (Al2O3) a-(112¯0), c-(0001) and Distributed Bragg Reflector (DBR) substrates were investigated. All samples were grown using Molecular Beam Epitaxy (MBE). Photoluminescence technique was used to examine the optical properties of GZO structures. The photoluminescence (PL) spectra were taken at different temperatures in the range of 10K to 300K and different excitation power densities for all three samples. The PL spectra were dominated by excitonic transitions as well as transitions related to impurities and local defects. To identify the origin of the emission bands observed at low temperature PL spectra, Gaussian fit were applied to the experimental data in the temperature range of interest. The temperature variation of peak energies, intensities, and line widths of the observed transitions were studied in detail with empirical fit equations. The fit parameters were compared with highly quoted parameters in the literature. Photoluminescence measurements depending on the excitation power density were performed at the temperature of 10K in the range of 2.6-330 mW/cm2 by changing the drive current of the laser. As the excitation power density increases, it is concluded that the most obvious change in PL spectra in all three samples is due to the gradual expansion of line widths due to increased exciton-phonon interactions. As a result, the photoluminescence spectra depending on the temperature and excitation power densities of all three samples showed similar characteristics and they were found to be in agreement with the studies reported in the literature.

Poster Presentations
Mathematical Physics, Astrophysics and Applications

COLLECTING THE UPDATE PARAMETERS OF ECLIPSING BINARIES WITH DELTA SCUTI STARS

DUYGU SENA DOĞAN, GANİ ÇAĞLAR ÇOBAN, EDA ÇELİK, SEDA KAPTAN, FİLİZ KAHRAMAN ALİÇAVUŞ
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The existence of Delta Scuti-type variability in eclipsing binary systems has been known for decades. These valuable systems are essential to deeply investigate stellar structure and evolution. Pulsations in such systems are affected by the binarity. It was shown that the single Delta Scuti stars oscillate with higher and longer pulsation amplitude and period. To find out the binarity effects on Delta Scuti stars in eclipsing binaries we collected their fundamental stellar (such as effective temperature, mass, radius) and also pulsational parameters considering the determination approach of these parameters. For example, if parameters were estimated with high-quality spectroscopic and photometric data, we gave the results first priority and these parameters were used to determine more reliable relationships between the pulsation and binary properties. As a result of this study we updated the catalog of such systems taking into account the sensitivity of collecting parameters.

This study has been supported by the Scientific and Technological Research Council (TUBITAK) project through 120F330.

AN ALGORITHM FOR DETECTION ECLIPSING BINARY SYSTEMS

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We developed an algorithm to detect detached and semi-detached Eclipsing Binary (EB) systems among southern stars using the light curve data from the TESS spacecraft. This algorithm was created using the Python programming language and employed the "lightkurve" and "astropy" libraries to retrieve 120-second SAPFLUX data from the MAST database. The temperature range of the target systems was set between 5600 and 12000 Kelvin as a limit for effective temperatures. Three distinct methods were employed to characterize EB systems. The initial method involved identifying harmonic frequencies. The algorithm determines the frequencies of EB stars' eclipse periods by obtaining the frequency distribution from the light curve data. The second employed approach is a machine learning model called UPSILON. This model utilizes various analyses, including frequency analysis, skewness, and Fourier transforms, to classify systems. The third method centeres on calculating the skewness of the light curve data. The algorithm categorizes a system as EB if at least two methods concurred in their identification. The algorithm undergoes evaluation on a test dataset encompassing different star types. It accurately detects EB-type stars with a precision of 100% and exhibited an 84% overall accuracy for all types. Within the scope of this study, approximately 18,000 southern stars' data from the TESS satellite were analyzed. Additionally, visually prominent systems with oscillation components were selected, leading to the identification of around 150 δ Scuti component systems through frequency analysis.

This study has been supported by the Scientific and Technological Research Council (TUBITAK) project through 120F330.

COMPREHENSIVE COSMOLOGICAL MODELING WITH REACTION-DIFFUSION EQUATIONS

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We are presenting a new approach to modeling the early universe using reaction-diffusion equations. The reaction terms are derived in detail and describe the physical processes governing the evolution of matter and radiation components, including the impact of dark matter and energy, gravitational lensing, and higher-order fluctuations. The approach provides a comprehensive framework for simulating the universe's evolution and has the potential to contribute significantly to cosmology, particularly in the study of the cosmic microwave background and our understanding of dark matter and dark energy.

THE ANALYSIS OF NONLINEAR FINANCIAL SYSTEMS USING FRACTIONAL CALCULUS

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Ordinary mathematics falls short in addressing problems encountered in the study of situations out of equilibrium and nonlinear fractal functions. Fractional calculus must be used to solve in those kind of functions. Standard approaches are not sufficient to examine the phenomenon of the nonlinear Van der Pol oscillator equation in complex systems and the nonlinear financial system. Fractional calculus has been used in computations to shed light on the phenomenon of the nonlinear Van der Pol oscillator equation and the nonlinear financial system within complex systems, where standard mathematics falls short in providing adequate explanations. Indeed, the physical origin of the α-order fractional derivative in fractional mathematics and the q-entropy index in nonextensive physics is a subject of interest and curiosity within the scientific community. In this study, the solutions of the Nonlinear Van der Pol oscillator equation and the nonlinear financial system equation were examined as modeling problems within the framework of fractional calculus and nonextensive physics. The diffusion equation was solved using the method of cumulative contractions/growth, elucidating the physical nature of the α and q parameters, the fractal nature of space, and the memory effect. It has been emphasized that the mathematical foundation of deviations from standard behaviors in distribution functions can be explained using fractional mathematics, while the physical mechanism behind them can be elucidated through the method of cumulative contractions/growth.

Poster Presentations
Medical Physics and Applications

ENHANCED DISEASE DIAGNOSIS THROUGH INTEGRATION OF MACHINE LEARNING ALGORITHMS: A COMPARATIVE ANALYSIS ON CHRONIC KIDNEY DISEASE AND CARDIOVASCULAR DISEASE DATASETS

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The advancements in the healthcare sector have the potential to enhance patients' quality of life and improve treatment outcomes by enabling early and rapid disease detection. Therefore, the use of machine learning methods in disease diagnosis is rapidly increasing. Specifically, the accurate identification of features within datasets significantly determines the effectiveness and sensitivity of studies. Diseases such as chronic kidney disease and cardiovascular diseases have a significant impact, affecting over a tenth of the global population, and they stand out among global causes of death. The transformation in the diagnostic process of such diseases represents a significant evolution in the realm of modern medicine. However, traditional methods for diagnosing these complex diseases can fall short. This is where machine learning algorithms come into play, providing critical support to doctors in the diagnostic process. Disease diagnosis is often based on numerical or nominal features observed in humans. In this study, chronic kidney disease data is sourced from the UCI Machine Learning Database, while cardiovascular disease data is gathered from the Cardiovascular Disease dataset published on the Kaggle platform. During the data analysis phase, numerical properties, nominal properties and all attributes within the datasets are addressed individually. A detailed analysis is conducted using the Artificial Bee Colony (ABC) algorithm to determine the most suitable features. The obtained data and features are thoroughly examined using ten different machine-learning algorithms. The algorithms employed in the analysis include Gradient Boosting (GB), Extreme Gradient Boosting (XGBoost), LightGBM Boosting (LightGBMBoost), CatBoost, K-Nearest Neighbor (KNN), Random Forest (RF), Naive Bayes (NB), Support Vector Machines (SVM), Decision Tree, and Logistic Regression (LR). Additionally, a Flexible Voting Classifier mechanism is established using combinations such as RF+XGBoost, and the diagnostic accuracy of these models is meticulously evaluated using ten distinct performance metrics. Analysis of numerically and nominally separated data showed lower accuracy than using entire datasets. However, it is observed that nominal data yields higher accuracy than numerical data. These results underscore the critical importance of feature determination in disease diagnosis.

TREATMENT MODEL PREDICTION WITH MACHINE LEARNING USING LOGISTIC REGRESSION ALGORITHM IN PROSTATE CANCER CASES

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This study used the machine learning logistic regression algorithm to predict the treatment plans chosen by the oncology clinic for patients who had been diagnosed with prostate cancer in the Nuclear Medicine Department of the Istanbul Training and Research Hospital. Age, PSA level, Gleason score, tumor SUVmax value and pathology results of 45 patients were used as features in the study. Machine learning was carried out in the R Studio program. After the min-max normalization, the data set was divided into training and testing (8:2) and an estimate was obtained with the logistic regression algorithm. In estimating the treatment model with logistic regression, the highest accuracy was found in chemotherapy (CT)+high-intensity focused ultrasound waves (HT) treatment with 93%, and the lowest accuracy was found in HT treatment with 41%. Kappa value was 0.25, mean specificity was 0.85. It will continue to be developed through different algorithms in order to achieve higher accuracy in estimating the treatment model with machine learning.

Keywords: Machine Learning, Logistic Regression, Prostate Cancer, Treatment.

OBTAINING DOSE ENHACEMENT FACTORS OF SOME DRUGS VIA MCNP

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Radioactive nuclei and radiation technologies are used in various ways to treat cancer. As some of the patients can be treated by just chemotherapy, others may need radiotherapy or surgery. While planning the radiotherapy, required dose amount is being determined by considering various parameters such as the patient's cancer type, tumour location, tumour volume and etc. As the required dose for treatment can be applied by only one treatment method, there are treatments planned with synchronised multiple methods. Recently, simultaneous chemotherapy and radiotherapy applications in cancer treatment are increasingly preferred and raise the rate of successful treatment. Effects of treatmens which are parallelly applied to each other can alter the treatment progress significantly. Researchers are still studying on nanomaterials to inject to the tumour for boosting the absorbed dose on tumour without damaging the surrounding healthy tissue. The fact that the substances in the medium affect the absorbed dose constitutes the main motivation of this study. This study investigates the influence on the absorbed dose of the cancer drugs while their interaction with radiation. Absorbed doses and dose enhancement ratios of tissues which containing 8 different chemotherapy drugs are determined under 5-125 KeV radiation. Results are obtained by using Monte Carlo N Particle Transport Code. As a result of simulations, drugs which contain elements with higher atomic numbers have greater dose enhancer effect. Obtained results showed that chemicals inside the tissue have to be considered while preparing dosement plan.

A STUDY FOR ASSESSING RADIATION PROTECTION AWARENESS OF HEALTH SERVICES VOCATIONAL SCHOOL STUDENTS

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"The aim of this study was to evaluate Health Services Vocational School students' knowledge and awareness about radiation protection and radiation effects. This study reveals the awareness of Nişantaşı University Health Services Vocational School students (Program of First Aid and Emergency, Radiotherapy and Medical Imaging Techniques) about radiation and the precautions they take for radiation shooting methods. Invitation to take part in our survey has been shared online with students from June to August 2023. Hypothesis:1- Among the students participating in the study; students who have completed their internship have higher levels of knowledge than students who have not completed their internship. Therefore, answering the questions correctly rates are higher. 2-Most of the students participating in the survey do not know that magnetic resonance imaging does not contain ionizing radiation. Results: The majority of the participants answered correctly questions about general radiation information and radiation protection. Statistical analysis of the data obtained was performed by "SPSS 22.0 for windows" program. Only 35% of the 250 students who took part in the survey was able to rank incorrectly stated that a diffusion-weighted brain magnetic resonance imaging (MRI) entails a larger dose of radiation when compared to the other tests. 56,6% of them were not confident with their current level of radiation dose and radiation protection knowledge. Nearly half of both groups have insufficient information about the stochastic and deterministic effects of radiation (before intership 48.6%, students complete internships 59.5%) ($p>0.05$). According to the results obtained from the radiation awareness survey, radiation awareness is not at the expected and desired level among first year students. Ideally, all students who have successfully completed the radiological imaging physics and radiation protection course should be more knowledgeable about whether radiological examinations contain ionizing radiation, the principles of medical radiation protection and radiation exposure. It was determined that courses on radiation protection, radiation types and biological effects should be given more importance in the course content before students complete their internships. ".

GTV PREDICTION WITH MACHINE LEARNING

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Gross Tumor Volume (GTV) is a concept used in radiotherapy planning. It is determined volume of a tumor in human body by imagining methods (MR, CT, PET etc.) and clinical examination. Shape, volume and location of tumor has a important role in treatment plans. During radiotherapy, the dose to kill cancerous cells is applied to the target area, which includes the GTV. Therefore, the correct determination of GTV is critical to the success of the patient's treatment process. In this study, by modelling different machine learning (ML) algorithms for the pelvic region; it aimed to predict the GTV to be observed during the continuation of treatment of patients with Tanimoto similarity coefficients (TSC), Ochiai similarity coefficients (OSC), Dice similarity coefficients (DSC) and Jaccard similarity coefficients (JSC) and after any fraction. The most popular and widely used machine learning models are used in this study. In order to observe the effects of similarity coefficients on the prediction of gross tumour volumes, "feature importances" were investigated in each machine learning model. As a result of these studies, it was concluded that Dice similarity coefficients (DSC) are the similarity coefficients that have the most weight in predicting gross tumour volumes in machine learning models. Also, it was observed that the Ochiai Similarity Coefficients (OSC), although having the lowest weight, retained its discriminatory power in estimating gross tumour volume in each fraction. For researchers who want to improve the planning and application of radiotherapy treatments, reson the weights of the similarity coefficients can be an important contribution to supporting their decisions.

TUMOUR VOLUME ESTIMATION WITH ARTIFICIAL INTELLIGENCE AND OPTIMUM RADIATION APPLICATION

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Brain tumors are a major health problem in modern medicine. Accurately determining the dosage of radiotherapy applications is critical to increase the effectiveness of the treatment of brain tumors. It is crucial to make the treatment processes of brain tumors more sensitive and effective in order to improve the quality of life of patients. This study aims to predict volume of a tumor in two dimensions by using OpenCV library and determine the optimum radiation dose that can be applied to tumor by this way go beyond traditional methods by adopting a completely non-invasive and patient-friendly approach. In this study, tumor boundaries were detected with OpenCV algorithms using magnetic resonance images obtained from patients. Obtained data was used to predict the size of the tumor. Also, the optimum radiation dose to be applied to the tumor was calculated considering the tumor size, histopathological features and radiation sensitivity. The results of this study show that the tumor volume can be reliably predict with the results from OpenCV and the optimum radiation dose can be determined for this predicted volume. This approach allows optimization of treatment plans based on patient and tumor specificity. In the future, we plan to conduct academic research to predict the three-dimensional volume of brain tumors in more detail. Three-dimensional volume prediction aims to make treatment planning more precise and more individualized. By this way, this study focuses on increasing the success rate in treatment of brain tumors.

Poster Presentations
Nuclear Physics

INVESTIGATION OF THE WAVEFORM OF GW170817 IN COMPACT STARS UNDERGOING A FIRST-ORDER PHASE TRANSITION

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We confronted GW170817 event with X-ray emissions from millisecond pulsars on compact stars which are undergone the first order phase transition. A Bayesian framework is used with semi-agnostic equation of states to generate posterior tidal deformability and radii distributions of compact stars. We find that GW170817 waveform is supporting binary hybrid star configuration with a low value for the transition density. The other configurations such as binary neutron star and neutron star-hybrid star are valid for soft nuclear equation of states but these are disregarded by the waveform of GW170817.

This work is supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK) under project number MFAG-122F121 and the Yildiz Technical UNIVERSITY under project number FBA-2021-4229.

INPGEN – A SUPPORTIVE SOFTWARE FOR MONTE CARLO N PARTICLE SIMULATIONS

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Recently researchers often prefer digital methods instead of analytical or experimental methods. Digital methods are quite efficient for decreasing the cost, experimental risks and error rates. As the researchers steering to solve contemporary problems, they need modernised tools because current tools and methods may need longer times and experience or talent on different fields like coding, modelling and etc. Monte Carlo Simulation is a successful method which is used on simulating natural processes. Monte Carlo N Particle (MCNP) is a simulation software based on this method and used on calculations of radiation-matter interactions. MCNP is preferred for it's speed and high accuracy with experimental data. However; researchers should have experience on various digital operations like coding, modelling to functionally use it. There are some supportive softwares to use with MCNP and similar simulation programs but these supportive softwares require similar needs to use, too. Newly developed software InpGen aims to serve an easy to use facility by it's modern interface. After user designs the experiment on visualisation screen, input file for the MCNP simulation can be automatically generated and exported from InpGen. Thus, researchers can save time from preparing the input file and have the facility to check their potential mistakes on designing the experiment environment. Therefore, Inpgen helps the users save time on pre-processing. Besides, it's visualization screen minimizes the operational mistakes. In this study, a supportive software developed to make researchers save time and facilitate new researchers for using MCNP simulations.

XRF SPECTROSCOPY ANALYSIS OF CEMENT VIA MCNP SIMULATIONS

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Elemental composition of cement is crucial for concrete structure's strength and durability. There are destructive analysis methods such as chemical methods and non-destructive analysis methods such as XRF and XRD for the qualitative and quantitative analysis of cement. To perform destructive methods, samples must be subjected to sample preparation processes such as mineralization. In this mineralization process disables precise determination of one of the most abundant cement components which is silicon. In cement analysis by XRF spectroscopy, particle size reduction and pressing for sample compaction are sufficient processes for sample preparation. Even though the elements in it are mostly low atomic numbers, making XRF spectroscopy analysis difficult. Also, analytical methods such as calibration graphs and standard addition method are used for quantitative analysis of a sample of unknown content by XRF spectroscopy. In these analytical methods, it is necessary to prepare a new cement sample each time. Sample preparation processes to obtain enough samples for quantitative analysis are both costly and time consuming. In this study, XRF spectroscopy of the cement was determined by MCNP simulations. To obtain realistic results, the Mini-X1 x-ray tube and X-123 silicon drift detector (SDD) were designed on MCNP simulations. 35 kV accelerated x-ray tube energy distribution was used in the simulations. Cement samples from the literature that were quantitatively analyzed by XRF spectroscopy and cement samples produced to draw a calibration curve were analyzed by XRF spectroscopy in MCNP simulations at 900 degree scattering geometry. According to the results, the XRF spectroscopy of the cement determined by MCNP simulations was consistent with the experimental data.

COMPARISON OF COMPOSITE AND MULTILAYERED SHIELDING MATERIALS ON MCNP SIMULATIONS

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Radiation is used in various fields such as health, agriculture, industry, nuclear power plants and its areas of use are increasing every day. With the increase in the areas radiation use, it has become important to reduce the damage caused by radiation to people working in these areas. Therefore, researchers are still studying on more efficient and cost-effective ways of radiation protection. Composite and multi layered shielding structures are the types of shielding for radiation protection. Composite shielding structures is homogeneous mixtures of different materials and layered shielding structures are the use of more than one shielding material arranged side by side. There are code systems that used in radiation-matter interaction researches, like MCNP, FLUKA, GEANT4 based on Monte Carlo mathematical method. Since the results obtained from these programs are consistent with experimental data, they are often preferred by researchers. Working on research by simulations eliminates experimental cost and health risk. In this study, both composite and multilayer structured shielding materials containing Al, Fe ve Pb simulated on MCNP. 35 kV accelerated LINAC radiation source energy distribution and natural radiation source energies in the range of 0.059 MeV-1.330 MeV were used to investigate the radiation absorption properties of composite and multi layered shielding materials made in different orders. The absorbed dose of the sodium iodide detector was determined and compared for the composite structure and for combinations of the individual layers. Obtained data showed that, the composite structure is better for the LINAC energy distribution and the Fe-Pb-Al arrangement of the multilayer structure provides approximately 0.2% better absorption at other energy values.

BARIUM OXIDE NANOPARTICLE REINFORCED POLYESTER FOR RADIATION PROTECTIVE CLOTHING

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In this study, the gamma-ray shielding capability of Polyester/BaO nanocomposites (NCs), having BaO nanoparticles (NPs) in 0-20% range, were discussed. Polyester was chosen as the host matrix since it is widely used in clothing fabrics. Since polyester consists of low atomic number elements, to develop its gamma-ray shielding performance for screening the harmful effects of radiation, BaO NPs, which were synthesized by co-precipitation method, were utilized. The gamma-ray shielding performances of NCs were evaluated by mass attenuation coefficient (MAC), half-value layer (HVL), and mean free path, determined experimentally by using a NaI(Tl) detector and 133Ba, 137Cs, and 60Co radioactive sources. When all experimental data were evaluated, it was concluded that the radiation shielding ability of polyester was improved with increasing BaO N contribution, and the most serious improvement was in low-energy ionizing radiation, such as 81 keV.

MAPPING DOSE DISTRIBUTION OF AN ANGIOGRAPHY CHAMBER WITH MCNP

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Interventional applications are the highest risk area in terms of radiation dose for personnel in the medical field. These minimally invasive procedures replace conventional surgery, providing less risk to the patient. The medical team is exposed to high doses in this environment due to the fact that real-time images are taken with X-rays and the personnel work in close proximity to the radiation source during the procedures performed on the patient. Regular occupational dose monitoring is required to verify compliance with legal dose limits and to evaluate the effectiveness of protective measures. Physical dosimetries exhibit significant uncertainties in the ranges of radiation energy and radiation dose rate associated with interventional radiology. Due to the inhomogeneous radiation field, proper placement of the dosimetry on the body is crucial and several dosimeters may be required. The time required to calibrate and read the dosimeters and to evaluate the results in detail causes the procedure to be prolonged. In this study, it was aimed to calculate the dose that the personnel will be exposed to in an angiography room by Monte Carlo Simulation without the use of physical dosimetry. In the first stage, the chamber was divided into nested layers and the dose distributions in each layer were measured. The dose distributions were calculated from the innermost layer to the outermost layer of the angio chamber with a 100 KeV X-ray source. Then, the doses of human phantoms weighing 70 kg and a length of 170 cm, placed in different parts of the room, were measured according to the personnel at the closest and farthest distance. The measured values were found to be in good agreement with the expected theoretical results. It was concluded that the simulation of any angiography room in accordance with its own conditions is important in terms of determining the dose exposure.

COMPARATIVE ANALYSIS OF EXPERIMENTAL AND SIMULATED X-RAY FLUORESCENCE SPECTRA OF STAINLESS STEELS

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X-ray fluorescence spectrometry (XRF) is an analytical technique used to determine the elements contained in different materials. The XRF method has many advantages such as low cost, non-destructivity, the ability to measure multicomponent (compound or mixture) materials, ease of sample preparation compared to other analysis methods and it has high accuracy with experimental data. Although XRF systems have various advantages, they bring problems such as high installation costs and radiation exposure of the researcher. Matrix effect, measurement errors due to the limited resolution of the detector, errors due to human factors, electronic noise and the lack of ideal conditions in the laboratory are other difficulties of experimental analysis. These difficulties, which are among the most important disadvantages recognized in XRF experimental studies, inspired our study. In this study, the compatibility of Monte Carlo 6.2 simulations with experimental data was investigated. The identical environment of the experimental setup was designed in the MCNP 6.2 simulation. SS316, SS304 and SS303 stainless steel samples were chosen due to their wide range of applications. In general, the study examines the agreement between the experimental spectra and the spectra obtained from MCNP 6.2 simulations. Results showed that, MCNP simulations has high accuracy with experimental results and researchers can save time from processes like sample preparation by analyzing the materials with MCNP simulations instead of analytical methods.

Poster Presentations
Physics Education and Applications

INVESTIGATION OF OPTICAL PROPERTIES AND WETTABILITY IN ANTI-REFLECTIVE THIN-FILM COATINGS

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Under cold weather conditions, icing may form on the surfaces of the protective windows in various ammunition. Due to the accumulated water vapor, the operating performance of the imaging systems is adversely affected. Performance related issues can be controlled by thin film coating to the surface of optical component. The wettability of the coatings is directly related to the amount of icing. In this study, the wettability of various coating materials had been examined, considering their optical properties, and low-wettability coatings integrated into anti-reflective thin film coatings had been designed and produced.

TURKISH PHYSICAL SOCIETY 39th INTERNATIONAL PHYSICS CONGRESS

August 31 - September 4, 2023

BODRUM / TURKEY

Book of Programme

CONGRESS TOPICS

01-ATOMIC AND MOLECULAR PHYSICS

02-APPLIED PHYSICS

03-CONDENSED MATTER PHYSICS

04-ENERGY AND APPLICATIONS

05-HIGH ENERGY, PARTICLE AND PLASMA PHYSICS

06-MATERIAL SCIENCE AND APPLICATIONS

07-MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS

08-MEDICAL PHYSICS AND APPLICATIONS

09-NUCLEAR PHYSICS

10-PHYSICS EDUCATION AND APPLICATIONS

ABBREVIATIONS

PP: POSTER PRESENTATION

OP: ORAL PRESENTATION

MAIN HOLE: KONACIK HERODOT CULTURAL CENTRE

31 August 2023, Thursday **MAIN HALL** **Join Zoom Meeting** **https://zoom.us/j/92527358896**		
HERODOT CULTURAL CENTRE	**09:00 – 12.00**	**OPENING CEREMONY**
	12:00 – 13:30	**LUNCH**
		CHAIR: Oğuz GÜLSEREN ***13:30-15:00***
	13:30- 14:00	**Luc Bergé** **Title of Talk: Laser-Driven Intense Terahertz Fields: Sources and Applications**
	14:00- 14:30	**Coskun Kocabas** **Title of Talk: Topological control of light with graphene devices**
	14:30 – 15:00	**Şahin K. Özdemir** **Title of Talk: Chiral processes in non-Hermitian system**
	20.00 – 23.00	**WELCOME PARTY** **LOCATION : BODRUM BARS STREET - TRAFO**

1 September 2023, Friday **MAIN HALL** **Join Zoom Meeting** **https://zoom.us/j/92527358896**	
09:30 – 10:00	***CHAIR: Vladimir REKOVIC*** ***09:30-11:00***
	Haldun Sevinçli **Title of Talk: Unconventional transport phenomena in strongly disordered two-dimensional multilayers**
10:00 – 10:30	**Ludger Wirtz** **Title of Talk: Spectroscopy of 2D Materials: interplay of excitons and phonons**
10:30 - 11:00	**Liss Vazquez Rodriguez** **Title of Talk: Recent highlights on laser spectroscopy at COLLAPS - CERN**
11:00 – 11:15	**COFFEE BREAK**
11:15- 11:45	**CHAIR: *Coşkun KOCABAŞ*** **11:15 - 13:15**
	Andrea Lausi **Title of Talk: Science Opportunities at SESAME**
11:45 – 12:15	**Wilfred van der Wiel** **Title of Talk: Materializing Cognition-Information Processing in Cognitive Matter**
12:15 – 12:45	**Vladimir Rekovic** **Title of Talk: Future Physics with ATLAS and CMS detectors at HL-LHC**

12:45-13:15	**Christos Markou** **Title of Talk: The KM3NeT infrastructure: Status and recent results**
13:15 – 14:00	**LUNCH**
14:00 – 15:00	**POSTER SESSION (ON SITE)** 01-PP: ATOMIC AND MOLECULAR PHYSICS **Zehra Başakıl** **Zehra Başakıl** **Nahit Polat** **Fikret Karaduman** 02-PP: APPLIED PHYSICS **Elif Meriç** **Esra Duran** **Kadriye Kaçmaz** **Şeyda Anaç** **Duygunur Özdemir** **Rukiye Aldemir** **Çiğse Oral** **Büşra İşler** **Okan Şimşek** **Gülnaz Dönmez** **Şefika Öztürk** **Uygar Ege Kocakır** 03-PP: CONDENSED MATTER PHYSICS **Banu Süngü Mısırlıoğlu** **Dragos-Victor Anghel** **Musab Tugrul** **Ziya Merdan** **Çağıl Kaderoğlu** **Atilla Eren Mamuk** 06-MATERIAL SCIENCE AND APPLICATIONS **Sinem Elif Kayral**
15:00 -15:30	**COFFEE BREAK**
15:30 - 18:00	**PARALEL SESSION (ON SITE)** **LOCATION: BODRUM ANATOLIAN HIGH SCHOOL**

2 September 2023, Saturday **MAIN HALL** **Join Zoom Meeting** **https://zoom.us/j/92527358896**	
09:30 – 10:00	***CHAIR: Radu CONSTANTINESCU*** ***09:30-11:00***
	Hüseyin Ozan Tekin **Title of Talk: Monte Carlo Simulations in Medical Applications: A game-changer tool**
10:00 – 10:30	**Aşkın Kocabaş** **Title of Talk: Biological Significance of Chirality**
10:30 - 11:00	**Nicola Seriani** **Title of Talk: Ab-initio simulations of materials for energy applications**
11:00 – 11:15	**COFFEE BREAK**
11:15- 11:45	**CHAIR: Aybaba HANÇERLİOĞULLARI** **11:15 - 13:15**
	Sandro Scandolo **Title of Talk:Deep-learning simulations: a window into Earth's core**
11:45 – 12:15	**Deniz Aybaş** **Title of Talk: Zero- to ultralow-field nuclear magnetic resonance with optical magnetometers**
12:15 – 12:45	**Şener Oktik** **Title of Talk: Nanotechnology for photovoltaics**
12:45-13:15	**M.Pınar Mengüç** **Title of Talk: Sustainable Energy Transition**

13:15 – 14:00	**LUNCH**
14:00 – 15:00	**POSTER SESSION (ON SITE)** 04-ENERGY AND APPLICATIONS **Gizem Gediz Şahin** 05-HIGH ENERGY, PARTICLE AND PLASMA PHYSICS **Senem Özdemir** 06-MATERIAL SCIENCE AND APPLICATIONS **Bekir Oğuz Meral** **Buse Kahraman** **Dilara Aygün** **Fatma Kuru** **Hanife Şevval Dere** **İbrahim Samet Tunca** **Özay Eroğlu** **Özgür Güçlü** **Berna Uyanık** **Hulya Subasat** **Serdar Gökce** 07-MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS **Mehmet Baran Ökten** **Ozan Kıyıkçı**
15:00 -15:30	**COFFEE BREAK**
15:30 - 18:00	**PARALEL SESSION (ON SITE)** **LOCATION: BODRUM ANATOLIAN HIGH SCHOOL**

3 September 2023, Sunday **MAIN HALL** **Join Zoom Meeting** **https://zoom.us/j/92527358896**	
09:30 – 10:00	***CHAIR: Burçin ÜNLÜ*** ***09:30-11:00***
	Nilufer Didiş Körhasan **Title of Talk: New Approaches in Physics Teaching: Research Based Examples from Physics Departments**
10:00 – 10:30	**Özgür Baştürk** **Title of Talk: Exoplanets Around Evolved Binary Star Systems Revealed with Eclipse Timing Technique**
10:30 - 11:00	**Zafer Gedik** **Title of Talk: Time-Symmetric Quantum Mechanics**
11:00 – 11:15	**COFFEE BREAK**
11:15- 11:45	**CHAIR: Ömer YAVAŞ** **11:15 - 13:15**
	Ceren B. Dağ **Title of Talk: Quantum scars and regular eigenstates in a chaotic spinor condensate**
11:45 – 12:15	**Seyit Kale** **Title of Talk: Symmetry considerations in chromatin structure and dynamics**
12:15 – 12:45	**Burçin Ünlü** **Title of Talk: Exosome Biophysics**

12:45-13:15	**Ersen Mete** **Title of Talk: Graphene-gold superlattices with self assembled thiolates**
13:15 – 14:00	**LUNCH**
14:00 – 15:00	**POSTER SESSION (ON SITE)** 08-MEDICAL PHYSICS AND APPLICATIONS **Derya Yılmaz Baysoy** **Handan Tanyıldızı Kökkülünk** **Ziya Kemal** **Ziya Kemal** **Hüseyin Furkan Eminoğlu** 09-NUCLEAR PHYSICS **Hüseyin Furkan Eminoğlu** **Kaan Yavaş** **Kaan Yavaş** **Kevser Hışıroğlu Ayar** **Ulaş Keskin** **Kerime Selin Ertaş** 10-PHYSICS EDUCATION AND APPLICATIONS **Yunus Emre Koç**
15:00 -15:30	**COFFEE BREAK**
15:30 - 18:00	**PARALEL SESSION (ON SITE)** **LOCATION: BODRUM ANATOLIAN HIGH SCHOOL**

PARALEL SESSIONS
ON SITE ORAL PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

1 SEPTEMBER 2023, FRIDAY
HALL –1
ATOMIC AND MOLECULAR PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 16:45 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Güldem Ürer Özbilen**
Some Transition Parameters for Hydrogen Like Berkelyum

15:45 – 16: 00 **Güldem Ürer Özbilen**
A Calculation for Hydrogen Like Berkelyum

16:00 – 16:15 **Güldem Ürer Özbilen**
The Lifetimes of Hydrogen Like Berkelyum

16:15 – 16:30 **Tuğba Aycan**
Investigation of Spectroscopic Properties of Cu(II)-Acetazolamide/Nicotinamide Complex by Computational Chemistry Method: Molecular Modelling Study, ADME and Toxicology

16:30 – 16:45 **Fatmagül Tunç**
Investigation of Interactions between Dihalogen Compounds and NCH Lewis Base under External Electric Field

1 SEPTEMBER 2023, FRIDAY
HALL – 2
APPLIED PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Mustafa Yılmaz**
Quantum Computation, Communication and Fuzzy Theory

15:45 – 16:00 **Mücella Özbay Karakuş**
Enhancing Performance and Stability of Hydrogel-Based Ionic Diodes Through Cross-Linking Ratio Optimization and Bending Adaptability

16:00 – 16:15 **Melda Patan Alper**
Design and Comparative Analysis of Blackbody Calibration Systems for Industrial Infrared Thermometer Calibration

16:15 – 16:30 **Deniz Koçyiğit**
Germanate-Based Glasses for Scintillation Applications

16:30 – 16:45 **Nergis Yıldız Angın Atmaca**
Polymer Doping of Tungsten Pellets To Enhance Surface Roughness of Cathode Surface Therefore Electron Emission of Thermionic Cathodes

16:45 – 17:00 **Tolga Önen**
Manufacturing of Graphitic Carbon Nitride Modified Cannabis Based Counter Electrodes and the Applications in Dssc

17:00 – 17:15 **Çağrı Durmuş**
Inactivation of Pseudomonas Aeruginosa Planktonic Bacteria By Surface Dielectric Barrier Discharge Plasma

17:15 – 17:30 **Esra Şen**
The Structural and Electro-Optical Properties of Ma3Sb2I9-XBrx Perovskite Thin Films Deposited by Using Ultrasonic Spray Pyrolysis

1 SEPTEMBER 2023, FRIDAY
HALL – 3
CONDENSED MATTER PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:45 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Dragos-Victor Anghel**
The Two-Particles R-Matrix Formalism

15:45 – 16: 00 **Dragos-Victor Anghel**
Resonance Phenomena and Kapitza Pendulum Effects In a Nanomagnet Coupled to A Josephson Junction and Under External Radiation

16:00 – 16:15 **Hüseyin Toktamış**
Investigation of The Effects of Cerium Doping at Different Concentrations on Tl Glow Curve in BaB4O7:Dy Polycrystalline

16:15 – 16:30 **Dilek Toktamış**
Grain Size Analysis of Beta Irradiated Sodium Chloride (NaCl) From Different Region In Turkey

16:30 – 16:45 **Ayten Seckin**
Investigation of Voltage Dependent Electrical Properties of the Layered Metaloxide Structure

16:45 – 17:00 **Pınar Oruç**
Investigation of Frequency Dependent Electrical Properties of Multilayer Metal Oxide Structures

17:00 – 17:15 **Atilla Eren Mamuk**
Generating Cholesteric Liquid Crystal Fibers by Single-Needle Electrospinning and Analyzing Their Fundamental Properties

17:15 – 17:30 **Çağrı Durmuş**
Investigation Of Zn Doped V2O5 Thin Film Deposited by Thermionic Vacuum Arc

17:30 – 17:45 **Havva Elif LAPA**
Substrate Temperature Effects on Pb-Based Perovskite Thin Films Produced Via Ultrasonic Spray Pyrolysis

1 SEPTEMBER 2023, FRIDAY
HALL – 4
ENERGY AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 15:45 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Hatice Kanbur Çavuş**
The Effects Acetic Acid Derivatives as Co-adsorbents on the Dye-Sensitized Solar Cells

1 SEPTEMBER 2023, FRIDAY
HALL - 4
PHYSICS EDUCATION AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:45 – 16:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:45 – 16:00 **Mustafa Böyükata**
Village School Experiences and Observations of a Physics Academician

16:00 – 16:15 **Sabiha Tunçel Güçtekin**
The History of Turkish Astronomy's Pioneering A Name: Dr. Hasan TAYŞİR (1923-1984)

16:15– 16:30 **Özlem Akın**
Variation of Memristive Behavior of BST Thin Film Grown by RF Sputter Technique According to Substrate Temperature

1 SEPTEMBER 2023, FRIDAY
HALL – 5
HIGH ENERGY, PARTICLE AND PLASMA PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 16:45 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Neslihan Şahin**
Determination of Electron Temperature of Radio-Frequency Hydrogen Discharges

15:45 – 16: 00 **Ayşe Bat**
Machine Learning for Cherenkov and Scintillation Light Separation in a Hybrid Neutrino Detector

16:00 – 16:15 **Mine Fakılı**
Dual-Frequency Plasma at Low Pressure

16:15 – 16:30 **Murat Altınlı**
Reactor Neutrino Detection with Gadolinium Loaded Plastic Scintillators: Simulation and Analysis

16:30 – 16:45 **Narmin Akbarova**
Deuteron Gravitational Form Factors Within Hard Wall Model AdS/QCD

1 SEPTEMBER 2023, FRIDAY
HALL - 5
MEDICAL PHYSICS AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

16:45 – 17:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

16:45– 17:00 **Murat Çavuş**
Derivation of Mammalian Sodium Channel from Bacterial Sodium Channel and Energy Calculations

17:00 – 17:15 **Mustafa Tüfekçi**
Investigation of Antifouling Effect of PEG-Coated Urinary Catheter Surfaces Against Proteus Mirabilis

17:15 – 17:30 **Taha Yusuf Kebapçı**

Investigation of Physical Principles and Laws Applied to Tomographic Imaging Techniques Used In Medical Science

1 SEPTEMBER 2023, FRIDAY
HALL 6
MATERIAL SCIENCE AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:45 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Esin Eren**
Investigation of Photocatalytic Properties based on Graphene oxide and Reduced Graphene Oxide

15:45 – 16: 00 **Emrah Sarıca**
Fabrication of AZO/CuO Heterojunction by Ultrasonic Spray Pyrolysis

16:00 – 16:15 **Emrah Sarıca**
Enhancing Tin Oxide Films: Effects of W Element Doping on Morphology and Electrical Properties

16:15 – 16:30 **Gökçenur Çakmak Keçelioğlu**
Design and Mechanical Properties of A Novel Auxetic Metamaterials

16:30 – 16:45 **Sena Hamarat**
Synthesis of Polymeric Thin Films for Biomedical Applications

16:45 – 17:00 **Ayşegül Türker**
Hybrid Propulsion of Polydopamıne Functionalized Nanomotors

17:00 – 17:15 **Ozan Güneş**
Effect of boron/nitrogen (B/N) co-doping on the structural, optical and electrical properties of DC magnetron sputtered vanadium dioxide (VO2) thin films

17:15 – 17:30 **İsmail Akkan**
Investigation of Thermal Properties of Cycling Clothing Fabrics with Different Raw Materials and Physical Properties

17:30 – 17:45 **Çağıl Kaderoğlu**
A Dft Study on the Modification of Anatase TO2 Surfaces With Various Metal and Lanthanide Atoms

1 SEPTEMBER 2023, FRIDAY
HALL – 7
MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:45 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Filiz Kahraman Aliçavuş**
Pulsations in a Detached Double-lined Eclipsing Binary

15:45 – 16:00 **Fahri Aliçavuş**
Orbital Period Analysis of some oEA systems

16:00 – 16:15 **Aylin Çalışkan**
Investigation of Wormhole Solutions In The Framework of Weitzenbock Geometry

16:15 – 16:30 **Batuhan Çil**
Holographic Principle Applications in f(T) Gravity for the Big Bounce Scenario

16:30 – 16:45 **Gizem Dilara Açan Yıldız**
Hyperbolic Scenario of Accelerating Universe in Anisotropic Universe

16:45 – 17:00 **Ali Osman Yılmaz**
State Space Construction and Stability Analysis of 2-Component Fluids Under Einstein's Field Equations

17:00 – 17:15 **Ömer İslam Şahin**
Ionospheric Responses of Partial Solar Eclipses at Mid-Latitudes

17:15 – 17:30 **Ömer İslam Şahin**
Galaxy Classification with BPT Diagram for SDSS Galaxy Sample

17:30 – 17:45 **Ezgi Altıntaş**
Spectroscopic Analysis and Classification of Galaxy SDSS J152950.65+423744.1

1 SEPTEMBER 2023, FRIDAY
HALL 8
NUCLEAR PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:15 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Huseyin Ozan Tekin**
A closer look at shielding applications of glasses for various purposes: A methodological review

15:45 – 16: 00 **Ghada ALMisned**
Neutron absorption properties of Zircaloys as fuel rod and fuel coating materials in nuclear reactors: A Monte Carlo simulation study

16:00 – 16:15 **Gökhan Kılıç**
Overview of critical material properties of glass in radiation shielding applications

16:15 – 16:30 **Ömer Güler**
Application of High Entropy Alloys (HEAs) In Nuclear Reactor Technology

16:30 – 16:45 **Erkan İlik**
An overview of Lanthanide doped glasses through characteristic material properties in radiation shielding applications

16:45 – 17:00 **Duygu Şen Baykal**
Characterization of Gamma-ray Transmission Factor Values for Some Borosilicate Glass Samples Through MCNPX Code

17:00 – 17:15 **Gizem Öztürk**
Investigation of some oxide compounds in glass synthesis on shielding properties for cosmic radiation through the OLTARIS program

2 SEPTEMBER 2023, SATURDAY
HALL –1
ATOMIC AND MOLECULAR PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 16:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Özgen Özge**
Spectroscopic and Non-linear Optical Investigations for a Polycyclic Organic Compound by Using DFT Methods

15:45 – 16: 00 **Mehmet Yılmaz**
Mn doping effect on the non-linear optical properties of 2D MnAu7 clusters by DFT calculations

2 SEPTEMBER 2023, SATURDAY
HALL – 2
APPLIED PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Ayhan Aydın**
Genetic Algorithms-Based Synchrotron Radiation Optimization For an X-Ray Beamline: The Gasoline Software

15:45 – 16:00 **Ayhan Aydın**
Optimization of Synchrotron Radiation Parameters Using Bio-Inspired Approaches

15:00 – 15:15 **Semanur Nazif**
A Simulation Work: Determination of The Change In Error Rate Depending on The Parameter in Surface Profile Analysis with Gabor Wavelet

15:15 – 15:30 **Semanur Nazif**
A Numerical Approach for Determination of the Refractive Index of Dielectric Film From Reflectance Spectrum at Various Angles of Incidence by Using Paul Wavelet

15:30 – 15:45 **Harun Yücel**
Manipulation of Brownian Particles by Circular Optical Light Fields: A Simulation Study

15:45 – 16:00 **Merve Uyanık**
Measurement of Phase Calibration Standard for Verification of Experiment Parameters of Diffraction Phase Microscopy Setup

16:00 – 16:15 **Melih Kayra Kadıoğlu**
Generation of 150 fs Pulses Directly from A 1.2 GHz Single-Mode Er-Doped Fiber Laser At 1.5 W Output Power

16:15 – 16:30 **Haydar Mutaf**
Estimation Of Plasma Parameters of Laser Induced Breakdown Spectroscopy (LIBS) Using Ag Emission Lines

16:30 – 16:45 **Haydar Mutaf**
Laser Induced Breakdown Spectroscopy Quantative Analysis of A Ceramic Sample Via Calibration Free Method

16:45 – 17:00 **Süha Gül Kara**
Perovskite Solar Cell Designs by Based on Machine Learning

2 SEPTEMBER 2023, SATURDAY
HALL – 3
CONDENSED MATTER PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 18:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Victor Ciupina**
Synthesis and Characterisation of C/Ti/C/Al/C/Si Multilayer and C+Ti/C+Al/C+Si Composite Thin Films

15:45 – 16: 00 **Radu Manu**
Nanostructure examinate by electron diffraction using precession of electron beam

16:00 – 16:15 **Ercüment Yüzüak**
Improving Thermoelectric Characteristics of Bi2Se0.1Te2.9 Thin Films Through Annealing in Vacuum Environment

16:15 – 16:30 **Gizem Durak Yüzüak**
Beyond the Binary: Exploring Ternary Transition Metal Borates For Advanced Coatings and Performance Enhancement

16:30 – 16:45 **Öznur Demirkol**
Determining the Thermal Properties of Terminated Ti2C Mxene Structures with Quasi-Harmonic Approximation

16:45 – 17:00 **Cihat Güleryüz**
Probing the Adsorption Properties of Sulfur Monoxide On β_12 Borophene

17:00 – 17:15 **Hatice Hilal Yücel (Kurt)**
Dielectric Barrier Discharge and Dc Discharges in Micro distance Plasma

17:15 – 17:30 **Hüseyin Atcı**
Electronic Compressibility of Graphene

17:30 – 17:45 **Uğur Demirkol**
Cadmium Oxide (CdO) Thin Film Deposition by the Thermionic Vacuum Arc

17:45 – 18:00 **Uğur Demirkol**
Molybdenum (Mo) Thin Film Deposition by the Thermionic Vacuum Arc

2 SEPTEMBER 2023, SATURDAY
HALL 4
MATERIAL SCIENCE AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 16:15 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Ozan Güneş**
Effect of boron/nitrogen (B/N) co-doping on the structural, optical and electrical properties of DC magnetron sputtered vanadium dioxide (VO2) thin films

15:45 – 16: 00 **Halime Tugay**
Investigation of TMD and TMM 2D Materials for Plasmonic Applications in the Terahertz Frequency Region

16:00 – 16:15 **Hanife İrem Erten**
Sample Production by Lost Foam Casting Method

2 SEPTEMBER 2023, SATURDAY
HALL – 5
MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Ali Bağcı**
A new bi-directional approach in evaluation of integrals involving higher transcendental functions

15:45 – 16: 00 **Halide Köklü**
Solution of the Anisotropic Radiative Transfer Equation with Spherical Harmonics Method

16:00 – 16:15 **Eda Çelik**
Variability Examination of Two oEA Stars

16:15 – 16:30 **Damla Karadeniz**
O-C Analysis of the Eclipsing Binary System VW Cygni

16:30 – 16:45 **Onurhan Baran**
Period Variations and Photometric Analysis of The Y Leonis Binary System

16:45 – 17:00 **İlker Börekçi**
Solutions of the Schrödinger Equatıon With Dunkl Derivative For Pöschl-Teller Potential

2 SEPTEMBER 2023, SATURDAY
HALL - 6
NUCLEAR PHYSICS
ON SITE PRESENTATIONS
BODRUM ANATOLIAN HIGH SCHOOL

15:30 – 17:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Mahmut Böyükata**
IBM-1 calculations on some structure properties of even-even Hg isotopes

15:45 – 16: 00 **Nuray Yavuzkanat**
Exploring Lead-Free Shielding Materials: Gamma and Neutron Shielding Properties of Lithium Borate-Neodymium Oxide Doped Silicon Dioxide Glass

16:00 – 16:15 **Nuray Yavuzkanat**
Developing Radiation Detection System for Oil and Gas Industry

16:15 – 16:30 **Abbas Alpaslan Koçer**
Isparta Radon Laboratory-Radon Control System

16:30 – 16:45 **Damla Dicle Çıtak**
Determination of Gold Setting by ED-XRF Analysis

16:45 – 17:00 **Aydan Altıkulaç**
Radiological Effects of Phosphophyps Released by Phosphate Fertilizer Production

17:00 – 17:15 **Aydan Altıkulaç**
Determination of Natural Potassium Content of Hazelnut Samples by Gamma Spectrometric Method

17:15 – 17:30 **Özlem Öner**
A Study on The Height Dependence of Indoor Radon

PARALEL SESSIONS
ONLINE POSTER PRESENTATIONS

3 SEPTEMBER 2023, SUNDAY
HALL –1
01-ATOMIC AND MOLECULAR PHYSICS
09-NUCLEAR PHYSICS

ONLINE POSTER PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/97623318398

15:30 – 17:15 CHAIR: TPS-39 ORGANIZING COMMITTEE:

01-ATOMIC AND MOLECULAR PHYSICS

15:30 – 15:45 **Ebru Karakaş Sarıkaya**
Spectroscopic (FT-IR, Raman, NMR and UV/vis) and Quantum Chemical Calculations on 5-Bromosalicylaldehyde

15:45 – 16: 00 **Mehmet Hanifi Kebiroğlu**
Obtaining Theoretical Characterizations of Ca+2 Atom Doped Noradrenaline by DFT

16:00 – 16:15 **Mücahit Yılmaz**
Quantum Chemical Characterization of Mg+2 Atom Doped Noradrenaline

16:15 – 16:30 **Gülşen Pirbudak Altıntaş**
Solvatochromism of 4'-Bromo Methyl-2-Biphenyl Carbonitrile and 4-Phenylbenzonitrile Compounds

16:30 – 16:45 **Gülşen Pirbudak Altıntaş**
Electronic Structure Calculations of Liquid Crystals Having Some Nematic Structure

16:45 – 17:00 **Serkan Yüce**
Effect of External Electric Field On Halogen and Hydrogen Bonds in Py ⋯ XF (Py= pyridine; X=Cl, H) Complexes

09-NUCLEAR PHYSICS

17:00 – 17:15 **Haşim Zahid Güven**
Investigation of the Waveform of GW170817 in Compact Stars Undergoing a First-order Phase Transition

3 SEPTEMBER 2023, SUNDAY
HALL –2
03-CONDENSED MATTER PHYSICS
06-MATERIAL SCIENCE AND APPLICATIONS
07-MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS
08-MEDICAL PHYSICS AND APPLICATIONS
ONLINE POSTER PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/93392374767

15:30 – 17:30 CHAIR: TPS-39 ORGANIZING COMMITTEE:

03-CONDENSED MATTER PHYSICS

15:30 – 15:45 Irmak Balmumcu
Structural, Electronic, Half-Metallic And Magnetic Properties of Hf2RhGa Full-Heusler Compound Via Ab-Initio Method

15:45 – 16:00 Murat Çalışkan
A DFT Study on 2D Hexagonal ZnS Structure

06-MATERIAL SCIENCE AND APPLICATIONS

16:00 – 16:15 Mehriban Hasanova
Microelectronic Switch Based on Semiconductor (In2Te3)0.97(Mnte2)0.03

16:15 – 16:30 İlkay Kara
The Temperature Effect on Dielectric Properties Of ((S)-4-(3,7-Dimethyloctyloxy)Phenyl 6-(4-Dodecyloxyphenyl)Pyridine-3-Carboxylate) Liquid Crystal

16:30 – 16:45 Sevim Bircek Coşkun
Synthesis and Characterization of Porous and Non-Porous Mnfe2o4 Nanoparticles

07-MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS

16:45 – 17:00 Duygu Sena Doğan
Collecting the Update Parameters of Eclipsing Binaries with Delta Scuti Stars

17:00 – 17:15 Gani Çağlar Çoban
An Algorithm for Detection Eclipsing Binary Systems

08-MEDICAL PHYSICS AND APPLICATIONS

17:15 – 17:30 **Sevilay Uçar**
A study for assessing radiation protection awareness of Health Services Vocational School students

PARALEL SESSIONS
ONLINE ORAL PRESENTATIONS

4 SEPTEMBER 2023, MONDAY
HALL – 1
ATOMIC AND MOLECULAR PHYSICS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/97623318398

09:45 – 17:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

09:45 – 10:00 **Fehmi Bardak**
The Investigation of Electronic Structure, Reactivity, Toxicity, and Binding Characteristics to Estrogen Receptor of Some Tamoxifen Derivatives

10:00 – 10:15 **Gülay Günday Konan**
Electric Dipole Transition Parameters For Highly Ionized Tantalum Ion

10:15 – 10:30 **Selda Eser**
Atomic Multiconfiguration Calculations of Allowed (E1) and Forbidden (E2 and M1) Transitions and Energies for Co-like Krypton (Kr X)

10:30 – 10:45 **Yavuz Ekincioğlu**
Structural, Spectroscopic (Infrared, Raman and Uv-Vis) and, Electronic Properties of FOX-7 and Nitroguanidine Molecules: A Computational Study

10:45 – 11:00 **Etem Kose**
The Spectroscopic Investigation of 3-Amino-X-Aromopyridine Molecules (X=2,4,5) with the Quantum Chemical Calculations

11:00 – 11:15 **Ebru Karakaş Sarıkaya**
Structural Characterization on a New 3-(2-((4-fluorophenyl)amino)thiazol-4-yl)-2H-chromen-2-one molecule Utilizing DFT, FT-IR, and NMR

11:15 – 11:30 **Abdullah Kepceoğlu**
Designing a Faraday Cup Setup for Laser Ablation Material Analysis

11:30 – 11:45 **Gözde Yılmaz**
Molecular Docking Analysis of Oxytetracycline with cytochrome c oxidase

11:45 – 12:00 **Gözde Yılmaz**
Molecular Docking Analysis of Farnesol with Cytochrome P450

12:00 – 12:15 **Merve Hamzaçebi**
A Comparison Between Two Qubit and Two Ququart Quantum Phase Estimation

12:15 – 12:30 **Murat Kurt**
The Constructions of up and Down Quantum Counter Circuits For Qudit Systems

12:30 – 14:30 **BREAK**

14: 30 – 14:45 **Tuğçe Sinem Öktemer**
Molecular Docking Analysis of Proline-containing Dipeptide

14:45 – 15: 00 **Tuğçe Sinem Öktemer**
Molecular Docking Analysis of Anilino-monoindolylmaleimide with PKCβ2 Receptor

15:00 – 15:15 **Emine Akpınar**
Comparing the Performance of Various Variational Quantum Classifiers Using the IBM Quantum Computer: A Study in the Field of Neuroscience

15:15 – 15:30 **Emine Akpınar**
Investigating the Effect of Quantum Feature Maps on Classification Results

15:30 – 15:45 **Çağlar Karaca**
The investigation of the ultrafast electronic relaxation dynamics of organic compounds

15:45 – 16:00 **Mahmut Aydınol**
Electron Impact Excitations of 74W, 75Re, 76Os, 77Ir Atoms Relativistic L Subshells Ionization Cross Section Calculations by Using Lotz's Equation

16:00 – 16:15 **Ahmet Burak Sarıgüney**
A New Molecule's (3-(2-((4-nitrophenyl)amino)thiazol-4-yl)-2H-chromen-2-one) Structural Characterization Combining FT-IR, DFT, and NMR

16:15 – 16:30 **Efe Ünal**
Investigation of the Roles of Kokumi and Umami Active Dipeptides in Taste Sensing and Taste Masking by Vibrational Spectroscopy and Molecular Modeling Techniques.

16:30 – 16:45 **Ender Eylenceoğlu**
Effect of the Cathode Surface Temperature on the Cathode Fall Layer Parameters

16:45 – 17:00 **Filiz Ozturk**
DFT, Hirshfeld Surface Analysis and Molecular Docking, Druglikeness and ADMET of Zn(II)-Sulfamethoxazole Complex with Diethylentriamine Ligands

4 SEPTEMBER 2023, MONDAY
HALL – 2
APPLIED PHYSICS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/93392374767

09:45 – 12:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

09:45 – 10:00 **Meral Bayraktar**
Improving Acoustic Performance of a Triple-Layer Perforated Panel by Examining the Geometric Parameters

10:00 – 10:15 **Oktay Karaduman**
The Shape Memory Characteristics of Cualnicr Htsma Including Quaternary Cr Element Addition

10:15 – 10:30 **Oktay Karaduman**
Structural and Thermal Shape Memory Effect Analysis of Cualfe High-Temperature Shape Memory Alloy

10:30 – 10:45 **Ala Jehad**
Self-Powered Graphene/4h-Sic Schottky Junction Uv Photodetector With Enhanced Spectral Responsivity

10:45 – 11:00 **Emre Hasar**
All PM, 14 W, 2.8 Ghz Intra-Burst Repetition Rate Yb-Doped Fiber Laser

11:00 – 11:15 **Mert Ünsaldı**
Determining Schottky Diode Characteristics with Python

11:15 – 11:30 **Mustafa Yılmaz**
Synthesis of Al and Zn Doped Copper Oxide Nanoparticles by Sol- Gel Method and Comparison of Antimicrobial Activities for Escherichia Coli

11:30 – 11:45 **Onur Akın Akbal**
Anomaly Effects on Atmosphere in Middle and Equatorial Latitudes

11:45 – 12:00 **Selin Aşmanoğlu**
Metal and Silicon Processing by 2.8 GHz, 14W, 640 fs Yb-Doped Fiber Laser

12:00 – 12:15 **Murat Çalışkan**
Impedance Spectroscopy and AC Modelling of Porous Scaffold Within a Temperature Range of 293 – 373K

12:15 – 12:30 **Ezgi Uzatıcı Sağlam**
Evaluation of the Causes of Flickering of Vehicle Headlamp by Using Structural Analysis

4 SEPTEMBER 2023, MONDAY
HALL – 2
ENERGY AND APPLICATIONS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/93392374767

14:30 – 15:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

14:30 – 14:45 **Arzu Kurt**
Calculation of Energy Conversion Efficiency in Parabolic Trough Solar Collectors

14:45– 15: 00 **Arzu Kurt**
Calculation of Energy Conversion Efficiency in Parabolic Trough Solar Collectors

15:00– 15: 15 **İdris Doğan**
Performance Investigation of Photovoltaic Power Systems by Manual Cleaning and Anti-Soiling Coatings in Van Region

15:15– 15: 30 **İrem Çakır**
Investigation of Liquid Crystal Doped Electrolytes in Dye Sensitive Solar Cells

4 SEPTEMBER 2023, MONDAY
HALL – 3
CONDENSED MATTER PHYSICS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/95683458327

09:45 – 12:15 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

09:45 – 10:00 **Sevilay Uçar Yüzbaş**
Calculation of Surface Properties of Ti, Fe and V near the Melting Point

10:00 – 10:15 **Ahmet Kürşat Bilgili**
Interaction Between Interface State and Dislocation Densities

10:15 – 10:30 **Buğra Yıldız**
Structural and Elastic Features of Al4As3Mn Material

10:30 – 10:45 **Cem Sanga**
Investigation of Charge-Density Wave Mechanisms In TMDC NbSe2

10:45 – 11:00 **Halime Yarar**
The Investigation of Spin-Orbit Effect on The Superconductivity Properties Of ThSn3

11:00 – 11:15 **Halime Yarar**
The Structural, Elastic and Electronic Properties of Thx3 (X:In, Sn, Sb and Pb)

11:15 – 11:30 **Semih Doğruer**
NbMnVAl and NbFeCrAl full heusler alloys (QHA) Temperature Dependent Hysteresis Behaviour

11:30 – 11:45 **Ümit Bayram**
Investigation of the Effect on Electrical and Mechanical Properties Additional Fe Element to Al–32.5 Wt % Cu Eutectic Alloy

11:45 – 12:00 **Selçuk Utaş**
Investigation of HgCdTe Photodetector in Plasma Media Beyond Atmospheric Pressure

12:00 – 12:15 **Ali Gültekin**
Investigation with Pressure of Structural, Electronic, Elastic, Optical and Dynamical Properties of Hg1−xZnxS Alloys

4 SEPTEMBER 2023, MONDAY
HALL 3
PHYSICS EDUCATION AND APPLICATIONS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/95683458327

14: 30 – 15:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

14: 30 – 14:45 **Ali Gültekin**
Wireless Color Control for RGB LED with Bluetooth and Arduino

14:45 – 15: 00 **Ali Gültekin**
Drunk Driving Prevention System

4 SEPTEMBER 2023, MONDAY
HALL – 4
HIGH ENERGY, PARTICLE AND PLASMA PHYSICS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/92336031275

09:45 – 15:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

09:45 – 10:00 **Vael Hajahmad**
Lepton Flavor Violating Higgs Boson Decays in Minimal Supersymmetric High Scale Seesaw Mechanism

10:00 – 10:15 **Vael Hajahmad**
Lepton Flavor Violating of Z Boson Decays in Non- Universal Gaugino Masses Seesaw Mechanism

10:15 – 10:30 **Sinan Sağır**
Search for Production of Four-top Quarks in Proton-Proton Collisions at Center-of-Mass Energy of 13 TeV in the Single-Lepton Final State

10:30 – 10:45 **Gülşah Bozkır**
Spectral Density of Pseudoscalar Currents in a Hot and Dense Medium

10:45 – 11:00 **Ahmet Taş**
Investigation of Thermodynamic Properties of YO and ScO Molecules

11:00 – 11:15 **Serdar Spor**
Sensitivity of the Higgs-gauge Boson Couplings at Future Colliders

11:15 – 11:30 **Ayşe Kuday**
Analysis of Direct and Indirect Detection of Fermionic Dark Matter of 6-Dimensional Effective Field Theory

11:30 – 11:45 **Ceren Bayhan**
The Response of the Ionosphere To Different Levels of Geomagnetoc Storms of Cme Orogon

11:45 – 12:00 **Erhan Ongun**
The Investigation of Spatio-temporal Dynamics of Planar DC Field Emission-driven Gas Discharge-Semiconductor Microplasma System (GDSμPS)

12:00 – 12:15 **Mahmoud Albari**

Phenomenological Study of Lepton Flavor Violation of Tau Decays in the Constrained MSSM Seesaw Type-I Mechanism

12:15 – 12:30 **Muhammad Fauzi Mustamin**
Coherent Elastic Neutrino-Nucleus Scattering by Using Artificial and Natural Neutrino Sources

12:30 – 14:30 **BREAK**

14: 30 – 14:45 **Onur Başlı**
Electromagnetic Properties of Neutrinos with Coherent Elastic Neutrino-Nucleus Scattering

14:45 – 15:00 **Rawad Hadi Ali Alawadi**
Lepton Flavour violation of Tau Decay to Muon/Electron & Gamma in the Constrained Minimal Supersymmetric Type-I Seesaw model

15:00 – 15:15 **Feyza Başpehlivan**
Comments on the Results of Experimental Searches for Vector-like Leptons at CERN

15:15 – 15:30 **Neslihan Alan**
Preliminary X-ray Spectral Analysis of the Supernova Remnant 0509-67.5

4 SEPTEMBER 2023, MONDAY
HALL – 4
MATERIAL SCIENCE AND APPLICATIONS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/92336031275

15:30 – 16:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

15:30 – 15:45 **Saltuk Buğra Töreli**
Investigation of Barium Cadmium Borate for Dosimetric Applications Under Beta Excitation

15:45 – 16:00 **Saltuk Buğra Töreli**
Synthesis and Characterization of Ce3+ Doped Ba3CdSi2O8 for Thermoluminescence Dosimetry

16:00 – 16:15 **Barkın Özer**
Development of Conductive Pva/Agarose Biocomposite

16:15 – 16:30 **Çağla Pilavcı**
Optimization of the CO2 Laser Parameters on Dimple to Obtain the Desired Geometry on Al2O3 Ceramic Surface

16:15 – 16:45 **Selma Özarslan**
Investigation of Microstructural, Mechanical and Corrosion Properties of Biodegradable Mg-Sn-Y Alloys

4 SEPTEMBER 2023, MONDAY
HALL 5
MATHEMATICAL PHYSICS, ASTROPHYSICS AND APPLICATIONS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/97528930804

09:45 – 11:30 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

09:45 – 10:00 **Derya Sürgit**
The Spectroscopic and Photometric Analyses of Southern Eclipsing Binary Star: V714 Sco

10:00 – 10:15 **Gökhan İlhan**
Solving Physics Problems with Green's Functions Method

10:15 – 10:30 **Hasan Şafak Erdağ**
Statistical Study on STEVE, HILDCAA and Two-Step Geomagnetic Storms on the 25th Solar Cycle

10:30 – 10:45 **Hatice Özer**
Gravitational Waves in Massive Horndeski Theory

10:45 – 11:00 **Ikram Imane Kouachi**
The Dirac Equation with PT/non-PT Symmetric Potentials in Curved Space-time Backgrounds

11:00 – 11:15 **Murat İnanç Gözütok**
First Photometric Results of Two Binary Systems Selected from the TESS Database

11:15 – 11:30 **Simge Özer**
The Satellite Light-curve Solutions and Period Investigations of the V404 Dra and V781 Tau

4 SEPTEMBER 2023, MONDAY
HALL 5
MEDICAL PHYSICS AND APPLICATIONS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/97528930804

14:30 – 16:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

14: 30 – 14:45 **Serap Çatlı Dinç**
Evaluating Target Coverage and Normal Tissue Sparing in the Artificial Intelligence-Based Prostate Radiation Therapy Planning

14:45 – 15: 00 **Onur Buğra Kolcu**
The Potential of a Gamma Probe with Active Shielding in Sentinel Lymph Node Detection

15:00 – 15:15 **Duygu Tunçman**
Thermoluminescence Dosimeters Calibration With PLA Cassette Produced in 3D Printing

15:15 – 15:30 **Duygu Tunçman**
Evaluation of 3D-Printed Bolus for Radiotherapy Using Electron Beam Therapy

15:30 – 15:45 **Mürsel Şen**
A Fractional Approach to the Sıngle-Target Single-Hit Model

15:45 – 16:00 **Gülsiye Acar**
Measuring the Dosimetrıc Leaf Spacing Parameter of the Treatment Planning System with Different Experimental Setup

4 SEPTEMBER 2023, MONDAY
HALL 6
NUCLEAR PHYSICS
ONLINE ORAL PRESENTATIONS
Join Zoom Meeting
https://zoom.us/j/97921992103

09:45 – 12:00 **CHAIR: TPS-39 ORGANIZING COMMITTEE:**

09:45 – 10:00 **Lidya Susam**
Zinc-Tellurite Glasses: A better understanding of their role in alpha-proton stopping applications: A comprehensive study

10:00 – 10:15 **Hatice Yılmaz Alan**
Assessment of glass shielding for cosmic radiation and space applications using OLTARIS code

10:15 – 10:30 **Bahar Tüysüz**
Progress in Protective Glass Shielding for Mamography Scans

10:30 – 10:45 **Mücahit Yılmaz**
Determination of Gamma Radiation Shielding Characteristics of Some TiC-based Nanocomposite Polymer Materials

10:45 – 11:00 **Sacide Safadi**
Determination of multiplication factor with enrichment for an enriched uranium reactor

11:00 – 11:15 **Esranur Yalçınkaya**
Investigation of Giant Dipole Resonance (GDR) in pseudo-mirror 168Hf and 160Er nuclei

11:15 – 11:30 **Elif Kemah**
Ground-State Magnetic Moments of 237,239Np Isotopes

11:30 – 11:45 **Çiğdem Tarakçı**
Finite Temperature Density Functional Theory: Investigation of Pairing and Normal Densities in Ca Hypernucleus

11:45 – 12:00 **Büşra Başaran**
Synthesis and characterization of Dy3+ doped Ba3CdSi2O8 for thermoluminescence dosimetry

Participant List

	Name Surname	University	Title
1	Abbas Alpaslan Koçer	Süleyman Demirel University	Presenter (Oral&Poster)
2	Abdullah Ceylan	Hacettepe University	Scientific Committee
3	Abdullah Kaplan	Süleyman Demirel University	Award Winner
4	Abdullah Kepceoğlu	Koç University	Presenter (Oral&Poster)
5	Ahmet Aras	Mayor of Bodrum	Opening Speakers
6	Ahmet Ataç	Rector of Manisa Celal Bayar University	Award Winner & Advisory Committee
7	Ahmet Burak Sarıgüney	Necmettin Erbakan University	Presenter (Oral&Poster)
8	Ahmet Hakan Yılmaz	Karadeniz Technical University	Advisory Committee
9	Ahmet Kara	Middle East Technical University	Listener
10	Ahmet Kürşat Bilgili	Gazi University Fen Fakültesi	Presenter (Oral&Poster)
11	Ahmet Taş	Harran University	Presenter (Oral&Poster)
12	Ahmet Ulaş Aksu	Yıldız Technical University	Listener
13	Ahmet Umut Akduman	Koç University	Listener
14	Ala Jehad	Izmir Institute of Technology	Presenter (Oral&Poster)
15	Alexander O. Govorov	Ohio University	Scientific Committee
16	Alexandru I. Nicolin	University of Bucharest	Scientific Committee
17	Ali Bağcı	Pamukkale University	Presenter (Oral&Poster)
18	Ali Gültekin	Gazi University	Presenter (Oral&Poster)
19	Ali Osman Yılmaz	İstanbul University	Presenter (Oral&Poster)
20	Alper Kağan Güler	İzmir High Technology Institute	Listener
21	Altan Baykal	Middle East Technical University	Advisory Committee

22	Altan Çakır	İstanbul Technical University	Advisory Committee
23	Alya Çakır	Yıldız Technical University	Listener
24	Amare Abebe	North-West University	Advisory Committee
25	Andrea Lausi	Scientific Director of SESAME	Invited Speakers
26	Arda Bulut	Koç University	Listener
27	Aroonkumar Beesham	University of Zululand	Scientific Committee
28	Arzu Çilli	Yıldız Technical University	Organizing Committee
29	Arzu Kurt	Çanakkale Onsekiz Mart Unv.	Presenter (Oral&Poster)
30	Aşkın Kocabaş	Koç University	Invited Speakers
31	Ata Göktuğ Çim	Yıldız Technical University	Listener
32	Atılay Güngör	Aydın Adnan Menderes University	Listener
33	Atilla Eren Mamuk	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
34	Ayberk Yılmaz	İstanbul University	Organizing Committee
35	Ayça Sayın	Yıldız Technical University	Listener
36	Aydan Altıkulaç	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
37	Ayhan Aydın	Ankara University	Presenter (Oral&Poster)
38	Aylin Çalışkan	İstanbul University	Local Organizing Committee Presenter (Oral&Poster)
39	Aynur Özcan	Gazi University	Listener
40	Ayşe Bat	Bandırma Onyedi Eylül University	Presenter (Oral&Poster)
41	Ayşe Kuday	Natıonal Defence Unıversıty	Presenter (Oral&Poster)
42	Ayşe Nur Şahin	Yıldız Technical University	Listener
43	Ayşe Uçak	Gazi University	Listener
44	Ayşegül Kuldaş	Gazi University	Listener

45	Ayşegül Türker	Süleyman Demirel University	Presenter (Oral&Poster)
46	Ayşen Özel	İstanbul University	Scientific Committee
47	Ayten Seckin	Gazi University	Presenter (Oral&Poster)
48	Aytül Adıgüzel	İstanbul University	Organizing Committee
49	Babe Abderrahmane	Karadeniz Technical University	Listener
50	Bahar Dirican	University of Health Sciences	Award Winner
51	Bahar Tüysüz	İstanbul University	Presenter (Oral&Poster)
52	Baki Akkuş	İstanbul University & President of Turkish Physical Society	Opening Speakers
53	Baran Tan	Ankara University	Listener
54	Banu Süngü Mısırlıoğlu	Yıldız Technical University	Presenter (Oral&Poster)
55	Baran Arslan	Koç University	Listener
56	Barkın Özer	Yıldız Technical University	Presenter (Oral&Poster)
57	Batuhan Çil	İstanbul University, Haliç University	Local Organizing Committee Presenter (Oral&Poster)
58	Bayram Tekin	Middle East Technical University	Scientific Committee
59	Bekir Oğuz Meral	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
60	Bekir Özçelik	Çukurova University	Advisory Committee
61	Belgin Küçükömeroğlu	Karadeniz Technical University	Award Winner
62	Berat Badurlu	Ege University	Listener
63	Berat Polat	Yıldız Technical University	Listener
64	Berkan Doruk Eke	Middle East Technical University	Listener
65	Berke C. Efe	İzmir Institute Of Technology	Listener
66	Berkin Mutlu	Middle East Technical University	Listener

67	Berna Uyanık	Çukurova University	Presenter (Oral&Poster)
68	Bilge Demirköz	Middle East Technical University	Scientific Committee
69	Bilgehan Bayar	District Governor of Bodrum	Opening Speakers
70	Birgül Kök	Erciyes University	Listener
71	Birsel Can Ömür	Yıldız Technical University	Organizing Committee
72	Bo Cederwall	KTH Royal Institute of Technology	Scientific Committee
73	Bora Çelebi	Ted Bodrum Collage	Listener
74	Bora Ketenoğlu	Ankara University	Organizing Committee
75	Buğra Yıldız	Hacettepe University	Presenter (Oral&Poster)
76	Burak Ahmet Yıldız	Middle East Technical University	Listener
77	Burcu Al	Tokat Gaziosmanpasa University	Listener
78	Burçin Ünlü	Boğaziçi University	Invited Speakers & Advisory Committee
79	Buse Kahraman	Trakya University	Presenter (Oral&Poster)
80	Bükem Tanören	Acıbadem University	Advisory Committee
81	Bülent Kutlu	Gazi University	Advisory Committee
82	Büşra Başaran	Gaziantep University	Presenter (Oral&Poster)
83	Büşra Gökçe Zolmaz	Bolu Abant İzzet Baysal University	Listener
84	Büşra İşler	Mugla Sitki Kocman University	Presenter (Oral&Poster)
85	Büşranur Öztürk	Yıldız Technical University	Listener
86	Cahit Karanfil	Muğla Sıtkı Koçman University	Organizing Committee
87	Călin A. Ur	Polytechnic University of Bucharest	Referee Committee & Advisory Committee
88	Can Akalın	Manager and Physicist at RENKO LTD	Award Winner

89	Canan Aksu Canbay	Fırat University	Organizing Committee
90	Caner Baydur	Tongji University	Award Winner
91	Caner Baydur	Yıldız Technical University	Listener
92	Cem Çelebi	Izmir Institute of Technology	Scientific Committee
93	Cem Sanga	İstanbul Technical University	Presenter (Oral&Poster)
94	Ceren B. Dağ	Harvard University	Invited Speakers
95	Ceren Bayhan	Yıldız Technical University	Presenter (Oral&Poster)
96	Ceren Temel	Manisa Celal Bayar University	Listener
97	Ceylan Zafer	Ege University Solar Energy Institute	Award Winner
98	Christos Markou	Director of NCSR	Invited Speakers
99	Cihat Güleryüz	Marmara University	Presenter (Oral&Poster)
100	Coşkun Kocabaş	The University of Manchester	Invited Speakers & Scientific Committee & Award Winner
101	Çağıl Kaderoğlu	Ankara University	Presenter (Oral&Poster)
102	Çağla Pilavcı	Kocaeli University	Presenter (Oral&Poster)
103	Çağlar Çetinkaya	İstanbul University	Vice President of Organizing Committee
104	Çağlar Karaca	Manisa Celal Bayar University	Presenter (Oral&Poster)
105	Çağrı Çırak	Erzincan Binali Yıldırım University	Advisory Committee
106	Çağrı Durmuş	Eskişehir Osmangazi University	Presenter (Oral&Poster)
107	Çiğdem Tarakcı	Yıldız Technical University	Presenter (Oral&Poster)
108	Çiğse Oral	Yıldız Technical University	Presenter (Oral&Poster)
109	Çisem İlayda İnci	İstanbul University	Local Organizing Committee
110	Damla Dicle Çatak	Gazi University	Presenter (Oral&Poster)

111	Damla Karadeniz	Erciyes University	Presenter (Oral&Poster)
112	Danica Krstovska	Saints Cyril and Methodius University of Skopje	Scientific Committee & International Organizing Committee
113	Değer Sofuoğlu	İstanbul University	Vice President of Organizing Committee
114	Deniz Aybaş	University of California	Invited Speakers
115	Deniz Koçyiğit	Pamukkale University	Presenter (Oral&Poster)
116	Dennis Bonatsos	National Center for Scientific Research Demokritos (NCSR)	Referee Committee & Scientific Committee
117	Deren Ahsen Şahin	İstanbul University	Listener
118	Derya Çetiner Tekir	İstanbul University	Listener
119	Derya Sürgit	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)
120	Derya Yılmaz Baysoy	İstanbul Aydın University	Presenter (Oral&Poster)
121	Devrim Yazıcı	Yıldız Technical University	Award Winner
122	Didem Ketenoğlu	Ankara University	Organizing Committee
123	Dilara Aygün	Ege University	Presenter (Oral&Poster)
124	Dilara İçkecan	Marmara University	Listener
125	Dilek Toktamış	Gaziantep University	Presenter (Oral&Poster)
126	Dimitar Tonev	Institute for Nuclear Research and Nuclear Energy	Referee Committee
127	Dimitrios Petrellıs	Greece	Scientific Committee & International Organizing Committee
128	Doğa Demir	İzmir Ekonomi University	Local Organizing Committee
129	Dragos-Victor Anghel	IFIN-HH	Presenter (Oral&Poster)
130	Durmuş Ali Demir	Sabancı University	Scientific Committee

131	Duygu Halis	Yıldız Technical University	Local Organizing Committee
132	Duygu Sena Doğan	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)
133	Duygu Şen Baykal	İstanbul Nişantaşı University	Award Winner Presenter (Oral&Poster)
134	Duygu Tunçman	İstanbul University - Cerrahpaşa	Presenter (Oral&Poster)
135	Duygunur Özdemir	Uludağ University	Presenter (Oral&Poster)
136	Ebrar Akyüz	Middle East Technical University	Listener
137	Ebrar Melisa Aslan	Gazi University	Listener
138	Ebru Karakaş Sarıkaya	Necmettin Erbakan University	Presenter (Oral&Poster)
139	Ebru Menşur Alkoy	Gebze Technical University	Scientific Committee
140	Eda Çelik	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)
141	Efe Baş		Listener
142	Efe Ünal	Ege University	Presenter (Oral&Poster)
143	Ege Oran	Ufuk Universitesi	Listener
144	Ekaterina Batchvarova	Bulgarian Academy of Sciences	Scientific Committee
145	Ekaterina Salkova	Bulgaria	International Organizing Committee
146	Ekmel Özbay	Bilkent University	Referee Committee & Scientific Committee
147	Elif Kemah	Sakarya University	Presenter (Oral&Poster)
148	Elif Meriç	Trakya University	Presenter (Oral&Poster)
149	Elif Nur Selçuk	Süleyman Demirel University	Listener
150	Emine Akpınar	Yıldız Technical University	Presenter (Oral&Poster)
151	Emine Derin Zeybek	Boğaziçi University	Listener

152	Emine Ersöz	Necmettin Erbakan University	Listener
153	Emrah Sarıca	Başkent University	Presenter (Oral&Poster)
154	Emre Hasar	Boğaziçi University	Presenter (Oral&Poster)
155	Emre Onur Kahya	Istanbul Technical University	Scientific Committee
156	Emre Pişkin	Gazi University	Listener
157	Ender Eylenceoğlu	Middle East Technical University	Presenter (Oral&Poster)
158	Enes Gülez	Yıldız Technical University	Listener
159	Enes Kılıç		Listener
160	Enes Malik Çatak	Bolu Abant İzzet Baysal University	Listener
161	Engin Deligöz	Aksaray University	Advisory Committee
162	Ercüment Yüzüak	Recep Tayyip Erdoğan University	Presenter (Oral&Poster)
163	Ergun Yolcu	Manager of Günaydın Newspaper Document Information Center	Award Winner
164	Erhan Cin	Kırıkkale University	Listener
165	Erhan Kara	İstanbul University	Local Organizing Committee
166	Erhan Ongun	Gazi University	Presenter (Oral&Poster)
167	Erkan İbiş	Rector of İstinye University	Opening Speakers
168	Erkan İlik	Eskişehir Osmangazi University	Presenter (Oral&Poster)
169	Ersen Mete	Balıkesir University	Invited Speakers
170	Ersin Feyzioğlu	Ankara University	Listener
171	Ersin Göğüş	Sabancı University	Advisory Committee
172	Ersin Şahin	Marmara University	Listener
173	Ertan Güdekli	İstanbul University	Opening Speakers & President of Organizing Committee
174	Esen Ercan Alp	Argonne National Laboratory	Scientific Committee

175	Esin Eren	Süleyman Demirel University	Presenter (Oral&Poster)
176	Esma Topal	Kırıkkale University	Listener
177	Esra Alveroğlu Durucu	Istanbul Technical University	Advisory Committee
178	Esra Duran	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
179	Esra Şen	Süleyman Demirel University	Presenter (Oral&Poster)
180	Esranur Yalçınkaya	Sakarya University	Presenter (Oral&Poster)
181	Etem Kose	Manisa Celal Bayar University	Presenter (Oral&Poster)
182	Ezgi Altıntaş	Yıldız Technical University	Presenter (Oral&Poster)
183	Ezgi Uzatıcı Sağlam	Uludağ University	Presenter (Oral&Poster)
184	Fahri Aliçavuş	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)
185	Faruk Dalgıç	Manisa Celal Bayar University	Listener
186	Faruk Erdem	Azerbaijan State Pedagogical University	Listener
187	Faruk Karadağ	Çukurova University	Advisory Committee
188	Fatma Aydoğmuş	İstanbul University	Organizing Committee
189	Fatma Kuru	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
190	Fatma Nida Ocak	Üsküdar University	Local Organizing Committee
191	Fatmagül Tunç	Artvin Çoruh University	Presenter (Oral&Poster)
192	Fehmi Bardak	Manisa Celal Bayar Universitesi	Presenter (Oral&Poster)
193	Feyza Başpehlivan	Tobb Economy and Technology University	Presenter (Oral&Poster)
194	Feyza Gönenli Hacıluman	Dumlupınar University	Listener
195	Fikret Karaduman	Balıkesir University	Presenter (Oral&Poster)
196	Filiz Kahraman Aliçavuş	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)

197	Filiz Ozturk	Ondokuz Mayis University	Presenter (Oral&Poster)
198	Francois Peeters	Antwerp University	Scientific Committee
199	Furkan Mücahit Ata	Ege University	Listener
200	Gani Çağlar Çoban	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)
201	Ghada Almisned	Princess Nourah Bint Abdulrahman University	Presenter (Oral&Poster)
202	Gizem Dilara Açan Yıldız	Piri Reis University	Local Organizing Committee Presenter (Oral&Poster)
203	Gizem Durak Yüzüak	Munzur University	Presenter (Oral&Poster)
204	Gizem Gediz	Dokuz Eylül University	Presenter (Oral&Poster)
205	Gizem Öztürk	İstanbul University	Local Organizing Committee Presenter (Oral&Poster)
206	Goran S. Djordjevic	University of Niš	Scientific Committee
207	Gordana Apostolovska	Saints Cyril and Methodius University of Skopje	International Organizing Committee
208	Goutami Chattopadhyay	Calcutta University	International Organizing Committee
209	Gökçenur Çakmak Keçelioğlu	Süleyman Demirel University	Presenter (Oral&Poster)
210	Gökhan İlhan	Gebze Technical University	Presenter (Oral&Poster)
211	Gökhan Kılıç	Eskişehir Osmangazi University	Presenter (Oral&Poster)
212	Gökhan Şaşmazer	Mugla Sıtkı Kocman Universitesi	Listener
213	Göksen Demir	Yıldız Technical University	Listener
214	Görkem Oylumluoğlu	Muğla Sıtkı Koçman University	Organizing Committee
215	Gözde Yılmaz	Kültür University	Presenter (Oral&Poster)

216	Gülay Günday Konan	Sakarya University	Presenter (Oral&Poster)
217	Güldem Ürer Özbilen	Sakarya University Of Applied Sciences	Presenter (Oral&Poster)
218	Gülfem Süsoy Doğan	İstanbul University	Organizing Committee
219	Gülnaz Dönmez	Mugla Sitki Kocman University	Presenter (Oral&Poster)
220	Gülsiye Acar	Yıldız Technical University	Presenter (Oral&Poster)
221	Gülşah Balaban	Boğaziçi University	Listener
222	Gülşah Bozkır	Milli Savunma University	Presenter (Oral&Poster)
223	Gülşen Pirbudak Altıntaş	Okyanus High School	Presenter (Oral&Poster)
224	Haldun Sevinçli	Izmir Institute of Technology	Invited Speakers
225	Halide Koklu	Iğdır University	Presenter (Oral&Poster)
226	Halime Gül Yağlıoğlu	Ankara University	Scientific Committee
227	Halime Tugay	Middle East Technical University	Presenter (Oral&Poster)
228	Halime Yarar	Sakarya University	Presenter (Oral&Poster)
229	Handan Tanyıldızı Kökkülünk	Altınbaş University	Presenter (Oral&Poster)
230	Hande Toffoli	Middle East Technical University	Advisory Committee
231	Hanife İrem Erten	Kto Karatay University	Presenter (Oral&Poster)
232	Hanife Şevval Dere	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
233	Harun Yücel	Bayburt University	Presenter (Oral&Poster)
234	Hasan Kırboğa	Bolu Abant İzzet Baysal University	Listener
235	Hasan Şafak Erdağ	Yıldız Technical University	Presenter (Oral&Poster)
236	Hasan Tatlıpınar	Yildiz Technical	Listener
237	Haşim Zahid Güven	Yildiz Technical Üniverstesi	Presenter (Oral&Poster)

238	Hatice Hilal Yücel (Kurt)	Gazi Unıversıty	Presenter (Oral&Poster)
239	Hatice Kanbur Çavuş	Yozgat Bozok University	Presenter (Oral&Poster)
240	Hatice Özer	İstanbul University	Presenter (Oral&Poster)
241	Hatice Yılmaz Alan	Ankara University - Institute Of Nuclear Sciences	Organizing Committee Presenter (Oral&Poster)
242	Hava Helin Haydaroğlu	Ankara University	Listener
243	Havva Elif Lapa	Isparta University Of Applied Sciences	Presenter (Oral&Poster)
244	Haydar Mutaf	Tübitak	Presenter (Oral&Poster)
245	Hilal Kayar	Yıldız Technical University	Listener
246	Hilmi Volkan Demir	Bilkent University	Scientific Committee
247	Hulya Subasat	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
248	Hüseyin Ozan Tekin	University Of Sharjah	Invited Speakers & Scientific Committee Presenter (Oral&Poster)
249	Hüseyin Atcı	İstanbul University	Presenter (Oral&Poster)
250	Hüseyin Furkan Eminoğlu	Yıldız Technical University	Presenter (Oral&Poster)
251	Hüseyin Sertaç Sümer	Ankara University	Listener
252	Hüseyin Toktamış	Gaziantep University	Presenter (Oral&Poster)
253	Ikram Imane Kouachi	Gazi University	Presenter (Oral&Poster)
254	Ilgın Albasar	TOBB University	Listener
255	Irmak Balmumcu	Gazi University	Presenter (Oral&Poster)
256	Ivanka Bozovıc-Jelısavc	Vinca Institute of Nuclear Sciences	International Organizing Committee

257	İbrahim Samet Tunca	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
258	İdris Sorar	Hatay Mustafa Kemal University	Advisory Committee
259	İlkay Demir	Sivas Cumhuriyet University	Scientific Committee
260	İlkay Kara	Yıldız Technical University	Presenter (Oral&Poster)
261	İlker Börekçi	Mersin University	Presenter (Oral&Poster)
262	İlknur Aydemir	Ege University	Listener
263	İpek Karaaslan	Yeditepe University	Advisory Committee
264	İrem Çakır	Yıldız Technical University	Presenter (Oral&Poster)
265	İrem Çevik	Manisa Celal Bayar University	Listener
266	İrfan Selim Önen	Bolu Abant İzzet Baysal University	Listener
267	İsmail Akkan	Uşak University	Presenter (Oral&Poster)
268	Kaan Yavaş	Yıldız Technical University	Presenter (Oral&Poster)
269	Kadir Demir	Zonguldak Bülent Ecevit University	Advisory Committee
270	Kadriye Kaçmaz	Mugla Sitki Kocman University	Presenter (Oral&Poster)
271	Kerime Selin Ertaş	Yıldız Technical University	Presenter (Oral&Poster)
272	Kevser Hışıroğlu Ayar	Yıldız Technical University	Presenter (Oral&Poster)
273	Kıvanç Gürkan İliksiz	Bolu Abant İzzet Baysal University	Listener
274	Klaudio Peqini	University of Tirana	Advisory Committee
275	Klaus Blaum	Max Planck Institute	Scientific Committee
276	Kutsal Bozkurt	Yıldız Technical University	Advisory Committee
277	Kübra Altuntaş	İstanbul University	Local Organizing Committee
278	Kübra Değirmenci	Gazi University	Listener
279	Kübra Nur Batur	Karadeniz Technical University	Listener

280	Lambe Barandovski	Ss. Cyril and Methodius University	Scientific Committee
281	Laura Mersini	University of North Carolina	Scientific Committee
282	Levent Kaan Oğuz	Middle East Technical University	Listener
283	Lidija Zivkovic	Institute of Physics Belgrade	Scientific Committee
284	Lidya Susam	İstanbul University	Organizing Committee Presenter (Oral&Poster)
285	Liss Vazquez Rodriguez	CERN	Invited Speakers
286	Luc Bergé	President of European Physical Society (EPS), France	Invited Speakers & Award Winner & Opening Speakers
287	Ludger Wirtz	University of Luxembourg	Invited Speakers
288	M. Pınar Mengüç	Özyeğin University	Invited Speakers
289	M. Selim Ünlü	Boston University	Scientific Committee
290	M.Tahir Güllüoğlu	Rector of Harran University	Award Winner
291	Macide Cantürk Rodop	Yıldız Technical University	Award Winner
292	Mahmoud Albari	Erzincan Binali Yıldırım University	Presenter (Oral&Poster)
293	Mahmut Aydınol	Dicle University	Presenter (Oral&Poster)
294	Mahmut Böyükata	Kırıkkale University	Advisory Committee Presenter (Oral&Poster)
295	Mahmut Doğru	Supervisory Board Member of Higher Education Council	Advisory Committee
296	Mahmut Marışmak	Akdeniz University	Listener
297	Mahmut Sami Yüce	Bolu Abant İzzet Baysal University	Listener
298	Marah Alqedra	Middle East Technical University Universitesi	Listener
299	Mariana Petrıs	Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering	International Organizing Committee

300	Mehiban Hasanova	Azerbaycan Technical University	Presenter (Oral&Poster)
301	Mehmet Ali Uçak	Middle East Technical University	Listener
302	Mehmet Baran Ökten	Yıldız Technical University	Presenter (Oral&Poster)
303	Mehmet Hanifi Kebiroğlu	Malatya Turgut Özal University	Presenter (Oral&Poster)
304	Mehmet Tahir Güllüoğlu	Harran University	Advisory Committee
305	Mehmet Yılmaz	Yıldız Technical University	Presenter (Oral&Poster)
306	Mehmet Yurtsever	İzmir High Technology Institute	Listener
307	Mehmet Zeyrek	Middle East Technical University	Advisory Committee
308	Melda Patan Alper	Yeditepe University	Presenter (Oral&Poster)
309	Melih Kayra Kadıoğlu	Koç University	Presenter (Oral&Poster)
310	Meral Bayraktar	Yıldız Technical University	Presenter (Oral&Poster)
311	Meriç Dedemen	Ege University	Listener
312	Mert Aydın Bayram		Listener
313	Mert Ünsaldı	Middle East Technical University	Presenter (Oral&Poster)
314	Merve Doğan	Haliç University	Organizing Committee
315	Merve Hamzaçebi	Samsun Ondokuz Mayıs University	Presenter (Oral&Poster)
316	Merve Pehlivan	Gazi University	Listener
317	Merve Uyanık	Tekirdağ Namık Kemal University	Presenter (Oral&Poster)
318	Mervenur Keleş	Hacettepe University	Listener
319	Metin Arık	Boğaziçi University	Referee Committee & Scientific Committee
320	Mihai Girtu	Ovidius University	Referee Committee & Scientific Committee

321	Mila Pandurovıc	Vinca Institute of Nuclear Sciences	International Organizing Committee
322	Milorad Milosevic	Antwerp University	Scientific Committee
323	Mine Fakılı	Eskişehir Technical University	Presenter (Oral&Poster)
324	Minel Yay	Çanakkale Onsekiz Mart University	Listener
325	Muhammad Fauzi Mustamin	Karadeniz Technical University	Presenter (Oral&Poster)
326	Muhammed Zeki Şentürk	Ege University	Listener
327	Murat Altınlı	Eskişehir Technical University	Presenter (Oral&Poster)
328	Murat Çalışkan	Yıldız Technical University	Presenter (Oral&Poster)
329	Murat Çavuş	Yozgat Bozok University	Presenter (Oral&Poster)
330	Murat İnanç Gözütok	Çanakkale Onsekiz Mart University	Presenter (Oral&Poster)
331	Murat Kurt	Ondokuz Mayıs University	Presenter (Oral&Poster)
332	Murat Tanışlı	Eskişehir Technical University	Award Winner
333	Murat Tomakin	Recep Tayyip Erdoğan University	Advisory Committee
334	Musab Tugrul	Mugla Sitki Kocman University	Presenter (Oral&Poster)
335	Mustafa Böyükata	Yozgat Bozok University	Award Winner Presenter (Oral&Poster)
336	Mustafa Erol	İzmir 9 Eylül University	Scientific Committee
337	Mustafa Tekin	Bolu Abant Izzet Baysal Universitesi	Listener
338	Mustafa Tüfekçi	Ankara Universitesi	Presenter (Oral&Poster)
339	Mustafa Yılmaz	Gaziantep University	Award Winner Presenter (Oral&Poster)
340	Mustafa Yılmaz	Yıldız Technical University	Presenter (Oral&Poster)

341	Mustafa Zafer Balbağ	Osmangazi University	Scientific Committee
342	Mücahit Yılmaz	Fırat University	Presenter (Oral&Poster)
343	Mücella Özbay Karakuş	Yozgat Bozok University	Presenter (Oral&Poster)
344	Mürsel Şen	Ege University	Presenter (Oral&Poster)
345	N. Victor Zamfir	Romania	Advisory Committee
346	Nahit Polat	İzmir High Technology Institute	Presenter (Oral&Poster)
347	Narmin Akbarova	Baku State University	Presenter (Oral&Poster)
348	Naser Alsalehi	Ankara University	Listener
349	Nasser Kalantar-Nayestanakı	KVI Center for Advanced Radiation Technology	Referee Committee
350	Nazlı Eylül Dağ	Gazi University	Listener
351	Nehir Çalışkan	Ankara University	Listener
352	Nergis Yıldız Angın Atmaca	İstanbul Technical University	Presenter (Oral&Poster)
353	Neslihan Alan	İstanbul University	Presenter (Oral&Poster)
354	Neslihan Şahin	Eskişehir Technical University	Presenter (Oral&Poster)
355	Nicola Seriani	ICTP	Invited Speakers
356	Nida Nur Ekgü	Adana Çukurova University	Listener
357	Nihal Büyükçizmeci	Selçuk University	Advisory Committee
358	Nihat Berker	Kadir Has University	Advisory Committee
359	Nil İnce	Koç University	Listener
360	Nilay Bostan	Tenmak Nuken	Listener
361	Nilüfer Didiş Körhasan	Zonguldak Bülent Ecevit University	Invited Speakers
362	Nur Çınar	Akdeniz University	Listener
363	Nur İman Muttaki	Sakarya University	Listener
364	Nuray Küp Aylıkcı İdris Doğan	İskenderun Technical University	Presenter (Oral&Poster)

365	Nuray Yavuzkanat	Bitlis Eren University	Presenter (Oral&Poster)
366	Nursel Can	Yıldız Technical University	Organizing Committee
367	Oğuz Gülseren	Bilkent University	Opening Speakers & President of Scientific Committee
368	Oğuzhan Oğuz	Gazi Universitiy	Listener
369	Okan Şimşek	Ondokuz Mayıs University	Presenter (Oral&Poster)
370	Oktay Karaduman	Munzur University	Presenter (Oral&Poster)
371	Onur Akın Akbal	Yıldız Technical University	Presenter (Oral&Poster)
372	Onur Başlı	Karadeniz Technical University	Presenter (Oral&Poster)
373	Onur Buğra Kolcu	Istinye University	Presenter (Oral&Poster)
374	Onurhan Baran	Erciyes University	Presenter (Oral&Poster)
375	Oya Oğuz	Haliç University	Advisory Committee
376	Ozan Güneş	University Of Saskatchewan	Presenter (Oral&Poster)
377	Ozan Kiyikci	Mugla Sitki Kocman University	Presenter (Oral&Poster)
378	Ömer Alihaydar Tekiner		Listener
379	Ömer Faruk Kadı	Gebze Technical University	Listener
380	Ömer Faruk Soydan	Middle East Technical University	Listener
381	Ömer Güler	Munzur University	Presenter (Oral&Poster)
382	Ömer İslam Şahin	Yıldız Technical University	Presenter (Oral&Poster)
383	Ömer Önlükuş	Ted Bodrum Collage	Listener
384	Ömer Yavaş	Ankara University	Advisory Committee
385	Özay Eroğlu	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
386	Özgen Özge	Sakarya University	Presenter (Oral&Poster)

387	Özgür Baştürk	Ankara University	Invited Speakers
388	Özgür E. Müstecaplıoğlu	Koç University	Scientific Committee
389	Özgür Güçlü	Mugla Sitki Kocman University	Presenter (Oral&Poster)
390	Özgür Nazlı	Hacettepe University	Listener
391	Özlem Akın	Eskişehir Technical University	Presenter (Oral&Poster)
392	Özlem Eda Demircan	Kocaeli University	Listener
393	Özlem Öner	Süleyman Demirel University	Presenter (Oral&Poster)
394	Öznur Arslan	İstanbul University	Local Organizing Committee
395	Öznur Demirkol	Eskişehir Technical University	Presenter (Oral&Poster)
396	Parviz Elahi	Bogazici University	Listener
397	Pervin Arıkan	Gazi University	Advisory Committee & Vice President of Turkish Physical Society
398	Pınar Oruç	Gazi University	Presenter (Oral&Poster)
399	R. Burcu Çakırlı Mutlu	İstanbul University	Scientific Committee
400	R. Kumar Tiwari	APS University	Advisory Committee
401	Radu Dan Constantinescu	University of Craiova & President of Balkan Physical Union (BPL)	Opening Speakers & Scientific Committee
402	Radu Manu	Naval Academy, Mircea Cel Batran	Presenter (Oral&Poster)
403	Rana Başaran	İstanbul University	Listener
404	Raşit Turan	Middle East Technical University	Advisory Committee
405	Rawad Hadı Alı Alawadı	Erzincan Binali Yıldırım University	Presenter (Oral&Poster)
406	Recep Zan	Niğde Ömer Halis Demir University	Scientific Committee
407	Rıfat Onur Umucalılar	Mimar Sinan Fine Arts University	Advisory Committee

408	Richard Casten	Yale University	Scientific Committee
409	Rukiye Aldemir	Süleyman Demirel University	Presenter (Oral&Poster)
410	Sabiha Tunçel Güçtekin	Ankara Hacı Bayram Veli University	Presenter (Oral&Poster)
411	Sacide Safadi	Gaziantep University	Presenter (Oral&Poster)
412	Sadiye Çetinkaya Çolak	Eskişehir Osmangazi University	Organizing Committee & President of Local Organizing Committee
413	Safa Kasap	University of Saskatchewan	Scientific Committee
414	Safa Sadaghiyanfam	Izmir Katip Celebi University	Listener
415	Saltuk Buğra Töreli	Adana Alparslan Türkeş Bilim Ve Technology University	Presenter (Oral&Poster)
416	Sandro Scandolo	ICTP	Invited Speakers
417	Sarp Kargı	Boğaziçi University	Listener
418	Sefer Bora Lişesivdin	Gazi University	Scientific Committee
419	Selçuk Utaş	Gazi University	Presenter (Oral&Poster)
420	Selda Eser	Sakarya University	Presenter (Oral&Poster)
421	Selim Yücel	Ege University	Listener
422	Selin Aşmanoğlu	Middle East Technical University	Presenter (Oral&Poster)
423	Selma Özarslan	Hatay Mustafa Kemal University	Presenter (Oral&Poster)
424	Semanur Nazıf	Çanakkale 18 Mart University	Presenter (Oral&Poster)
425	Semih Doğruer	Ankara Yıldırım Beyazıt University, Gazi University	Presenter (Oral&Poster)
426	Semra İde	Hacettepe University	Award Winner
427	Sena Hamarat	Ankara University	Presenter (Oral&Poster)
428	Senem Özdemir	Ege University	Local Organizing Committee

429	Senem Özdemir	İstanbul Nişantaşı University	Presenter (Oral&Poster)
430	Serap Çatlı Dinç	Gazi University	Presenter (Oral&Poster)
431	Serap Güneş	Yıldız Technical University	Scientific Committee
432	Serdar Gökce	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
433	Serdar Spor	Zonguldak Bülent Ecevit University	Presenter (Oral&Poster)
434	Serkan Ateş	İzmir Institute of Technology	Scientific Committee
435	Serkan Yüce	Süleyman Demirel University	Presenter (Oral&Poster)
436	Serkant Ali Çetin	İstinye University	Scientific Committee
437	Sertaç Hoşhanlı	İzmir High Technology Institute	Listener
438	Sevdalina Stoyanova Dimitrova	Bulgarian Academy of Science	International Organizing Committee
439	Sevde Nur Utlu	İzmir Institute of Technology	Award Winner
440	Sevil Gülderen	Hacettepe University	Listener
441	Sevilay Uçar Yüzbaş	İstanbul Nişantaşı University	Presenter (Oral&Poster)
442	Sevilay Uçar Yüzbaş	İstanbul Nişantaşı University	Presenter (Oral&Poster)
443	Sevim Bircek Coşkun	Muğla Sıtkı Koçman University	Presenter (Oral&Poster)
444	Sevim Şenacay	Gebze Technical University	Presenter (Oral&Poster)
445	Seyfettin Çakmak	Süleyman Demirel University	Award Winner
446	Seyit Kale	İzmir Biomedicine and Genome Center	Invited Speakers
447	Sezai Asubay	Dicle University	Advisory Committee
448	Sezai Elagöz	Vice President of R&D at Aselsan	Scientific Committee
449	Sıla Sarıgöl	Bilkent University	Listener
450	Sibel Gokalp	Dokuz Eylül University	Listener
451	Simge Özer	Çanakkkale Onsekiz Mart University	Presenter (Oral&Poster)

452	Sinan Sağır	Karamanoğlu Mehmetbey University	Presenter (Oral&Poster)
453	Sinem Elif Kayral	Balıkesir University	Presenter (Oral&Poster)
454	Sondan Durukanoğlu Feyiz	Kadir Has University	Advisory Committee
455	Sude Ayhan	İzmir High Technology Institute	Listener
456	Sude Nur Eker	İzmir High Technology Institute	Listener
457	Sultan Başak	Sinop University	Listener
458	Süha Gül Kara	Gazi University	Presenter (Oral&Poster)
459	Süleyman Özçelik	Gazi University	Advisory Committee
460	Şadi Yazıcı	President of the Turkish Basic Sciences Research Foundation	Opening Speakers
461	Şahin K. Özdemir	Pennsylvania State University	Invited Speakers
462	Şefika Öztürk	Yıldız Technical University	Presenter (Oral&Poster)
463	Şenay Yurdakul	Gazi University	Award Winner
464	Şener Oktik	Kadir Has University	Invited Speakers & Advisory Committee
465	Şeval Gürtürk	Boğaziçi University	Listener
466	Şeyda Anaç	Mugla Sitki Kocman University	Presenter (Oral&Poster)
467	Şinasi Ellialtıoğlu	TED University	Referee Committee
468	Şule Ünlü	Ankara University	Listener
469	Taha Eren Duygun	Hacettepe University	Listener
470	Taha Yusuf Kebapcı	İstanbul University	Presenter (Oral&Poster)
471	Tahir Çağın	Texas A&M University	Scientific Committee
472	Tamer Akan	Eskişehir Osmangazi University	Award Winner
473	Tolga Önen	Bozok University	Presenter (Oral&Poster)
474	Tuğba Aycan	Sinop University	Presenter (Oral&Poster)
475	Tuğba Öküzcü	Gazi University	Listener

476	Tuğçe Metin	Ege University	Listener
477	Tuğçe Sinem Öktemer	İstanbul University	Presenter (Oral&Poster)
478	Tuna Kılınç	Hacettepe University	Listener
479	Ualikhanova Bayan Saparbekovna	South Kazakhstan State Pedagogical University	International Organizing Committee
480	Uğur Çevik	TENMAK Vice President	Opening Speakers
481	Uğur Demirkol	Eskişehir Osmangazi University	Presenter (Oral&Poster)
482	Ulaş Keskin	Yıldız Technical University	Presenter (Oral&Poster)
483	Ulviye Akgül	İzmir High Technology Institute	Listener
484	Uygar Ege Kocakır	Muğla TOBB Science High School	Presenter (Oral&Poster)
485	Ümit Bayram	Abdullah Gül University	Presenter (Oral&Poster)
486	Vasiliki Skoufi	National and Kapodistrian University of Athens	International Organizing Committee
487	Vesna Gershan	Saints Cyril and Methodius University of Skopje	International Organizing Committee
488	Vael Hajahmad	Erzincan Binali Yıldırım University	Presenter (Oral&Poster)
489	Victor Ciupina	Ovidius University	Scientific Committee Presenter (Oral&Poster)
490	Viladimir Rekovic	CERN	Invited Speakers
491	Wilfred Van Der Wiel	University of Twente	Invited Speakers
492	Yagmur Ece Sandıkcı	İzmir High Technology Institute	Listener
493	Yağızhan Dinçkurt	Yıldız Technical	Listener
494	Yağmur Seda Sankutlu	Boğaziçi University	Listener
495	Yasemin Doğan	Marmara	Presenter (Oral&Poster)

496	Yashar Azizian-Kalandaragh	Gazi University	Scientific Committee
497	Yasir Bagci	Ondokuz Mayis Universitesi	Listener
498	Yavuz Ekincioğlu	Bayburt University	Presenter (Oral&Poster)
499	Yavuz Ekşi	Istanbul Technical University	Opening Speakers & President of Advisory Committee
500	Yavuz Selim Gökduman	İstanbul University	Listener
501	Yunus Emre Koç	Gazi University	Presenter (Oral&Poster)
502	Yurdaşen Alp Yeni	Middle East Technical University	Listener
503	Zafer Gedik	Sabancı University	Invited Speakers & Scientific Committee
504	Zain Awan		Listener
505	Zehra Akdeniz	Piri Reis University	Advisory Committee
506	Zehra Başakıl	İstanbul University	Presenter (Oral&Poster)
507	Zeynel Abidin Ulusan	Koç University	Listener
508	Zeynep Latifoğlu	Yıldız Technical University	Listener
509	Zeynep Tamer	Muğla Sıtkı Koçman University	Listener
510	Ziya Berkay Benli	Ege University	Listener
511	Ziya Kemal	Yıldız Technical University	Presenter (Oral&Poster)
512	Ziya Merdan	Gazi University	Advisory Committee Presenter (Oral&Poster)
513	Zübeyde Serra Gazanker	Ludwig Maximilians Universität İn München	Listener