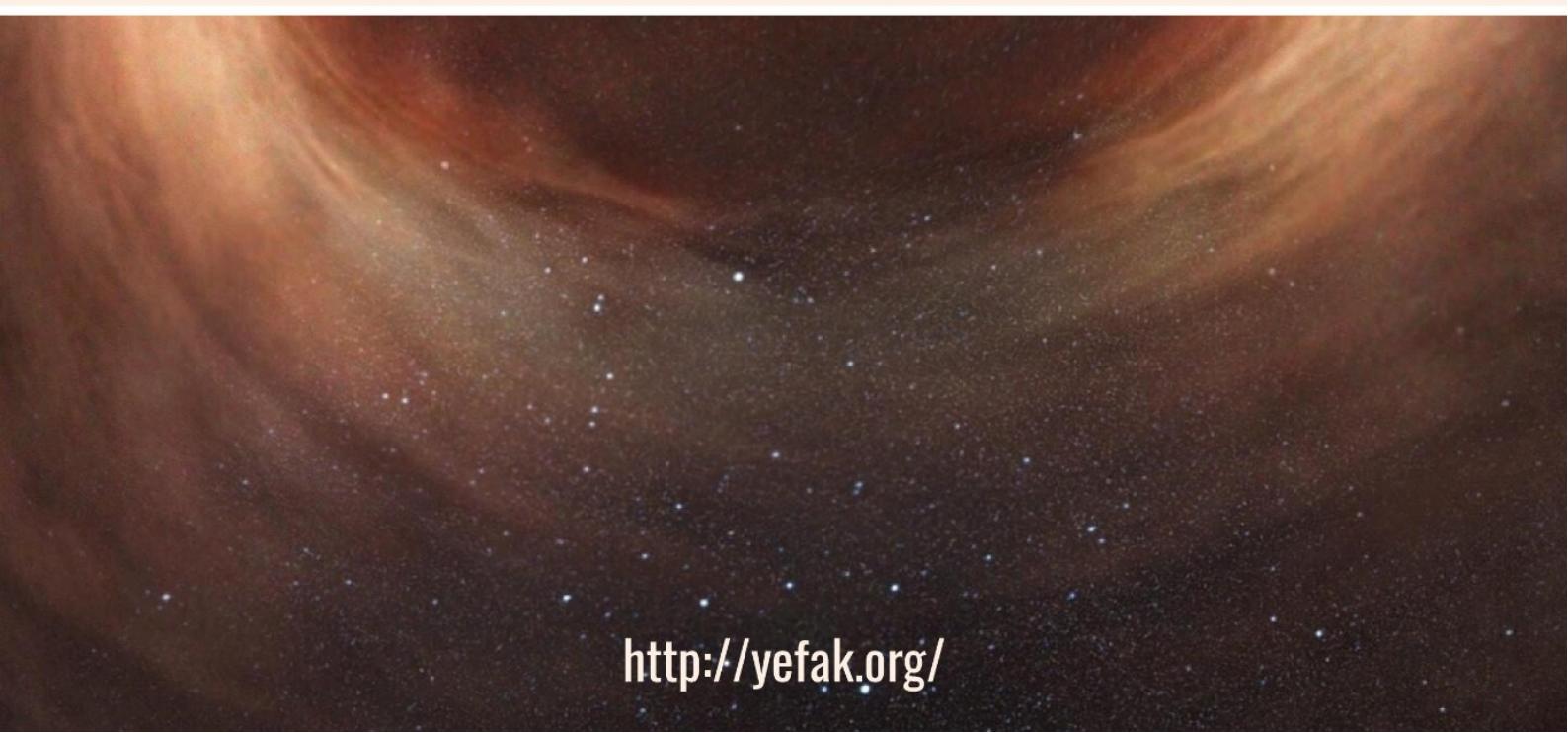




3rd WORKSHOP ON HIGH ENERGY PHYSICS, ASTROPHYSICS AND COSMOLOGY

• 3 - 5 FEBRUARY 2020 •

• İSTANBUL UNIVERSITY SCIENCE FACULTY •
• PROF. CEMİL BİLSEL CONFERENCE HALL •



HEPAC 2020
WORKSHOP ON HIGH ENERGY PHYSICS, ASTROPHYSICS & COSMOLOGY
February 3-5, 2020, Istanbul University, Türkiye

PREFACE

Physicists meet at Istanbul University!

The third of the High Energy Physics, Astrophysics and Cosmology (HEPAC) Workshop will be held on 3-5 February 2020, with the participation of distinguished local and international speakers. It will take place at Cemil Bilsel Conference Hall.

The aim of the workshop is to discuss current theoretical and experimental results in the fields of astrophysics, astrobiology, gravity theories, black holes, wormholes, dark matter, dark energy, particle physics, cosmology, mathematical physics and philosophy.

The first of the HEPAC Workshops was held with the participation of 20 speakers and more than 400 listeners, the second with the participation of 28 Speakers and more than 300 listeners and various poster presentations. The 3rd HEPAC Workshop, which will include highly distinguished leading physicists from abroad, will be held with 30 prominent speakers and about 500 participants.

The high interest in the workshop is clear evidence of its scientific level and high discipline. This workshop brings together researchers and young people in our country, who are passionate about physics and started to play a scientific role in the intersection of High Energy Physics, Astrophysics and Cosmology.

The workshop is undoubtedly shaped by the interests and efforts of the Speakers, the Chair persons, the Scientific Executive Board, the Organizing Committee and the Participants.

The workshop is organized by the support of Istanbul University. I would like to express my deep gratitude to our Rector Prof. Dr. Mahmut Ak, who honored our workshop with the generous support and opening speech, speakers, moderators, participants, members of the scientific committee, members of the organizing committee, NOVA Schools and to the working people behind the stage, the invisible heroes of the workshop.

I wish you a successful workshop.

Best regards.

Prof. Dr. Ekrem Aydiner
On behalf of HEPAC Scientific Committee and Organization Committee

Istanbul University, Faculty of Science, Department of Physics
Head of High Energy and Plasma Physics Department



3. YÜKSEK ENERJİ FİZİĞİ, ASTROFİZİK VE KOZMOLOJİ ÇALIŞTAYI

• 3 - 5 ŞUBAT 2020 •

• İSTANBUL ÜNİVERSİTESİ FEN FAKÜLTESİ •
• PROF. CEMİL BİLSEL KONFERANS SALONU •

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ÖNSÖZ

Fizikçiler İstanbul Üniversitesi'nde buluşuyor!

Yüksek Enerji Fiziği, Astrofizik ve Kozmoloji (YEFAK) Çalıştayının üçüncüsünü yurt içinden ve dışından çok seçkin konuşmacıların katılımıyla 3-5 Şubat 2020 tarihlerinde İstanbul Üniversitesi Fen Fakültesi Prof. Cemil Bilsel Konferans Salonu'nda gerçekleştiriyoruz.

Çalıştanın amacı: Astrofizik, astrobiyoloji, kütleçekim teorileri, kara delikler, solucan delikleri, karanlık madde, karanlık enerji, parçacık fiziği, kozmoloji, matematiksel fizik ve felsefe alanlarında güncel teorik ve deneysel sonuçları tartısmaktır.

YEFAK Çalıştaylarının birincisi 20 Konuşmacı ve 400 den fazla dinleyicinin katılımı, ikincisi 28 Konuşmacı ve 300 den fazla dinleyicinin katılımı ve çeşitli poster sunumları ile gerçekleştirılmıştır. Yurtdışından gelen çok seçkin fizikçilerin de yer alacağı 3. YEFAK Çalıştayı ise 30 çok seçkin konuşmacı ve 500 civarında katılımcı ile gerçekleştirilmektedir.

Çalıştaya gösterilen yüksek ilgi, çalıştanın bilimsel düzeyinin ve disiplinin yüksek olduğunu açık bir kanıtıdır. Bu çalıştan Yüksek Enerji Fiziği, Astrofizik ve Kozmoloji arakesitinde ülkemizdeki araştırmacıları ve fiziğe gönül vemiş gençleri bir araya getirmekte olup bilimsel anlamda önemli bir rol oynamaya başlamıştır.

Çalıştay hiç kuşkusuz, Konuşmacıların, Oturum Başkanlarının, Bilimsel Yürütme Kurulunu, Düzenleme Kurulunun ve Katılımcıların emeğiyle, ilgisiyle şekilenmiştir.

Çalıştay İstanbul Üniversitesi'nin ev sahipliği ve desteği gerçekleştirimektedir. Vermiş oldukları destek ve açılış konuşmasıyla çalıştanımızı onurlandıran Rektörümüz Prof. Dr. Mahmut Ak'a, konuşmacılara, oturum başkanlarına, katılımcılara, bilimsel yürütme kurulu üyelerine, düzenleme kurulu üyelerine, NOVA Okullarına ve çalıştanın görünmez kahramanları olan sahne gerisindeki emekçi dostlara şükranlarımı sunarım.

Başarılı bir çalıştay diliyorum.
Sevgilerimle,

Prof. Dr. Ekrem Aydiner
YEFAK Bilimsel Yürütme ve Düzenleme Kurulu Adına

İstanbul Üniversitesi, Fen Fakültesi, Fizik Bölümü
Yüksek Enerji ve Plazma Fiziği Anabilim Dalı Başkanı

DESTEKLEYEN KURULUŞLAR

İstanbul Üniversitesi



NOVA Okulları



Türk Fizik Topluluğu

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Takhmasib Aliev, Orta Doğu Teknik Üniversitesi

Tekin Dereli, Koç Üniversitesi

Teoman Turgut, Boğaziçi Üniversitesi

HEPAC-2020 Organization Committee / YEFAK-2020 Düzenleme Kurulu

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Mustafa Sarışaman, İstanbul Üniversitesi

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Sena Tuna, İstanbul Üniversitesi

Sevval Taşdemir, İstanbul Üniversitesi

Umut Acar, İstanbul Üniversitesi

** Liste alfabetik sıra izlenerek düzenlenmiştir.

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Program Date February 3

09:00-09:05 **Opening**, Ekrem Aydiner

09:05-09:15 Mahmut Ak, Rector, İstanbul University

Session I **Chair**, Nefer Şenoguz, Mimar Sinan University

09:15-10:00 Qaisar Shafi, University of Delaware
"Grand Unification, Inflation and Weak Gravity Conjecture"

10:00-10:30 Tekin Dereli, Koç University
"Massive Gravitation and Local Scaling Laws in Riemann-Weyl Spacetimes"

10:30-11:00 Tea & Cofee Break

Session II **Chair**, Kai Schwenzer, İstanbul University

11:00-11:30 Melahat Bayar, Kocaeli University
"Tılsım Kuark içeren Hadronların Kiral Teorilerde Araştırılması"

11:30-12:00 Ebru Devlen, Ege University
"Toplanma Disklerinin Kuramı"

12:00-14:00 Lunch

Session III **Chair**, Avadis Hacınlıyan, Yeditepe University

14:00-14:45 Christian Corda, İstanbul University
"Quantum Black Holes"

14:45-15:15 M. Bashirov, Lankaran State University
"Study of Solar Wind"

15:15-15:45 Tea & Cofee Break

Session IV **Chair**, Şahin Aktaş, Marmara University

15:45-16:00 Özgür Sevinç, Yeniüzyıl University
"Chaplygin Gazlı ve Madde Yaratmalı Zar-Evren modellerinde Gözlemsel Sınırlamaların İncelenmesi"

16:00-16:15 Serpil Yalçın Kuzu, Fırat University
"ALICE Detektörü ile Hadronik Rezonans Oluşumlarının İncelenmesi"

16:15-16:30 Emine Gülmез, Yıldız Technical University
"X-ray Study of Abell 478 Observed by XMM-Newton"

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Program Date February 4

Session I	Chair , Yorgo Şenlikoğlu, Koç University
09:15-10:00	Nobuchika Okada, The University of Alabama "Freeze-in Dark Matter and Lifetime Frontier"
10:00-10:30	Orhan Çakır, Ankara University "Proton-Proton Çarpışmalarında ZZ ve Z γ Üretim Tesir Kesitleri ve Anormal Yüksüz Üçlü Ayar Bozon Bağlaşımlarının Etkilerinin İncelenmesi"
10:30-11:00	Tea & Cofee Break
Session II	Chair , Cem Güçlü, İstanbul Technical University
11:00-11:30	Murat Özer, Yıldız Technical University "Negative mass and the principle of equivalence in general relativity"
11:30-12:00	Murli M. Verma, CERN "Dark Matter and Dark Energy in f(R) Gravity: A Unified Approach"
12:00-14:00	Lunch
Session III	Chair , Mehmet Emin Özal, Emeritus Professor
14:00-14:45	George K. Leontaris, University of Ioannia "Some Phenomenological and Cosmological Aspects of F-theory GUTs"
14:45-15:15	Emre Işık, Turkish-German University "Magnetic Flux Emergence and Brightness Variability of Sun-like Stars"
15:15-15:45	Tea & Cofee Break
Session IV	Chair , Mithat Kaya, Marmara University
15:45-16:00	Ulaş Özden, İstanbul Aydin University "Gravitational Form factors of Nucleon in Light-cone QCD"
16:00-16:15	Gülay Karakaya, İstanbul Technical University "Quantum Fluctuations of a Self-interacting Inflaton"
16:15-16:30	İşıl Başaran Öz, İstanbul University "Cosmology with Two Scalar Fields"

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Program Date February 5

Session I	Chair , Can Kozçaz, Boğaziçi University
09:15-10:00	George Lazarides, Aristotle University of Thessaloniki "Topological Defects and Gravity Waves"
10:00-10:30	Mahmut Hortaşsu, Mimar Sinan University "Kerr ve Kerr- (anti-) de Sitter Uzay Zamanlarında Kara Deliğin KütleSİfıra Gitme Sınırı: Çözümlər ve Kurt Delikləri"
10:30-11:00	Tea & Cofee Break
Session II	Chair , Nuri Ünal, Emeritus Professor
11:00-11:30	Alexander Kholmetskii, Belarus State University "Mössbauer Experiments in a Rotating System: Correct and Incorrect Approaches to Their Analysis"
11:30-12:00	Tolga Yarman, Okan University "Redshift of Light from the Star S0-2 in General Relativity and in YARK Gravitation Theory"
12:00-14:00	Lunch
Session III	Chair , Tolga Güver, İstanbul University
14:00-14:45	Alpar Sevgen, Boğaziçi University "Dünyada ve Evrenin Başlangıcında Müzik Sesi"
14:45-15:15	Cem Salih Ün, Uludağ University "Stop and Gluino Search at the LHC and Future Colliders"
15:15-15:45	Tea & Cofee Break
Session IV	Chair , Can Güngör, İstanbul Üniversitesi
15:45-16:00	Ciprian Sporea, University of Timisoara "Dirac quasibound states in a charged black hole spacetime"
16:00-16:15	Keremcan Doğan, Koç University "Dimensional Reduction of 6-dimensional Dirac Equation on 3-dimensional Sphere"
16:15-16:30	Closing Metin Arık, Boğaziçi University

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SÖZLÜ SUNUMLAR / ORAL PRESENTATIONS

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Qaisar Shafi

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Newark, DE 19716, USA
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Short Biography:

Qaisar Shafi received his BSc and PhD in theoretical physics from Imperial College under supervision of Abdus Salam. After completing PhD, Professor Shafi held postdoctoral and research fellowships including an Alexander von Humboldt fellowship and a senior fellowship at CERN. He joined University of Delaware in 1983, while maintaining close ties to the ICTP. He directed many summer schools in High Energy Physics and Cosmology including those under BCSVPIN, founded in collaboration with Abdus Salam and Jogesh Pati, and continues by Professor Shafi. His current research areas include Higgs boson, supersymmetry, new physics at the LHC, dark matter particle, inflationary cosmology and primordial gravity waves, origin of matter in the universe and nature of dark energy.

Selected Publications:

- [1] N. Okada, D. Raut, Q. Shafi, “Inflation, Proton Decay, and Higgs-Portal Dark Matter in $\mathrm{SO}(10) \times \mathrm{U}(1)_{\Psi^c}$ ”, European Journal of Physics C, 79, 1036 (2019).
- [2] S. Raza, Q. Shafi, C. S. Un “b-tau Yukawa Unification in SUSY SU(5) with Mirage Mediation: LHC and Dark Matter Implications”, Journal of High Energy Physics, 1905, 046 (2019).
- [3] G. Lazarides, Q. Shafi, “Monopoles, Strings, and Necklaces in $\mathrm{SO}(10)$ and E_6 ”, Journal of High energy Physics, 1910, 193 (2019).

Title and Short Summary of the Talk:

Grand Unification, Inflation and Weak Gravity Conjecture

Grand Unified Theories (GUTs) provide a compelling framework for unifying the strong, weak and electromagnetic interactions. I will review gauge and Yukawa unification, dark matter, proton decay, topological defects and inflation in supersymmetric and non-supersymmetric GUTs. Some implications of merging grand unification and the weak gravity conjecture will be briefly discussed.

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Short Biography:

Tekin Dereli got his B.S. and Ph.D. degrees in Physics from METU. He is currently Professor of Physics at Koç University. He received the TÜBİTAK Science Prize (1996), Mustafa Parlar Foundation Science Prize (1993), Sedat Simavi Foundation Science Prize (1989) and is a life-long member of The Turkish Academy of Sciences TÜBA (since 1994) and The Science Academy (since 2012). Tekin Dereli published 150 papers on theoretical physics in international journals and has supervised more than 20 Ph.D. theses up to now.

Selected Publications:

- [1] T. Dereli, C. Yetişmişoğlu, "Weyl Covariant Quadratic Curvature Gravity In Riemann-Cartan-Weyl Spacetimes" Phys. Rev. D, 100, 044010 (2019).
- [2] T. Dereli, C. Yetişmişoğlu, "Weyl Covariant Theories Of Gravity In 3-Dimensional Riemann-Cartan-Weyl Spacetimes", Class. Q. Grav. 36, 215005 (2019).
- [3] B. Demirkaya, T. Dereli, K. Güven, "Analog Black Holes And Energy Extraction By Super-radiance From Bose-Einstein Condensates (BEC) With Constant Density", Heliyon 5, e02497 (2019). (arXiv:1806.02139[cond-mat.other])

Title and Short Summary of the Talk:

Massive Gravitation and Local Scaling Laws in Riemann-Weyl Spacetimes

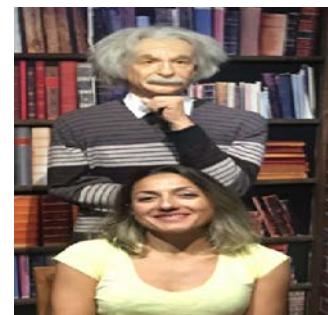
Abstract: The field equations of massive theories of gravity in 3d Riemann-Weyl spacetimes are derived by a first-order, zero-torsion constrained variational principle from locally scale (Weyl) invariant actions, using the language of exterior differential forms. In particular, the locally scale covariant extensions of the field equations of topologically massive gravity (TMG) and new massive gravity (NMG) are explicitly given. The consistency of these extensions are demonstrated by working out their respective vacuum configurations.

This is joint work with C. Yetişmişoğlu. (References [1] and [2]).

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Melihat Bayar

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Kısa Özgeçmiş:

Melihat Bayar, doktorasını 2007 yılında Karadeniz Teknik Üniversitesi’nde ‘KRD toplam kurallarının hadron fizигine uygulaması’ konusunda tamamladı. Orta Doğu Teknik Üniversitesinde Prof. Dr. Altuğ özpинeci ile KRD toplam kurallarını kullanarak hadronların özelliklerinin arşatılması konusunda doktora sonrası araştırmacı olarak çalışti. 2009 yılında Kocaeli Üniversitesi’nde Yrd. Doç. Dr olarak göreve başladı. Daha sonra iki yıl Valencia Üniversitesi, Parçacık Fiziği Enstitüsü’nde (Istituto Fisica Corpuscular-IFIC), Prof. Dr. Eulogio Oset ile hadron fizигinin kiral perturbasyon teorisi ile araştırılması konusunda doktora sonrası araştırmalar yaptı. 2013 yılında doçent unvanı aldı. Halen Valencia grubu ile ikili işbirliği devam etmekte olup, Valencia Üniversitesi tarafından Misafir Öğretim Üyesi olarak desteklenmektedir. Prestijli SCI dergilerde basılmış 50 makalesi, 853 atıfı vardır ve h-indexi 18'dir(spires). İyi derecede İngilizce ve İspanyolca bilmektedir.

Seçilmiş Yayımlar:

- [1] M. Bayar, V. R., "a₀(980)–f₀(980) mixing in $\chi c1 \rightarrow \pi 0 f_0(980) \rightarrow \pi 0 \pi^+ \pi^-$ and $\chi c1 \rightarrow \pi 0 a_0(980) \rightarrow \pi 0 \pi 0 \eta$ ", *Debastiani, Phys. Lett. B*, 775, 94, (2017).
- [2] N. Ikeno, M. Bayar, E. Oset, "Semileptonic decay of B–c into X(3930), X(3940), X(4160)", *Eur.Phys.J. C78* (2018) no.5, 429, 78, 429, (2018).
- [3] M. Bayar, F. Aceti, F-K Guo, E. Oset, "A Discussion on Triangle Singularities in the $\Lambda b \rightarrow J/\psi K^- p$ Reaction", *Phys. Rev. D*, 94, 074039, (2016).

Başlık ve Kısa Özet:

Tılsım Kuark içeren Hadronların Kiral Teorilerde Araştırılması

Hadronları, iç yapılarını ve etkileşmelerini anlamak son 50 yıldır parçacık fizигinin önemli konularından biridir. Kuark Model'e göre hadronlar, meson ve bayron olarak açıklanır. Fakat yapılan deneylerde gözlenen tüm hadronlar kuark model ile açıklanamamaktadır. Bu hadronlar egzotik hadronlar olarak adlandırılır. Egzotik hadronlar; gluontopu, tetrakuark, pentakuark, molekül vb olabilirler. Bu konușmada, tılsım kuark içeren hadronların üniter kiral perturbasyon teorisi ile araştırılması ve sonuçlarının özeti verilecektir. Birçok çalışma deneylerle uyumlu sonuçlar verirken bir kısım çalışmanın sonucu ise BESIII, Belle, LHCb, FAIR ve diğer laboratuarlarda çalışılmak üzere öngörülerde bulunmaktadır.

Kaynaklar:

- [1] N. Ikeno, M. Bayar, E. Oset, "Semileptonic decay of B–c into X(3930), X(3940), X(4160)", *Eur.Phys.J. C78* (2018) no.5, 429, 78, 429, (2018).
- [2] Q. X. Yu, W. H. Liang, M. Bayar, E. Oset, "Line shape and D(*)-D(*) probabilities of $\psi(3770)$ from the $e^+e^- \rightarrow D\bar{D}$ reaction", *Phys.Rev. D*, 99 (2019) no.7, 076002.
- [3] F. Aceti, M. Bayar, E. Oset, A. Martínez Torres, K. P. Khemchandani, J. M. Dias, F. S. Navarra, and M. Nielsen, "Prediction of an I=1 $D\bar{D}^*$ state and relationship to the claimed Zc(3900), Zc(3885)", *Phys. Rev. D*, 90, 016003, (2014).

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Ebru Devlen

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Kısa Biyografi:

Lisans, yüksek lisans ve doktora derecesini Ege Üniversitesi Astronomi ve Uzay Bilimleri Bölümü'nden alan Ebru Devlen, aynı bölümde öğretim üyesi olarak görev yapmaktadır. 2012-2013 yılları arasında İsveç Nordik Teorik Fizik Enstitüsü'nde doktora sonrası araştırmacı olarak çalışmalar yapmıştır. 2013 yılında İstanbul Üniversitesi tarafından Prof. Dr. Nüzhet Gökdöğan anısına verilen "Astronomi Bilim Ödülü"ne layık görülmüştür. 2015 yılında doçentlik ünvanını almıştır. Ebru Devlen manyetohidrodinamik alanında toplanma diskleri ve güneş fiziği konularında araştırmalar yapmaktadır. Hakemli dergilerde yayınlanmış bilimsel makalelerinin yanı sıra çalışma konusu ile ilgili TÜBİTAK ve BAP projeleri bulunmaktadır. Pek çok uluslararası dergi ve ulusal projelerde hakemlik yapmıştır. Ulusal ve uluslararası konferans, çalıştayı ve yaz okulu düzenlenmesine katkıda bulunmuştur. Ayrıca ilköğretim ve lise düzeyinde astronomi derslerinin STEM ile öğretimi üzerine çalışmalar yapmaktadır.

İlgili Alanları: Toplanma Diskleri, Güneş Fiziği, Plazma Kararsızlıklar ve Dalgalar, Manyetohidrodinamik, STEM eğitimi

Seçilmiş Yayımlar:

- [1] E. Devlen, A. Ulubay, E. R. Pekünlü "Magneto-rotational Instability in Diamagnetic, Misaligned Protostellar Discs", Monthly Notices of the Royal Astronomical Society (MNRAS), (2019), DOI:10.1093/mnras/stz3358.
- [2] E. Devlen, "The Anisotropic Transport Effects on The Dilute Plasmas", Astrophysical Journal (ApJ), 731:104, 1-16 pp., (2011), DOI: 10.1088/0004-637X/731/2/104.
- [3] E. Devlen, E. R. Pekünlü, "Influence of the Diamagnetic Effect on the Magneto-rotational Instability in Accretion Discs", Monthly Notices of the Royal Astronomical Society (MNRAS), 377, 1245-1262, (2007), DOI:10.1111/j.1365 2966.2007.11677.x.

Başlık ve Kısa Özeti:

Toplanma Disklerinin Kuramı

"Toplanma" (accretion) özekteki gök cismi üzerine madde birikmesi olayıdır. Gaz ve tozun toplanması gezegenler, yıldızlar ve gökadaların oluşumu ile çift yıldızlar ve etkin gökada çekirdeklerinin evriminde önemli rol oynar. Çoğu durumda maddenin toplandığı diskteki ölçek uzunluklar toplanmanın olduğu özekteki cismin ölçek uzunluklarından çok daha büyütür. Böylece küçük hızla dönen dizgelerde çekimsel büzülme merkezkaç bariyerle sınırlanır. İç enerji işinim olarak kolayca kaybedilirken, özgün açısal momentum (birim kütle başına açısal momentum) korunumludur ve akışkan elemanları tarafından kolayca uzaklaştırılamaz. Böylece toplanan maddenin özgün açısal momentumunun merkezkaç olarak desteklendiği bir disk oluşur. Gözlemsel ve tayfsal olarak belirlenen toplanma disklerindeki dışarıya doğru açısal momentum taşımının ve bu yüzden kütle toplanmasının ortaya çıkması için diskte ihtiyaç duyulan çalkantıyı üretmek ve desteklemek için bir kaynağa ihtiyaç vardır. Bu çalkantıyı üretmenin yollarından birisi manyetohidrodinamik (MHD) kararsızlıklarıdır. Bu konuşmada toplanma disklerinde ortaya çıkan MHD kararsızlıkları ve açısal momentum taşımış işlemlerine değinilecektir.

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Short Biography:

I received my Ph.D. degree in physics from the Pisa University, Pisa, Italy in 2008. I am the Editor-in-Chief of Journal of High Energy Physics, Gravitation and Cosmology and of Theoretical Physics. I am also Editorial Board Member of other five international peer-reviewed journals. I am Habilitated as Professor of Astrophysics and Theoretical Physics at the Italian Department for University and Research (MIUR). I am Professor of Theoretical Physics (Faculty Member) at the İstanbul University starting from 1/1/2020. I am Contract Professor of Astrophysics of the Research Institute for Astronomy and Astrophysics of Maragha (RIAAM), P.O. Box 55134-441, Maragha, Iran. 3 of my Essays on gravitation were Awarded Honorable Mention at the 2009, 2012 and 2018 Gravity Research Foundation Awards. I have been Community Rate Winner of the 2013 FQXi Essay Contest with a paper which solves the black hole information paradox which has been subsequently published in Annal of Physics. I have been awarded with a Certificate of Honor by the Nagpur University (October 2013). I have been awarded with the Honorary Fellowship of the European Society of Computational Methods in Sciences, Engineering and Technology at the 12th International Conference of Numerical Analysis and Applied Mathematics (September 2014). I am author and/or co-author of more than 150 scientific papers published in international peer reviewed specialistic journals in the fields of mathematics, theoretical physics, astrophysics and cosmology.

Selected Publications:

[1] C. Corda, "New proof of general relativity through the correct physical interpretation of the Mössbauer rotor experiment", Awarded Honorable Mention in the 2018 Essay Competition of the Gravity Research Foundation, Int. Journ. Mod. Phys. D **27**, 1847016 (2018).

[2] C. Corda, "Effective temperature, Hawking radiation and quasi-normal modes", Awarded Honorable Mention in the 2012 Essay Competition of the Gravity Research Foundation, Int. Journ. Mod. Phys. D **21**, 1242023 (2012).

[3] C. Corda, "Interferometric detection of gravitational waves: the definitive test for General Relativity", Awarded Honorable Mention in the 2009 Essay Competition of the Gravity Research Foundation, Int. Journ. Mod. Phys. D **18**, 2275-2282 (2009).

Title and Short Summary of the Talk:

Bohr-like approach to black hole quantum physics

It is an intuitive but general conviction that black holes (BHs) result in highly excited states representing both the "hydrogen atom" and the "quasi-thermal emission" in quantum gravity. In this Lecture we show that such an intuitive picture is more than a picture, discussing a model of quantum BH somewhat similar to the historical semi-classical model of the structure of a hydrogen atom introduced by Bohr in 1913. Our model has important implications for the BH information paradox and is in perfect agreement with existing results in the literature, starting from the famous result of Bekenstein on the area quantization.

References:

- [1] C. Corda and F. Feleppa, "The quantum black hole as a gravitational hydrogen atom", Invite Contribution to the Universe Special Issue "Feature Papers 2019 - Gravitational Physics", Edited by Prof. Lorenzo Iorio, Prof. Neil Turok, Prof. Mark Trodden and Prof. Orfeu Bertolami, DOI: 10.20944/preprints201810.0413.v3.
- [2] C. Corda, "Precise model of Hawking radiation from the tunnelling mechanism", Class. Quantum Grav. 32, 195007 (2015), DOI: [10.1088/0264-9381/32/19/195007](https://doi.org/10.1088/0264-9381/32/19/195007).
- [3] C. Corda, "Time-dependent Schrodinger equation for black hole evaporation: no information loss", Ann. Phys. 353, 71 (2015), DOI: [10.1016/j.aop.2014.11.002](https://doi.org/10.1016/j.aop.2014.11.002).

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Short Biography:

I was born on May 24, 1963, in Azerbaijan. In 1986 I graduated from the physical faculty of Baku State University. In 1992, I defended my Ph.D. in Physics and Mathematics. Since 2003 I am an associate professor. I have worked at Lankaran State University and am currently working at the Radiation Problems Institute of the National Academy of Sciences of Azerbaijan and Shamakhi Astrophysical Observatory. I'm married. I have two children.

Selected Publications:

- [1] M. Bashirov Solar radiation and generalized hydrodynamics model of the solar wind. Journal of Radiation Researches vol 5, N2, 2018- Baku, ANAS, Ins. of Radiation Problem. ISS N 2312-3001 Vol.5, N2, 2018, pp 334-341. http://irp.science.az/uploads/pdf/irp_journal_-_2018_2.pdf
- [2] M. Bashirov. N. Dzhalilov. Some particular solutions of the magnetodynamic transrort eduations for one-fluid plasma anisotropic solar wind International Conference MODERN TRENDS IN PHYSICS 1-3 May 2019 Baku State University "Dedicated to the 100th anniversary of the Baku State University" ISNN 2522-4352 <http://static.bsu.az/w28/MTPhysics/MTPhysics2019/Konference%20MTP%20proceeding.pdf>
https://apps.webofknowledge.com/Search.do?product=WOS&SID=E29b8RKI6u9RZGfQUHe&search_mode=GeneralSearch&prID=aa9188f9-e596-486d-9aeb-684f291d48e7

Title and Short Summary of the Talk:

Study of Solar Wind

In the research work, the study of the anisotropic solar wind MHD theory, taking into account the causes of particle formation in the solar wind, the parallel and perpendicular differences in heat fluxes and thermal pressures. An asymptotic and some special solutions of MHD transfer equations for anisotropic solar wind have been found. The solutions found give an idea of the radial dependence of wind velocity and can be used to further investigate the solar wind, to study the properties, parameters, and geometric dimensions of heliosphere and cosmic star winds.

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Kısa Özgeçmiş:

2002 yılında İstanbul Üniversitesi Fen Fakültesi Fizik bölümünü bitirdikten sonra Doktorayı aynı üniversitede Matematiksel Fizik Programında Prof. Dr. Ekrem Aydiner'in danışmanlığında tamamladım. 2005-2013 yıllarında İstanbul üniversitesinde araştırma görevlisi olarak daha sonra 2014 yılında hala görev yaptığım İstanbul Yeniyüzylinderi üniversitesi Elektrik-Elektronik Mühendisliği bölümünde Öğretim üyesi olarak çalışmaktadır. Çalışmalarımda Zar-evren (Brane-world) kozmoloji, Madde yaratımı (Particle Creation), SNIa Data Analizi, Karanlık Enerji ve Karanlık Madde Teorileri bulunmaktadır.

Seçilmiş Yayınlar:

- [1] Ö. Sevinç, E. Aydiner, "Particle Creation in Friedmann-Robertson-Walker Universe, *Gravitation and Cosmology*", Vol. 25, No.4, pp.397-406 (2019)
- [2] Ö. Sevinç, E. Güdekli, "Bulk-Brane Matching In Bianchi-Types Brane World", *Advance in High Energy Physics*, pp.10-20, (2011)

Başlık ve Kısa Özeti:

Chaplygin Gazlı ve Madde Yaratmalı Zar-Evren modellerinde Gözlemlisel Sınırlamaların İncelenmesi.

Bu çalışmada, parçacık yaratma etkilerini evrenimizin erken dönem yavaşlaması, günümüz ivmelenmesini, karanlık enerji ve karanlık madde gibi temel sorunları açıklamak için yüksek boyutlu FRW modellerini inceledik. Bu kapsamda geliştirdiğimiz **Birinci Modelde**, Bulkta Gauss-Bonnet terimi, brane üzerinde parçacık yaratma basıncı bulunan FRW zar-evren modelini ele aldık. Öncelikle alan denklemlerini elde ettik. Daha sonra modelin tutarlılığını incelemek için Geçmişe bakış zaman ölçüği kırmızıya-kayması, Kozmolojik uzaklık kırmızıya-kayması, Parlaklık uzaklığa kırmızıya-kayması ve Açısal büyülü kırmızıya-kayması gibi kinematik testleri uyguladık. Her bir test sonucu gözlemlisel verilerle uyumlu çıkmıştır. **İkinci Modelde** ise bulkta Gauss-Bonnet terimi ve zar üzerinde parçacık yaratma ve Chaplygin gazının birlikte olması durumunda, alan denklemlerini ve yavaşlama parametresini elde ettik. Son olarak da D. M. Scolnic ve arkadaşlarının 2018 yılında yayınladıkları makalelerinin yardımıyla uzaklık parametresi ve z kırmızıya-kayma arasındaki gözlemlisel verilerini kullanarak iki modelin uyumlu olduğunu Ki-Kare analizi sonuçlarıyla test ettik ve uyum grafiklerini çizdik. Bu analiz neticesinde yapısında iki tane negatif basınç sahip ikinci Modelin gözlemlisel verilerle daha uyumlu olduğunu gösterdik.

Kaynaklar:

- [1] D.M. Scolnic, et. al., "The complete light-curve sample of spectroscopically confirmed sne ia from pan-starrs1 and cosmological constraints from the combined pantheon sample," *The Astrophysical Journal*, 859, 101, (2018).
- [2] V. Singh, C.P. Singh, "Friedman cosmology with matter creation in modified f(R, T) gravity", *Int. J. Theor. Phys.* 55: 1257-1273, (2016).
- [3] Nozari, K., Azizi, T., Alipour, N., "Observational constraints on chaplygin cosmology in a braneworld scenario with induced gravity and curvature effect", *Monthly Notices of the Royal Astronomical Society*, 412, 2125–2136, (2011).

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Kısa Özgeçmiş:

2008 yılında Ortadoğu Teknik Üniversitesi Fizik Öğretmenliği Bölümü'nden normal sıresinden bir sene önce mezun olup Milli Eğitim Bakanlığı Yurt Dışı Lisansüstü Bursu kazanarak 2010 yılında New York Eyalet Üniversitesi, Stony Brook'da yüksek lisans eğitimime başladım. Eğitimim sırasında PHENIX deneyi sözcüsü Prof. Dr. Barbara Jacak ve Prof. Dr. Thomas Hemmick gözetimi altında Brookhaven Ulusal Laboratuvarı'nda (BNL) bulunan PHENIX (Pioneering High Energy Nuclear Interaction eXperiment) detektörü analiz grubundan yüksek enerji fizigi üzerine çalıştım. 2012 yılında New York Eyalet Üniversitesi, Stony Brook üniversiteden ve PHENIX araştırma grubundan burs alarak doktora öğrenimime başladım ve PHENIX grubu çalışmalarına 2015 yılına kadar Prof. Dr. Barbara Jacak ve Prof. Dr. Thomas Hemmick gözetiminde devam ettim. 2015 yılında doktora tez araştırmamı CERN'de bulunan ALICE deneyinde Prof. Dr. Thomas Hemmick, Prof. Dr. Ismail Zahed ve Doç. Dr. Ayben Karasu gözetimi altında ALICE Rezonans grubunda çalışmaya başladım. Doktora tezimi ALICE detektörü tarafından ölçülen 5.02 TeV enerjili proton-kurşun (p-Pb) çarpışmalarında oluşan Δ rezonans oluşumları üzerine yaptım.



Seçilmiş Yayımlar:

- [1] S. Yalcin, A. Karasu Uysal for ALICE Collaboration, “Recent resonance results measured with the ALICE detector at the LHC”, AIP Conf. Proc. 1815 no.1, 060025, (2017).
- [2] ALICE Collaboration, “Multiplicity dependence of light-flavor hadron production in pp collisions at $\sqrt{s} = 7$ TeV”, (2018). e-Print: 1807.11321 [nucl-ex].
- [3] ALICE Collaboration, “Measuring K^0_S K^\pm interactions using Pb-Pb collisions at $\sqrt{s_{NN}}=2.76$ TeV”, Phys. Lett. B774 64-77, (2017), e-Print: 1705.04929 [nucl-ex].

Başlık ve Kısa Özeti:

ALICE Detektörü ile Hadronik Rezonans Oluşumlarının İncelenmesi

Hadronik rezonanslar sahip oldukları çok kısa yarı ömür ($\tau \sim 10^{-23}$ s) nedeniyle yüksek enerjili ağır iyonların çarpışmaları sonucu oluşan ortamın (quark gluon plazma - QGP) kimyasal donma noktası ile termal donma noktası arasında (i) bozunabilir, (ii) yeniden saçılabilir ve (iii) yeniden üretilebilirler. Bu sebeple rezonanslar çarpışma ortamının oluşumunu ve farklı safhalarını incelemek için kullanılabılır. ALICE (Büyük İyon Çarpıştırıcı Deneyi), yüksek enerjili ağır iyonların çarpışmaları sonucu oluşan ortam özelliklerini inceleyebilmek için tasarlanmış Büyük Hadron Çarpıştırıcı (LHC) deneylerinden bir tanesidir. Detektörün geniş momentum aralığında parçacık tanımlama yeteneği sayesinde hadronik rezonans oluşumları incelenebilir. Bu konuğumda ALICE detektörü tarafından ölçülmüş çeşitli çalışma enerjilerindeki pp, pPb, PbPb ve XeXe sistemlerinde rezonans oluşumları hakkında bilgi verilecektir.

Kaynaklar:

- [1] ALICE Collaboration, “ $K^*(892)^0$ and $\phi(1020)$ meson production at high transverse momentum in pp and Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV”, Phys. Rev. C 95 no.6, 064606, (2017), e-Print: 1702.00555 [nucl-ex].
- [2] ALICE Collaboration, “Testing the system size dependence of hydrodynamical expansion and thermal particle production with π , K , p , and ϕ in Xe-Xe and Pb-Pb collisions with ALICE”, Nuclear Physics A, Volume 982, Pages 427-430, February (2019).

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Short Biography:

She graduated from the Department of Physics at Yeditepe University in 2019. She has started Master Degree of Physics at Yıldız Technical University in 2019.

Title and Short Summary of the Talk:

X-ray Study of Abell 478 Observed by XMM-Newton

In this work, we report the analysis results of deep (~127 kilosecond) XMM-Newton observation of nearby ($z=0.0881$) relaxed galaxy cluster Abell 478. We study thermodynamic properties of intra-cluster medium (ICM) by courtesy of the high quality x-ray archival data and the large field of view of XMM-Newton. We find that both the radial temperature and metal abundance, and investigate ICM's profiles of thermodynamic properties of cooling core cluster Abell 478.

References:

- [1] E. Pointecouteau, “XMM-Newton observation of the relaxed cluster A478: Gas and dark matter distribution from $0.01R_{200}$ to $0.5R_{200}$ ”, *Astronomy and Astrophysics*, v.423, p.33-47 (2004).
- [2] S. L. Snowden, & K. D. Kuntz, “Cookbook for analysis procedures for XMM-NEWTON EPIC MOS observations of extended objects and diffuse background”, version 5.9., (2014).
- [3] H. Bourdin, & P. Mazzotta, “Temperature structure of the intergalactic medium within seven nearby and bright clusters of galaxies observed with XMM-Newton”, *Astronomy and Astrophysics*, Volume 479, Issue 2, pp.307-320 (2008).

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Short Biography:

Professor of Physics at The University of Alabama; Ph.D. 1998 Tokyo Metropolitan University

Specialization: Theoretical particle physics and cosmology

Selected Publications:

- [1] N. Okada and S. Okada, ``Z' _BL portal dark matter and LHC Run-2 results,''
Phys. Rev. D 93, no. 7, 075003 (2016)
- [2] A. Das and N. Okada, ``Inverse seesaw neutrino signatures at the LHC and ILC,''
Phys. Rev. D 88, 113001 (2013)
- [3] S. Iso, N. Okada and Y. Orikasa, ``Classically conformal B-L extended Standard Model,''
Phys. Lett. B 676, 81 (2009)

Title and Short Summary of the Talk:

Freeze-in Dark Matter and Lifetime Frontier

Abstract: In the context of a well-motivated gauged U(1) extension of the Standard Model, I will introduce a non-thermal dark matter whose interaction is so weak that its relic density is determined by the freeze-in mechanism through a light mediator. I will discuss a complementarity between the cosmological constraint on this dark matter physics and the planned/proposed lifetime frontier experiments to search for a long-lived light mediator.

References:

- [1] R.N. Mohapatra and N. Okada, ``Dark Matter Constraints on Low Mass and Weakly Coupled B-L Gauge Boson,''
arXiv:1908.11325 [hep-ph].
- [2] N. Okada, S. Okada and Q. Shafi, ``Light Z' and Dark Matter from U(1)_X symmetry, in preparation.

Orhan Çakır

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Kısa Özgeçmiş:

Orhan ÇAKIR, 1966 yılında Kastamonu'da doğdu. Orta öğrenimini tamamladıktan sonra, 1982 yılında başladığı Ankara Üniversitesi Fen Fakültesi Fizik Bölümü'nden 1986 yılında mezun oldu. Yüksek Enerji Fiziği alanında 1989 yılında yüksek lisans ve 1994 yılında doktorasını tamamladı. CERN/Cenevre/İsviçre'de kısa ve uzun süreli araştırmalar yaptı. 1995-1996 yılları arasında Fizik Mühendisliği Bölümünde öğretim görevlisi olarak çalıştı. 1997 yılında Ankara ATLAS grubuna katıldı. Yüksek Enerji Fiziği alanında (1997-1999) yılları arasında Yardımcı Doçent ve (2000-2005) yılları arasında Doçent olarak öğretim üyeliği görevi yaptı. 2002 yılından beri Ankara ATLAS grubunun lideri olarak uluslararası proje kapsamında görevini sürdürmektedir. SCI indeksli dergilerde yayınlanmış çok sayıda makalesi bulunmaktadır. Prof.Dr. Orhan Çakır, Ankara Üniversitesi'nde 2006 yılından beri YEF anabilim dalında Fizik profesörü olarak görev yapmaktadır.

Seçilmiş Yayınlar:

- [1] O. Cakir, A. Yilmaz, I. Turk Cakir, A. Senol, H. Denizli, "Probing top quark FCNC tqγ and tqZ couplings at future electron-proton colliders", Nucl. Phys. B 944, 114640, July (2019).
- [2] A. Senol, H. Denizli, A. Yilmaz, I. Turk Cakir, O. Cakir, "Study on Anomalous Neutral Triple-Gauge Boson Couplings From Dimension-Eight Operators at the HL-LHC", Acta Physica Polonica B 50, No 10, 1597 (2019).
- [3] A. Senol, H. Denizli, A. Yilmaz, I. Turk Cakir, K.Y. Oyulmaz, O. Karadeniz, O. Cakir, "Probing the Effects of Dimension-eight Operators Describing Anomalous Neutral Triple Gauge Boson Interactions at FCC-hh", Nucl. Phys. B 935, 365-376 (2018).

Başlık ve Kısa Özeti:

Proton-Proton Çarpışmalarında ZZ ve Zγ Üretim Tesir Kesitleri ve Anormal Yüksüz Üçlü Ayar Bozon Bağlaşımlarının Etkilerinin İncelenmesi

Parçacık Fiziğinin Standart Modelinde (SM), yüksüz üçlü ayar bozon bağlaşımları (nTGC'ler) ağaç seviyesinde yoktur. Bu nedenle, ZZ ve Zγ üretim süreçlerine ağaç seviyesinde s-kanal ffbbar yok olmasından bir katkı gelmez. Bununla birlikte, bir ilmek seviyesinde, fermiyon üçgen diyagramları $\sim 10^{-4}$ mertebesinde nTGC'leri üretir. Standart modelin ötesindeki birçok fizik modeli nTGC'lerin değerlerini 10^{-4} ila 10^{-3} seviyelerinde tahmin eder. Sıfır olmayan nTGC'lerin bir sinyali, yüksek değişmez kütle ve yüksek enine momentumda, üretim tesir kesitinin artmasıdır. ZZ ve Zγ üretimi yüksek enerjili proton-proton çarpışmalarında incelenmiştir. Yüksüz elektrozayıf ayar bozonlarının üçlü etkin etkileşimlerinde boyut-8 operatörlerin etkisi incelenmiştir. Burada hadron çarpıştırıcılarında araştırılabilir nTGC'lerin limitleri tartışılmıştır.

Kaynaklar:

- [1] A. Abada et al., (FCC Collaboration), "FCC Physics Opportunities: Future Circular Collider Conceptual Design Report Volume 1", Eur. Phys. J. C 79, no.6, 474 (2019).
- [2] C. Hays, A. Martin, V. Sanz, J. Setford, "On the impact of dimension-eight SMEFT operators on Higgs measurements", JHEP 1902, 123 (2019).

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Short Biography:

Graduated from the Physics Department of Middle East Technical University in 1974. Received his PhD degree in 1981 from University of Maryland, College Park, under the supervision of Prof. Jogesh Pati. He worked on the Pati-Salam version of the Grand Unified Theories. Spent one and a half years at ICTP, Trieste and then joined the physics department of King Saud University, Riyadh, Saudi Arabia in 1983. Proposed in 1986, together with M. O. Taha , the decaying cosmological constant models of the universe. Proposed a unified theory of gravitation and electromagnetism in 1999. Currently, continuing his work on the theoretical and experimental aspects of this unified theory.

Selected Publications:

- [1] M. Özer, “Electrostatic time dilation and redshift”, Phys. Lett. B, 802, 135212, (2020);
<https://authors.elsevier.com/a/1aRAQ1KC8BJiQ2>

Title and Short Summary of the Talk:

Negative Mass and the Principle of Equivalence in General Relativity

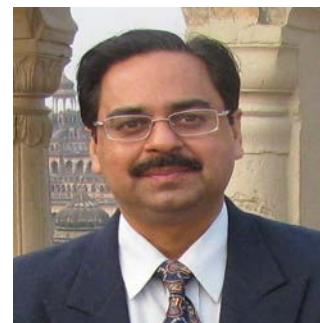
Our purpose in this work is twofold. First, we show that in a world consisting of negative gravitational mass only, rotational motion is prohibited unless the inertial mass is positive. Second, we show by means of the spacetime transformations that the principle of equivalence, which asserts the equivalence of acceleration and gravitation, does not require, contrary to the prevailing viewpoint, the equality of passive gravitational and inertial mass. We present the corrected principle which holds true when the passive gravitational mass - to - inertial mass ratio is not only \$pm 1\$, but may be any hypothetical value. Among the ramifications of the corrected principle is its extension to electromagnetic fields which renders the construction of a unified theory of gravitation and electromagnetism possible.

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D.Phil. (From University of Allahabad, India) on cosmological models.

Professor: Department of Physics, University of Lucknow, India

Visiting Scientist: CERN, Geneva (Theoretical Physics Division) 2014-2020.

Visiting Associate: Inter University Centre for Astronomy and Astrophysics, (IUCAA), Pune 2016-22.

Visiting Professor/Fellow/Scientist: Kavli Institute of Cosmological Physics, The University of Chicago, 2015, Kavli Institute of Physics and Mathematics of the Universe, University of Tokyo, 2018., Institute of High Energy Physics, Beijing, 2018. The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, 2018, 2019. Max Planck Institute for Astrophysics, Garching, 2019.

Current research area : Distinguished publications in Cosmology: dark energy and dark matter, modified gravity.

Books in progress : Classical Electrodynamics (Springer, Heidelberg)

Lectures recently delivered : about 150 including colloquia, and in International SCHOOLS/ CONFERENCES/ WORKSHOPS etc. across the world.

Member : International Society for General Relativity and Gravitation (ISGRG)

Selected Publications:

[1] B. K. Yadav, M. M. Verma, “Dark matter as scalaron in $f(R)$ gravity models”, J Cosmol. Astropart. Phys. (JCAP), 10, 052, (2019).

[2] M. M. Verma, B. K. Yadav, “Dynamics of $f(R)$ gravity models and asymmetry of time”, Int. J. Mod. Phys. D (IJMPD), 27, 1850002, (2018).

[3] M. M. Verma, B. K. Yadav, “Observational role of dark matter in $f(R)$ models for structure formation”, Int. J. Mod. Phys. (CS), 46, 1860045, (2018).

Title and Short Summary of the Talk:

Dark matter and dark energy in $f(R)$ gravity: A unified approach

I will talk about the exciting idea of explaining both dark matter and dark energy in a single unified scalar field matrix by modifying Einsteinian gravity. This new degree of freedom is also shown to interact with other matter (vector and fermionic) fields to give rise to subtle but testable effects in atomic spectroscopy beyond standard model. The observational features would also be discussed in detail.

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WORKSHOP ON HIGH ENERGY PHYSICS, ASTROPHYSICS & COSMOLOGY
February 3-5, 2020, İstanbul University, Türkiye

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Short Biography:

Born in Ioannina (year 1954), Greece. Obtainment of University Degree in Physics, after four year studies in Physics Department, Aristotle University of Thessaloniki. Doctoral Thesis at the University of Ioannina on “Lepton number and flavor non-conservation in gauge theories” (PhD degree 1986). Post Doctoral and visiting positions at CERN Geneva, Ecole Polytechnique Paris, etc. Full professor at the University of Ioannina since 1998.

Current research interests include: 1) Investigating possibilities of constructing de Sitter vacua in type IIB string theory (as well as in F-theory) from geometric configurations involving D7 branes. Moduli stabilisation, cosmological inflation and other related implications. 2) Phenomenological studies of Standard Model extensions incorporating additional abelian ($U(1)'$) symmetries with associated Z' bosons displaying non-universal couplings to fermion fields, embedded in String Theory.

Selected Publications:

- [1] I. Antoniadis, G.K. Leontaris, J. Rizos, “A Three generation $SU(4) \times O(4)$ string model”, Phys. Lett.B { 245}, 161 (1990). DOI:10.1016/0370-2693(90)90127-R.
- [2] J. Ellis, M. Gomez, G.K. Leontaris, S.Lola, D. Nanopoulos, “Charged lepton flavor violation in the light of the Super-Kamiokande data”, Eur.Phys.J.C 14, 319 (2000) DOI: 10.1007/s100520000357.
- [3] I. Antoniadis, Y. Chen and G.K. Leontaris, “Perturbative moduli stabilisation in type IIB/F-theory framework”, Eur.Phys.J.C 78, 766 (2018), DOI:10.1140/epjc/s10052-018-6248-4.

Title and Short Summary of the Talk:

Some phenomenological and cosmological aspects of F-theory GUTs

F-theory GUTs have attracted considerable interest over the recent years. In the first part of this talk, the basic ingredients for F-theory model building will be reviewed and some viable F-GUTs will be presented. In the second part, possible solutions regarding the moduli stabilisation problem, the existence of de Sitter vacua and inflation will be discussed.

References:

- [1] J.C. Callaghan, S.F. King, G.K. Leontaris and G.G. Ross., “Towards a Realistic F-theory GUT”, JHEP 1204, 094 (2012).
- [2] I. Antoniadis, Y. Chen and G.K. Leontaris, “Inflation from the internal volume in type IIB/F-theory compactification” Int.J.Mod.Phys.A 34no.08, 1950042, (2019).
- [3] G.K. Leontaris and Q. Shafi, “Phenomenology with F-theory $SU(5)$ ”, Phys.Rev. D96, no.6, 066023, (2017).

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Short Biography:

Emre Işık received his BS in astronomy in 1998 from Ege University, Izmir, and MS in physics from Akdeniz University, Antalya in 2002, and PhD in 2008 from the Faculty of Physics of Göttingen University, Germany. He worked as an assistant professor in İstanbul Kultur University (2009-2016), where he taught mathematics, physics, and astronomy. He was awarded the Young Scientist Prize of the Science Academy (Turkey, 2016). Between 2016-2019 he worked as a research fellow at the Max Planck Institute for Solar System Research in Göttingen, and as a guest scientist at the Feza Gürsey Center of Boğaziçi University. In 2019 he became an associate professor at the Department of Computer Science in Turkish-German University. His research focuses on magnetic flux generation and transport in solar and stellar interiors, as well as modelling brightness variability on Sun-like stars, aiming to explain a plethora of observational data.

Selected Publications:

- [1] E. Işık, S.K. Solanki, N.A. Krivova, A.I. Shapiro, “Forward modelling of brightness variations in Sun-like stars: I. Emergence and surface transport of magnetic flux”, *Astron. & Astrophys.*, 620, A177 (2018).
- [2] İ. Özavcı, H.V. Şenavcı, E. Işık, G.A.J. Hussain, D. O’Neal, M. Yılmaz, S.O. Selam, “Recurrent star-spot activity and differential rotation in KIC 11560447” *Mon. Not. Royal Astron. Soc.*, 474, 5534 (2018).
- [3] E. Işık, “A mechanism for the dependence of sunspot group tilt angles on cycle strength”, *Astrophys. J. Lett.*, 813, L13 (2015).

Title and Short Summary of the Talk:

Magnetic flux emergence and brightness variability of Sun-like stars

The solar dynamo involves nonlinear interactions between turbulent convection, filamentary magnetic fields, and differential rotation. Amidst such complexity, order prevails in global scales in the form of the sunspot cycle and the highly regular variations of low-order magnetic multipoles. The instability and rise of magnetic flux from the solar interior to form sunspots is not well-understood, owing to the lack of information as to the detailed structure of magnetic fields and flows in the deep solar interior. Much less is known about younger Sun-like stars, which can exhibit very different patterns of surface magnetism as compared to the Sun. Using computer simulations based on empirically constrained physical models, we attempt to improve our understanding of the generation, emergence, and surface-transport of stellar magnetic fields. These attempts in turn contribute studies of the solar dynamo, long-term climate variability in Earth-like planets, stellar activity and exoplanet detection.

References:

- [1] E. Işık, S.K. Solanki, N.A. Krivova, A.I. Shapiro, “Forward modelling of brightness variations in Sun-like stars: I. Emergence and surface transport of magnetic flux”, *Astron. & Astrophys.*, 620, A177 (2018).
- [2] E. Işık, “A mechanism for the dependence of sunspot group tilt angles on cycle strength”, *Astrophys. J. Lett.*, 813, L13 (2015).
- [3] E. Işık, D. Schmitt, M. Schüssler, “Magnetic flux generation and transport in cool stars”, *Astron. & Astrophys.*, 528, A135 (2011).

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Short Biography:

Ulaş ÖZDEM was born in 1985 at Varto, Muş as a citizen of Turkey. He received his BS degree in physics in 2003 at Çanakkale Onsekiz Mart University (ÇOMÜ). He obtained his Ms degree in High Energy Physics in 2010 at ÇOMÜ. He has achieved his PhD degree in High Energy Physics in 2016 at ÇOMÜ. Presently, he works Asst. Prof. in the Health Services Vocational School of Higher Education, İstanbul Aydin University,Istanbul.

Selected Publications:

- [1] A. Kucukarslan, U. Ozdem and A. Ozpineci, “Axial vector transition form factors of $N \rightarrow \Delta$ in QCD.” Nucl. Phys. B913, 132-150 (2016). DOI: 10.1016/j.nuclphysb.2016.09.019.
- [2] A. Kucukarslan, U. Ozdem and A. Ozpineci, “Tensor form factors of the octet hyperons in QCD.” Phys. Rev. D94, 094010 (2016). DOI: 10.1103/PhysRevD.94.094010.
- [3] U. Ozdem and K. Azizi, “Magnetic and quadrupole moments of the $Z_c(3900)$.” Phys. Rev. D96, 074030 (2017). DOI: 10.1103/PhysRevD.96.074030.

Title and Short Summary of the Talk:

Gravitational Form factors of Nucleon in light-cone QCD

We use the energy-momentum tensor (EMT) current to compute the EMT form factors of the nucleon in the framework of the light cone QCD sum rule formalism. In the calculations, we employ the most general form of the nucleon's interpolating field and use the distribution amplitudes (DAs) of the nucleon with two sets of the numerical values of the main input parameters entering the expressions of the DAs. The directly obtained results from the sum rules for the form factors are reliable at $Q^2 \geq 1$ GeV². The numerical computations show that the energy-momentum tensor form factors of the nucleon can be well fitted to the multipole fit form. We compare the results obtained for the form factors at $Q^2 = 0$ with the existing theoretical predictions as well as experimental data on the gravitational form factor $d_1(0)$. For the form factors $M_2(0)$ and $J(0)$ a consistency among the theoretical predictions is seen within the errors: Our results are nicely consistent with the Lattice QCD and chiral perturbation theory predictions. However, there are large discrepancies among the theoretical predictions on $d_1(0)$.

References:

- [1] P. Hagler, J. W. Negele, D. B. Renner, W. Schroers, T. Lippert, and K. Schilling (LHPC, SESAM), Phys. Rev. D68, 034505 (2003), arXiv:hep-lat/0304018 [hep-lat].
- [2] N. Mathur, S. J. Dong, K. F. Liu, L. Mankiewicz, and N. C. Mukhopadhyay, Phys. Rev. D62, 114504 (2000), arXiv:hep-ph/9912289 [hep-ph].
- [3] M. Gockeler, R. Horsley, D. Pleiter, P. E. L. Rakow, A. Schafer, G. Schierholz, and W. Schroers (QCDSF), Phys. Rev. Lett. 92, 042002 (2004), arXiv:hep-ph/0304249 [hep-ph].

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Short Biography:

Gulay Karakaya was graduated from the Physics and Mathematics Departments of Kocaeli University in 2010 and 2011 respectively. Then she got her M.Sc degree in Physics in 2014 from the Istanbul Technical University. She is persuing her doctoral studies in theoretical cosmology at the Istanbul Technical University.

Publications:

- [1] G. Karakaya and V. K. Onemli, “Quantum Effects of Mass on Scalar Field Correlations, Power Spectrum and Fluctuations during Inflation”, Phys. Rev. D, 97,123531 (2018).
- [2] G. Karakaya and V. K. Onemli, “Quantum Fluctuations of a Self-interacting Inflaton”, arXiv:1912.07963.

Title and Short Summary of the Talk:

Quantum Fluctuations of a Self-interacting Inflaton

(V. K. Öнемli ile birlikte)

We present a method to analytically compute the quantum corrected two-point correlation function of a scalar field in leading order at each loop in a homogeneous, isotropic and spatially flat spacetime where the expansion rate is time dependent and express the quantum corrected power spectrum $\Delta^2(k)$ as a time derivative of the coincident correlation function evaluated at time t_k of the first horizon crossing of a mode with comoving wave number k . To facilitate the method, we consider the simplest version of inflation driven by a massive, minimally coupled inflaton endowing a quartic self-interaction---with positive or negative self-coupling. We compute the quantum corrected two-point correlation function, power spectrum, spectral index $n(k)$ and the running of the spectral index $\alpha(k)$ for the inflaton fluctuations at one-loop order. Numerical estimates of the $n(k)$ and $\alpha(k)$ and the cosmological measurements are in agreement, within reasonable ranges of values for the physical parameters in the model.

References:

- [1] G. Karakaya and V. K. Onemli, “Quantum Effects of Mass on Scalar Field Correlations, Power Spectrum and Fluctuations during Inflation”, Phys. Rev. D, 97,123531 (2018).
- [2] V. K. Onemli and G. Karakaya, “Quantum fluctuations of a Self-interacting Inflaton”, arXiv:1912.07963.

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Işıl Başaran Öz

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Kısa Özgeçmiş:

Lisans öğrenimimi Ege Üniversitesi, Astronomi ve Uzay Bilimleri Bölümü'nde tamamladım. Yüksek lisans ve doktora derecelerimi Akdeniz Üniversitesi Fizik Bölümü'nden aldım. Nisan 2019 tarihinden itibaren İstanbul Üniversitesi Fizik Bölümü'nde Prof. Dr. Ekrem Aydiner'in Araştırma Grubunda doktora sonrası araştırmacı olarak çalışmaktayım. Ağırıklı çalışma alanları, Alternatif çekim teorileri ve Noether simetri yöntemidir.

Seçilmiş Yayımlar:

[1] I. Basaran Oz, Y. Kucukakca, N. Unal, "Anisotropic solution in phantom cosmology via Noether symmetry approach", Canadian Journal of Physics, (2017), DOI:10.1139=cjp -2017 - 0765.

[2] U. Camci, A. Yildirim, I. Basaran Oz, "New exact solutions of Bianchi I, Bianchi III and Kantowski–Sachs spacetimes in scalar-coupled gravity theories via Noether gauge symmetries", Astroparticle Physics 76;29_37, (2016).

Başlık ve Kısa Özet:

İki Skaler Alanlı Kozmolojik Model

(E. Aydiner, T. Dereli ve M. Sarışaman ile birlikte)

Bu çalışmada, FRLW uzay-zamanı için klasik görelî kozmolojik model incelenmiştir. Bu amaçla, iki skaler alana sahip gravitasyon teorisi tartışılmıştır. Alan denklemlerinin çözümleri, doğrusallaştırmak için kanonik dönüşümler uygulanarak kolayca elde edilebilir. Kozmolojik modelimizin sonuçları güncel kozmolojik çalışmalarla uyum göstermekle birlikte, evrenimizin genişlemesinin güç yasası ile üstel ivme rejimi arasında bir faz geçişine sahip olduğu açıkça görülmektedir.

Kaynaklar:

- [1] T. Dereli and R. W. Tucker, "Signature dynamics in general relativity," Classical and Quantum Gravity, vol. 10, pp. 365–373, feb (1993).
- [2] A. G. Riesset, et.al., "Observational evidence from supernovae for an accelerating universe and a cosmological constant," Astrophys. J., vol. 116, pp. 1009–1038, (1998).
- [3] S. Perlmutteret, et. al., "Measurements of omega and lambda from 42 high redshift supernovae," Astrophys. J., vol. 517, pp. 565–586, (1999).

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February 3-5, 2020, İstanbul University, Türkiye

George Lazarides

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Short Biography:

I was born in Thessaloniki in 1946. I graduated from the Physics Department of the Aristotle University of Thessaloniki in 1969. In 1973, I received the Ph. D. degree of the University of London as well as the Diploma of Membership of the Imperial College (D.I.C.). My thesis titled “On non-polynomial Lagrangian field theories” was performed under the supervision of Abdus Salam. I was a PostDoctoral fellow in the University of Ioannina, University of Hamburg, CERN, and Assistant Professor in the Rockefeller University, N.Y. From 1983 and until 2013 I was a full Professor of Physics in the School of Engineering of the Aristotle University of Thessaloniki and after my retirement in 2013 I became an Emeritus Professor in the same School.

I worked over the years on Grand Unified Theories, Topological Defects (Monopoles, Strings, Walls), Cosmological Inflation, Particle Phenomenology, Superstring Model Building, Supersymmetric Theories, Dark Matter, Leptogenesis, etc.

Selected Publications:

- [1] G. Lazarides, Q. Shafi, C. Wetterich, “Proton Lifetime and Fermion Masses in an SO(10) Model”, Nucl.Phys. B181, 287, (1981). DOI: [10.1016/0550-3213\(81\)90354-0](https://doi.org/10.1016/0550-3213(81)90354-0)
- [2] B. Ananthanarayan, G. Lazarides, Q. Shafi, “Top mass prediction from supersymmetric GUTs”, Phys.Rev. D44 ,1613, (1991). DOI: [10.1103/PhysRevD.44.1613](https://doi.org/10.1103/PhysRevD.44.1613)
- [3] M.E. Gomez, G. Lazarides, C. Pallis, “Supersymmetric cold dark matter with Yukawa unification”, Phys.Rev. D61, 123512, (2000). DOI: [10.1103/PhysRevD.61.123512](https://doi.org/10.1103/PhysRevD.61.123512)

Title and Short Summary of the Talk:

Topological Defects and Gravity Waves

Symmetry breaking patterns in $SO(10)$ and $E6$ are considered to demonstrate the appearance of magnetic monopoles, strings, and necklaces. We show that a topologically stable superheavy Dirac monopole is present in all patterns. Intermediate mass strings and monopoles carrying two or three quanta of Dirac charge which survive inflation can appear in $SO(10)$ and $E6$ models respectively. A novel necklace configuration in $SO(10)$ broken via the Pati-Salam group can also appear. It consists of $SU(4)c$ and $SU(2)R$ monopoles connected by flux tubes. Necklaces consisting of monopoles and antimonopoles joined together by flux tubes are also identified. Even in the absence of topologically stable strings, a monopole-string system can temporarily appear. This system decays by emitting gravity with a spectrum within the detection capability of LISA.

References:

- [1] G. Lazarides, Q. Shafi, “Monopoles, Strings, and Necklaces in $SO(10)$ and $E6$ ”, JHEP 10, 193, (2019). DOI: [10.1007/JHEP10\(2019\)193](https://doi.org/10.1007/JHEP10(2019)193).

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Kısa Özgeçmiş:

1971 yılı sonunda A.B.D.’deki Pittsburgh Üniversitesinden Fizik doktorası aldım. Şubat 1972- Nisan 1986 arasında Boğaziçi Üniversitesi Fizik Bölümünde çalıştım. Bu arada 1976 yılında Teorik Fizik konusunda doçent unvanını aldım. Bu kurumda iken 1978-1980 A.v. Humboldt bursu ile Berlin Özgür Üniversitesinde doktora ötesi araştırmalar yaptım. İlk “Affiliate” olarak gittiğim ICTP Trieste’ de 1982-87 arası “Associate” oldum. 1986 yılında İstanbul Teknik Üniversitesine profesör olarak atandım ve 2010 yılı başında yaşı haddinden emekli oluncaya kadar orada görev yaptım. 2011 Eylül ayından beri de Mimar Sinan Güzel Sanatlar Üniversitesi Fizik bölümünde “ders saatı ücretli” olarak bulunuyorum.

Araştırma konularım yüksek enerji fiziği ve genel görelilik konularında kuantum alan kuramı uygulamalarını içeriyor. Son zamanlarda daha çok matematik fizik konularında yazıyorum.

Seçilmiş Yayınlar:

- [1] M. Hortaçsu, R. Seiler, B. Schroer, “Conformal Symmetry and Reverberations”, Phys.Rev. D5, 2519-2534, (1972).
- [2] M. Hortaçsu, K.D. Rothe, B. Schroer, “Generalized (QED) in Two-Dimensions and Functional Determinants”, Phys.Rev.D20, 3203, (1979).
- [3] M. Hortaçsu, K.D. Rothe, B. Schroer, “Zero Energy Eigenstates for the Dirac Boundary Problem”, Nucl. Phys. B171, 530-542, (1980).

Başlık ve Kısa Özet:

Kerr ve Kerr- (anti-) de Sitter uzay zamanlarında kara deliğin kütlesi sıfır gitme sınırı: Çözümler ve kurt delikleri

Kerr ve Kerr- (Anti) de Sitter uzay zamanları fonlarındaki bir skaler parçacığın çözümleri bulundu. Kerr- (Anti) de Sitter durumunda çözümün normal modları ve gelen dalgalanın merkezden saçılma genlikleri hesaplandı.

Kaynaklar:

- [1] G.W. Gibbons, M.S. Volkov, Phys. Rev. D, 96 024053, (2017), arXiv:1705.07787 [hep-th].
- [2] R.P. Kerr, Phys. Rev. Lett. 11, 237 (1963).
- [3] L.D. Landau and E.M. Lifshitz, “The Classical Theory of Fields - Course of Theoretical Physics”, Butterworth-Heinemann (1975).

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Short Biography:

Alexander Kholmetskii graduated from the Moscow Engineering and Physics Institute (MEPHI) in 1979. He has got PhD in Physics in the Belarusian State University in 1985. Professor of Physics in the Belarusian State University since 1992. He has published more than 100 theoretical and experimental papers in leading Physics Journals. In 2007 Alexander Kholmetskii has got the award of the President of the Republic of Belarus for outstanding contribution to national science. His current scientific interests are: development of Yarman-Arik-Kholmetskii gravitational theory, classical and quantum electrodynamics, quantum phase effects.

Selected Publications:

- [1] A.L. Kholmetskii, T. Yarman, O.V. Mishevitch, M. Arik, “Quantum phases for moving charges and dipoles in an electromagnetic field and fundamental equations of quantum mechanics”, *Scientific Reports* 8, 11937, (2018).
- [2] A.L. Kholmetskii, T. Yarman, “Mössbauer experiments in a rotating system, Doppler effect and the influence of acceleration”, *Eur. Phys. J. Plus* 133, 261, (2018).
- [3] A.L. Kholmetskii, O.V. Mishevitch, T. Yarman, “Force law in material media, hidden momentum and quantum phases”, *Ann. Phys.* 369, 139, (2016).

Title and Short Summary of the Talk:

Mössbauer experiments in a rotating system: correct and incorrect approaches to their analysis

We analyze different approaches to physical interpretation of modern experiments for the measurement of the Mössbauer effect in a rotating systems (Minsk, 2008; Istanbul, 2014) in the framework of the general theory of relativity, in extended relativity (which is based on the assumption about the existence of a limited acceleration in Nature) and in Yarman-Arik-Kholmetskii (YARK) theory, which successfully combines the metric and dynamical approaches to the description of gravity, and which achieved considerable successes in the explanation of both old and present experimental facts in space-time physics. In particular, we show that at the moment, the YARK theory is the sole one, which provides the consistent explanation of the results of Mössbauer rotor experiments and discloses their physical meaning.

References:

- [1] A.L. Kholmetskii, T. Yarman, O. Yarman, M. Arik, “On the synchronization of a clock at the origin of a rotating system with a laboratory clock in Mössbauer rotor experiments”, *Ann. Phys.*, 409, 167931, (2019).
- [2] A.L. Kholmetskii, T. Yarman, O. Yarman, M. Arik, “Concerning Mössbauer experiments in a rotating system and their physical interpretation”, *Ann. Phys.*, 411, 167912, (2019).
- [3] A.L. Kholmetskii, T. Yarman, O. Yarman, M. Arik, “Comment on “New proof of general relativity through the correct physical interpretation of the Mössbauer rotor experiment” by C. Corda”. *Intern. J. Mod. Phys. D*, 28, 1950127, (2019).

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Short Biography:

Graduate from Institut National des Sciences Appliquées de Lyon (France) in Energy Engineering, equivalent to M.Sc. (1967); Institute of Nuclear Energy at Istanbul Technical University (ITU), equivalent to M.Sc. (1968); Massachusetts Institute of Technology (MIT) with a Ph.D. in Nuclear Science & Engineering (1972). Appointed as an Associate Professor at the ITU Institute of Nuclear Energy in 1977, and as a Full Professor in 1982.

Appointed as Dean of the Graduate School of Sciences of the University of Anatolia (Eskisehir) in 1983. Awarded by the Council for International Exchange of Scholars (Washington, D.C.), and enrolled as a Visiting Professor in the Engineering Science Department of the California Institute of Technology in 1984. Was a member of the Nuclear Regulatory Committee (1975-1982), and the Advisory Board (1978-1982) of the Turkish Atomic Energy Commission. Taught several courses in energy engineering, nuclear science and engineering, thermodynamics, fundamentals of physics, nuclear physics, plasma physics, mechanics, electrodynamics, atomistic, physical chemistry, quantum mechanics, and synergetics. Supervised very many M.Sc. and Ph.D. dissertations. Is author or co-author of several publications made in national or international journals, as well as numerous invited papers presented to national or international meetings.

His academic life-time approach on UMA (“*Universal Matter Architecture*”, as he called, i.e. the construct, matter has to delineate already at rest, and away from any field, in order to cope with the end results of the special theory of relativity if brought to a uniform translational motion, or when embedded in a field, such as a gravitational field, or an electric field, it can interact with), and in this sense, on bridging the end results of the general theory of relativity with quantum mechanics, thusly bridging the atomistic world and the celestial world, that he developed further with the participation of his colleagues through articles he published, in prestigious journals, continue to attract increasing attention from the world scientific community.

Selected Publications:

- [1] T. Yarman, A. L. Kholmetskii, & M. Arik, “Mössbauer experiments in a rotating system: Recent errors and novel interpretation”, Eur. Phys. J. Plus **130**, 191 (2015).
- [2] T. Yarman, A. L. Kholmetskii, M. Arik & O. Yarman, “Super-massive objects in Yarman-Arik-Kholmetskii (YARK) gravitation theory”, Can. J. Phys. **94**, 271-278 (2016).
- [3] M. Arik, T. Yarman, A. L. Kholmetskii & O. Yarman, “Yarman’s approach predicts anomalous gravitational bending of high-energy gamma-quanta”, Can. J. Phys. **94**, 616-622 (2016).
- [4] T. Yarman, “The General Equation of Motion via the Special Theory of Relativity and Quantum Mechanics”, Ann. Fond. de Broglie **29**, 459 (2004).
- [5] T. Yarman, “The End Results of General Theory Of Relativity, via Just Energy Conservation And Quantum Mechanics”, Found. Phys. Lett. **19**, 675 (2006).
- [6] T. Yarman, “Revealing the Mystery of the Galilean Principle of Relativity. Part I: Basic Assertions”, Int. J. Theor. Phys. **48**, 2235 (2009).

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Title and Short Summary of the Talk:

Redshift of light from the star S0-2 in general relativity and in YARK gravitation theory

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Measurement results of the redshift of light from the star S0-2 (Tuan Do, et al., *Science* **365**, 664 (2019)), which orbits with a period of 16 years the supermassive black hole Sagittarius A* (Sgr A) situated at the center of our galaxy, are analyzed. We focus our attention to the periastron of S0-2's orbit, where the gravitational field of Sgr A* was maximal during their closest encounter in May 2018, and a relative deviation of about 12 % turned up between measured data and the plot of calculations in the post-Newtonian approximation. In the standard approach, this would be tantamount to a problematic deviation of S0-2's orbital motion from its Keplerian orbital characteristics. Such difficulty does not arise, however, when S0-2's motion is described with the emergent YARK (Yarman-Arik-Kholmetskii) theory of gravity, where our estimated redshift for the light coming from S0-2 near its periastron agrees remarkably well with observations.

References:

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- [11] T. Yarman, “Scaling Properties of Quantum Mechanical Equations, Working As The Framework of Relativity: Applications Drawn By A Unique Architecture, Matter Is Made of”, *Phys. Essays* 27, 104 (2013).
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Kısa Özgeçmiş:

Lisans 1966 Robert Kolej, Doktora 1971 ABD-Yale Üniversitesi. Doktora sonrası araştırmacı: Heidelberg Max-Planck Nükleer Fizik Enstitüsü ve Freiburg Üniversitesi. 1973 Boğaziçi Üniversitesi Fizik Bölümü, 1976 Doçentlige, 1981 Profesörlüğe yükseltilme. Sabbatical dönemleri: ABD Massachusetts Institute of Technology, ve Heidelberg Max Planck Enstitüsü. Tübítak Teşvik Ödülü, Alexander von Humboldt ve Nato Araştırma projeleri. İdari görevleri Atom Enerji Komisyonu Danışma Kurulu üyeliği, bölüm başkanlığı, fakülte senato temsilciliği ve dekanlık. Öğretim Üyeleri Derneği ikinci başkanlığı. 2011- bugün: Emekli Emeritus hoca Boğaziçi Üniversitesi. Araştırma konuları: nükleer reaksiyonlar, ve müziksel akustik. Boğaziçinde 40'a yakın değişik kodlu ders vermiştir. Son senelerde verdiği dersler arasında izafiyet teorisi, kozmoloji, enerji fiziği ve müzik sesinin teorisi dersleri sayılabilir. Eğitim amaçlı videoları ve Kozmolojik Evrim söyleşileri youtube'dan izlenebilir.

Eğitim felsefesi, bölümlerinden bağımsız olarak bütün öğrencilerin fen bilimleri ve insanlık kültürü hakkında temel kavramlara sahip olabilmeleridir.

Seçilmiş Yayınlar:

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- [2] P. U. Sauer, A. Sevgen, “Off energy-shell continuation of the nucleon-nucleon and meson-nucleon transition matrices”, Physical Review C, 13, 720, (1976).
- [3] E. J. Moniz, A. Sevgen, “Pauli blocking in the nuclear medium pion-nucleon transition matrix”, Physical Review C, 24, 224 (1981).

Başlık ve Kısa Özeti:

Dünyada ve Evrenin Başlangıcında Müzik Sesи

Hepimiz güzel müzik sesinden hoşlanırız. Bu sesin içinden geçtiği ortamın fizikselli kaotik özelliklerini nedir? Müzik sesi bu ortamda bozulmadan nasıl ilerliyor? Sesi yaratan enstrümanların basitçe özellikleri. Müzik sesinin organizasyonu ve gamlar. Tampere dizilerin ilginç matematiksel özellikleri. Evrenin ilk dakikalarından Kozmik arka plan ışımاسının serbest kaldığı 380.000 inci seneye kadar baryon akustik salınımları ve bu evrede bir müzik enstrümanı olarak kainatımız. Bu salınımlardan kainatın geometrisi hakkında ne öğrendik? Ve...hayatımızı bu evrensel müziğe borçluyuz !

Kaynaklar:

- [1] A. Sevgen, “Transformations and invariances in equally tempered scales”, J. Acoust. Soc. Am. 115, 2451, (2004).
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Short Biography:

After graduating from physics department of Ege University, I started my master at Izmir Institute of Technology, and received a master by completing a master thesis on extra time-like dimensions. In 2008 I was granted by the National Education Ministry and accepted by the University of Delaware graduate program in Physics and Astronomy Department. I studied on phenomenology of supersymmetric models with Qaisar Shafi. My dissertation was about the phenomenology of Higgs boson, supersymmetric particles and dark matter within a class of Yukawa unified Supersymmetric grand unified theories. After receiving the Ph.D. degree, I continued my studies at Bursa Uludag University in 2014. Since then, I have been working on detection of new particles at the LHC, lepton flavor violation, muon anomalous magnetic moment and dark matter within supersymmetric and non-supersymmetric models.

Selected Publications:

- [1] S. Raza, Q. Shafi, C. S. Un “b-tau Yukawa Unification in SUSY SU(5) with Mirage Mediation: LHC and Dark Matter Implications”, Journal of High Energy Physics, 1905, 046 (2019). DOI:10.1063/1.5091207.
- [2] Y. Hicyilmaz, L. Selbuz, L. Solmaz, C. S. Un “Charged Higgs Boson in MSSM and Beyond”, Physical Review D, 97, 115041 (2018). DOI: 10.1103/PhysRevD.97.115041.
- [3] A. Cici, Z. Kirca, C. S. Un “Light Stops and Fine-Tuning in MSSM”, European Physics Journal C, 78, 60 (2018). DOI: 10.1140/epjc/s10052-018-5549-y.

Title and Short Summary of the Talk:

Stop and Gluino Search at the LHC and Future Colliders

The analyses over the new supersymmetric particles by the ATLAS and CMS collaborations have revealed quite sensitive and strict results, which exclusively shape the fundamental parameter space of low scale SUSY models. These analyses usually make some assumptions over the mass spectrum and particle species such as bino-like LSP neutralino, left-handed lightest stop, stau etc. Even though results from such analyses constrain the low scale SUSY models, some of the assumptions may not be possible, when the low scale spectrum is obtained of the SUSY grand unified theories (GUTs). In this talk, we present similar analyses performed within a class of SUSY GUTs and the exclusion curves for the stop and gluino from the current experimental results. We also perform the similar analyses to analyze the mass scales for stop and gluino, which can be probed in the near future collider experiments.

References

- [1] Z. Altin, A. Cici, Z. Kirca, Q. Shafi, C. S. Un, “Gluino Search with Stop and Top in Nonuniversal Gaugino Mass Models at LHC and Future Colliders”, arXiv:1910.01457.
- [2] Z. Altin, Z. Kirca, T. Tanimak, C. S. Un, “Stop Search in SUSY SO(10) GUTs with Nonuniversal Gaugino Masses”, arXiv:1910.12992.
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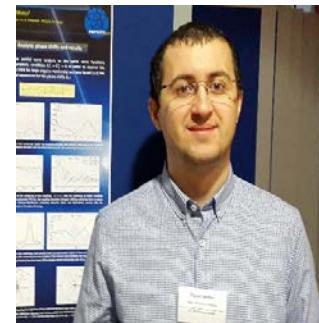
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Short Biography:

I am a Research Assistant at the Faculty of Physics from West University of Timisoara (Romania) and my current research interests include the following topics: quantum field theory in curved spacetimes, black hole scattering, greybody factors and galaxy rotation curves.

I have completed my Ph.D. in 2016 under the supervision of Professor Ion I. Cotaescu. The title of my thesis was: Fermion Scattering on Spherically Symmetric Black Holes.

Until now I have published 11 articles in ISI peer reviewed Journals and I have participated at about 20 international conferences with poster and oral presentations.

Google Scholar profile: <https://scholar.google.ro/citations?user=8UFaLkUAAAAJ&hl=en>

Publons profile: <https://publons.com/researcher/1347304/ciprian-sporea/>

Selected Publications:

[1] I. I. Cotaescu, C. Crucean and C. A. Sporea, “Partial wave analysis of the Dirac fermions scattered from Schwarzschild charged black holes”, Eur. Phys. J. C, 76:102, (2016), DOI: 10.1140/epjc/s10052-016-3936-9

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Title and Short Summary of the Talk:

Dirac quasibound states in a charged black hole spacetime

In this work, we discuss the existence of Dirac (quasi)bound states in the gravitational field of a Reissner-Nordström black hole. We have found that such type of states do exist and we obtain them by analysing the discrete quantum modes that are square integrable solutions of the Dirac equation in this type of geometry. By imposing a suitable quantization condition on these modes, we were able to derive an analytical expression for the ground state. The energy of higher states are then obtained numerically. In the limit of small black hole mass M, the energy of the RN quasibounds states are compared with the Dirac-Coulomb energy levels, and we have found that the two are in good agreement.

References:

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Short Biography:

Keremcan Doğan has received his B. S. degree from the Physics and Mathematics Departments of Koç University in 2016. Since then, he is a Ph. D. student in Koç University under the supervision of Prof. Tekin Dereli. He was the teaching assistant of several courses from both physics and mathematics departments. He attended more than twenty local or international schools including CERN. He is an organizer of the conference Istanbul Mathematical Physics Days which was held since 2018. He was granted several scholarships such as TÜBİTAK, Prime Minister and Engin Arik Fellowship. His thesis is on the usage of generalized and extended geometry theories in the context of effective string theory. His research interest also includes differential geometric and algebraic methods in classical field theories, dimensional reduction techniques and mathematical optics.

Selected Publications:

- [1] K. Dogan, A. Mostafazadeh, M. SarıSAMAN, “Spectral Singularities, Threshold Gain, and Output Intensity for a Slab Laser with Mirrors”, Ann. Phys. (N.Y.) 392, 165-178, (2018), <https://doi.org/10.1016/j.aop.2018.02.013>.
- [2] T. Dereli, K. Dogan, C. Yetismisoglu, “Kaluza-Klein Reduction of the 6 Dimensional Dirac Equation on $S^3 = SU(2)$ and Non-abelian Topological Insulators”, (in the referee process), arXiv: 1904.08146.
- [3] T. Dereli, K. Dogan, “Fiber Bundles in Classical Field Theories”, Mimar Sinan Fine Arts University, Theoretical Physics Days Proceedings, (in the referee process).

Title and Short Summary of the Talk:

Dimensional Reduction of 6-dimensional Dirac Equation on 3-dimensional Sphere

I will start with the fundamental concepts such as the geometry of spacetime and fiber bundle constructions. Then, I will construct physical theories on these mathematical structures and explain the Dirac equation which describes the spin $\frac{1}{2}$ particles. I will explain how local gauge theories can be written in terms of principal G-bundles which can be considered as higher dimensional spacetimes. In the case that G is a compact Lie group, I will demonstrate how one can induce lower dimensional theories on the base manifold via Kaluza-Klein dimensional reduction. My conclusion will be the application of this formalism to dimensional reduction of 6-dimensional Dirac equation on 3-dimensional sphere. I will demonstrate how the group structure on 3-dimensional sphere gives rise to non-minimal $SU(2)$ couplings on the lower dimensional theory.

References:

- [1] T. Dereli, K. Dogan, C. Yetismisoglu, “Kaluza-Klein Reduction of the 6 Dimensional Dirac Equation on $S^3 = SU(2)$ and Non-abelian Topological Insulators”, (in the referee process), arXiv: 1904.08146.

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Short Biography:

After graduating from Astronomy and Space Department of İstanbul University, Özgür Ökcü earned his master's degree in Physics under the supervision of Ekrem Aydiner. He is still a PhD student at İstanbul University under the supervision of Ekrem Aydiner.

Research interests: Black holes, black hole thermodynamics, cosmology, phenomenology of quantum gravity.

Selected Publications:

- [1] Ö. Ökcü and E. Aydiner, “Joule–Thomson expansion of the charged AdS black holes”, Eur. Phys. J. C, 77- 24, (2017).
- [2] Ö. Ökcü and E. Aydiner, “Joule–Thomson expansion of Kerr–AdS black holes”, Eur. Phys. J. C, 78-123 (2018).
- [3] Ö. Ökcü and E. Aydiner, “GUP-Corrected van der Waals Black Holes”, arxiv:1905.05007 (2019) 1.

Title and Short Summary of the Talk:

Modified Friedmann Equations from DSR-GUP

(with Christian Corda and Ekrem Aydiner)

Considering the modified entropi-eraea relation from DSR-GUP (Doubly special relativity-Generalized uncertainty principle), we obtain the modified Friedmann equations and show the maximum energy density ρ at Plank scale. Since GUP implies a minimal length, we find a minimum apperent horizon which has a potential to remove the Big Bang singularity. Furthermore, we analyse the effect of DSR-GUP on deceleration parameter q for the equation of state $p = \omega\rho$ and flat case. Finally, we check the validity of the generalized second law (GSL) of thermodynamics and show that it is valid all eras of the universe for any spatial curvature.

References:

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- [2] M. Akbar and R. G. Cai, “Thermodynamic Behavior of Friedmann Equation at Apparent Horizon ofFRW Universe”, Phys. Rev. D, 75, 084003 (2007).
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Short Biography:

Özgür Can Özüdoğru Orta Doğu Teknik Üniversitesi Fizik Bölümünde Astrofizik üzerine Yüksek Lisans yapmaktadır. ODTÜ Fizik bölümünden lisans derecesini alan Özüdoğru, bitirme lisans tezini dönen karadelik diskleri üzerine yapmış, şu anda yüksek enerji astrofiziği alanında gözlemsel veri analizi üzerine çalışmaktadır. Çalışma alanları arasında atarcalar ve X-İşimi çiftleri bulunan Özüdoğru Prof. Dr. Altan Baykal ve Prof. Dr. Sıtkı Çağdaş İnam ile birlikte çalışmalarını sürdürmektedir.

Title and Short Summary of the Talk:

2S 1417-624 Kaynağının En Son Madde Püskürmesi Öncesinde, Sırasında ve Sonrasındaki NICER Gözlemlerine Ait Zamanlama ve Tayf Analizi

Bu çalışma, Be Tipi Yüksek Kütleli X-İşimi Çifti 2S 1417-624 kaynağında Nisan 2018'de meydana gelen en son püskürme olayı sırasına ait zamanlama ve tayf analizleri içermektedir. Çalışmada, NASA tarafından Uluslararası Uzay İstasyonu'nda çalıştırılan X-İşimi Teleskopu Neutron Star Inner Composition Explorer(NICER) tarafından yapılan ve püskürmenin yaklaşık 15 gün öncesi ve sonrasında ait gözlemler kullanılmış, bu gözlemler ile topyekün bir ışık eğrisi ve güç yoğunluğu tayfi elde edilmiştir. Güç yoğunluğu tayfında kaynaktan gelen atım periyodu ve harmonikleri gözlenmekte ve cismin periyodu 17.50 saniye olarak ölçülmektedir. Bunlara ek olarak bahsedilen günlere ait enerji tayfları aracılığıyla cismin tayf evrimi incelenmiş ve tayfindaki güç yasası, demir çizgisi(gauss) ve soğurma modellerinin parametrelerinin zaman içinde değişimi üzerinden püskürmenin kaynağına etkileri incelenmiştir. Tüm analizler sırasında 1-10 keV enerji aralığına ait veriler kullanılmış, 6.45 keV civarında Demir K Çizgisi net bir şekilde tespit edilmiştir.

References:

- [1] M. Jaschek & D. Egret, "A Catalogue of Be-Stars", Dordrecht: D. Reidel Publishing Co., p.261,(1982).
- [2] K. M. Apprao, "2S 1417-624 - A Variable X-ray Source near CG312-1", (1980).

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Short Biography:

She graduated from the Department of Physics at Boğaziçi University in 2018. She has started Master Degree of Physics at Yıldız Technical University in 2019.

Title and Short Summary of the Talk:

XMM Study of Galaxy Cluster Abell 262

In this study, using the deep (~129 kilosecond) XMM-Newton archival data, we study the structural analysis and the thermodynamical properties of a cool core, nearby ($z=0.01742$) galaxy cluster Abell 262. The analysis results from the observation of Abell 262 are presented. We derived temperature and metal abundance distributions of the hot extend plasma and discuss the underlying physics.

References:

- [1] J. S. Sanders, A.C. Fabian & R. K. Smith, “Constraints on turbulent velocity broadening for a sample of clusters, groups and elliptical galaxies using XMM-Newton”, Mon. Not. R. Astron. Soc., Volume 410, 1797-1812, (2018), DOI: 10.1111/j.1365-2966.2010.17561.x.
- [2] S. L. Snowden & K. D. Kuntz, “Cookbook for analysis procedures for XMMNEWTON EPIC MOS observations of extended objects and diffuse background”, version 5.9., (2014).
- [3] P. M. W. Kalberla, W. B. Burton, D. Hartmann, E. M. Arnal, E. Bajaja, R. Morras, W. G. L. Poppel W, “VizieR Online Data Catalog: Leiden/Argentine/Bonn (LAB) Survey of Galactic HI (Kalberla+ 2005)”, A&A, 440, 775.

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Short Biography:

Anakara Üniversitesi Astronomi ve Uzay Bilimlerinden mezun olduktan sonra İstanbul üniversitesinde yüksek lisansımı Aktif Galaksi Çekirdeklerinin zamansal özellikleri üzerinden yaptım. Aynı üniversitede Doktora çalışmamı kütle çekimsel dalga kaynaklarının ardıl işinimi üzerinde yapmaktayım.

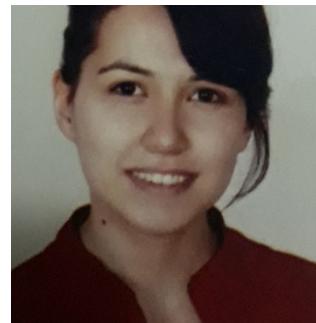
Selected Publication:

- [1] İlhan, Muhammed Diyaddin; De Pasquale, Massimiliano, Two-Component jet of GW170817 with BOXFIT at 80 Mpc. Ameriacan Institute of Physics Science Proceeding.
- [2] İlhan, Muhammed Diyaddin; De Pasquale, Massimiliano, 35th International Physics Conference of Turkish Physics Society, 4-8 September 2019. Two-Component jet of GW170817 with BOXFIT. Bildiri.
- [3] İlhan, Muhammed Diyaddin; De Pasquale, Massimiliano, Galactic Astrnomomy Workshop, 12-13 September, 2019. ILHAN, Muhammed Diyadin, De Pasquale, Massimiliano, Kütle Çekim Kaynağı Olan GW170817'nin BOXFIT ile modellenmesi. Bildiri.

Title and Short Summary of the Talk:

Electromagnetic counterparts of GW170817

GRB 170817A is the electromagnetic counterpart of the gravitational wave signal GW 170817. Observations of this event are best explained by a structured jet model in which energy per solid angle is a function of the distance from the jet axis. In our work, we investigate a two-component model of the jet, where the narrow component is more energetic and has a higher Lorentz factor, while a wide component is less energetic, and shows a lower Lorentz factor. By means of the numerical software BOXFIT, we produce the light-curves of this model and those of a single-component model.

Sevval Taşdemir**Adres:** İstanbul üniversitesi, Fizik Bölümü, Fatih/İstanbul**E-Posta:** stasdemir704@gmail.com**Kısa Özgeçmiş:**

İstanbul Üniversitesi Fizik bölümünden lisans eğitimimi tamamladım. Yüksek Lisansımı İstanbul Üniversitesi Metamatiksels Fizik Anabilim Dalı'nda Doç.Dr Mustafa Sarışaman danışmanlığında yapmakta olup, topolojik malzemeler üzerine çalışmalarımı sürdürmektediyim.

Başlık ve Kısa Özeti:**Topolojik Weyl Yarımetallerde p-Polarize Dalgalar ve Yüzey Etkileri**

(Mustafa Sarışaman ve Mehmet Ertan İndap ile birlikte)

Topolojik Yarımetaller (TYM), büyük sıcaklık değişimleri ve güçlü fiziksel deformasyonlara rağmen topolojik yapıları ve özelliklerini sayesinde azalmayan elektrik ve taşınım davranışları sergileyen yeni kuantum malzeme türlerinden birisidir. Bu malzemeler özellikle yüzeylerindeki iletken ve içerlerindeki de kısmen iletken olmalarından kaynaklanan ekzotik yapılarından dolayı hem teorik hem de deneySEL araştırmacıların oldukça fazla ilgisini çekmiştir. Bu tür malzemelerin fotonik, kataliz ve kuantum hesaplama alanlarındaki uygulamaları oldukça yoğun çalışma alanları oluşturmuştur. Bu çalışmamızda TYM yüzeyine p-polarize gönderilen bir elektromanyetik dalganın saçılma özellikleri incelenerek, bu malzemenin TM modu çözümleri ve bunun muhtemel uygulamaları ile yüzey etkileri araştırılacaktır.

Kaynaklar:

- [1] Ş. Taşdemir, M. E. İndap ve M. Sarışaman, “Surface Plasmon Polaritons in Topological Weyl Semimetals”, In Preparation.

HEPAC 2020
WORKSHOP ON HIGH ENERGY PHYSICS, ASTROPHYSICS & COSMOLOGY
February 3-5, 2020, İstanbul University, Türkiye

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Kısa Özgeçmiş:

EĞİTİM BİLGİLERİ:

- | | |
|------|--|
| 2019 | İstanbul Üniversitesi, Yüksek Lisans, Matematiksel Fizik (Öğrenci) |
| 2019 | HAYEF, Lisans, Pedagojik Formasyon (Mezun) |
| 2018 | İstanbul Üniversitesi, Lisans, Fizik Bölümü (Mezun) |

SEMİNER ve KURSLAR:

- Fotonik Çalıştayı, 2019, Koç Üniversitesi
YEFAK Çalıştayı, 2018-2019, İstanbul Üniversitesi

Başlık ve Kısa Özeti:

Spektral Tekillikler ve Plazmonik Lazerler

(Mustafa Sarisaman ve G. Oktay ile birlikte)

Bu çalışmada spektral tekilliklerin yüzey plazmon polaritonları üzerindeki etkilerini inceleyerek plazmonik lazerlerin çalışma prensiplerini ortaya koyacağız. Bu çalışmamız özellikle difraksiyon limiti içerisindeki optik olguların anlaşılmasına oldukça önemli katkı sağlayarak nanooptik özelliklerin anlaşılmasına yardımcı olacaktır. Bu doğrultuda dielektrik metal arayüzeyine TM modunda elektromanyetik dalgaların gönderilmesi ile yüzey plazmon polaritonlarının oluşması (YPP) sağlanarak, yine arayüzeyde oluşturulan bir kazanç ortamına elde edilen bu YPP dalgalarının spektral tekilik koşulunun uygulanması ile plazmonik lazer oluşuma sebep olacaktır. Oluşturmuş olduğumuz kuramsal yapı, son yıllarda deneysel olarak çalışma imkânı bulunmasına rağmen henüz kuramsal altyapısı bulunmadığı için bu alandaki çalışmalarla değerli katkılar sağlayacaktır. Dolayısıyla plazmonik lazerlerin çalışma prensipleri daha net bir şekilde anlaşılmış olacaktır. Mevcut çalışmamızda plazmonik lazerlerin lazer eşik koşulu elde edilerek, optik sisteme ait parametrelerinin bu tür lazer oluşumu için sağladığı gerekli koşullar incelenmiştir.

Kaynaklar:

- [1] J. M. Pitarke, V. M. Silkin, E. V. Chulkov and P. M. Echenique Rep. Prog. Phys(2007).
- [2] J. Zhang, L. Zhang, and W. Xu, J. Phys. D 45, 113001 (2012).
- [3] A. A. Maradudin, J. R. Sambles, and W. L. Barnes, eds., Modern Plasmonics (Elsevier, 2014).
- [4] M.E. İndap, G. Oktay, M. Sarisaman, Lasing Threshold Condition for Plasmonic Lasers, in preparation.

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NOTLAR / NOTES:

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NOTLAR / NOTES: