



Newsletter of the Physical Research Laboratory

THE SPECTRUM



Image of the Month

PRL team at inter center sports meet-2023 at Hyderabad

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Constraints on monopole-dipole potential from tests of gravity

(Tanmay Kumar Poddar, **Debashis Pachhar**)

The Author

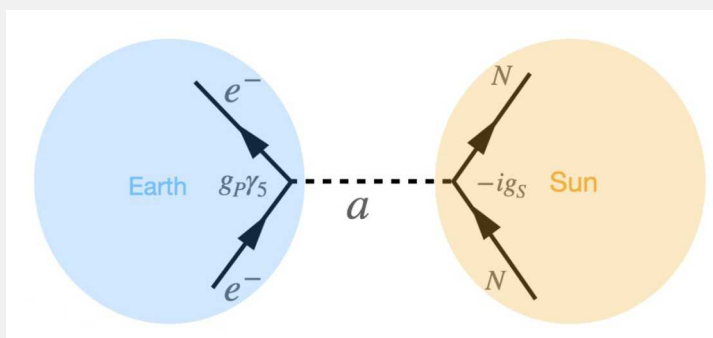


Debashis Pachhar

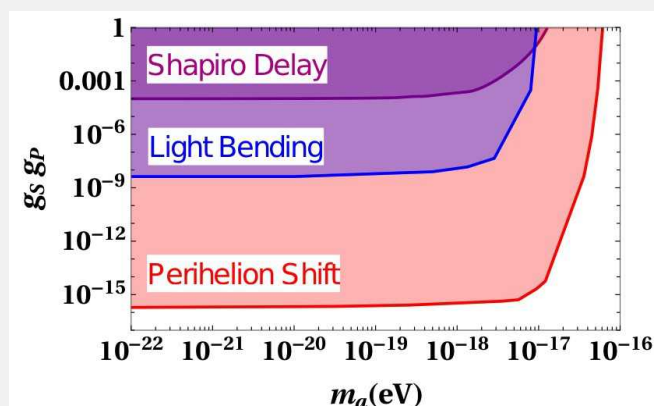
There are four fundamental forces in nature which includes Gravitational, Electromagnetic, Strong and Weak force. While first two are long range force (i.e can act between objects that are very far from each other), the last two are short range. Apart from these four, there can be a fifth force, called monopole-dipole force. Monopole-dipole force is a macroscopic long range force which can act between a polarised and an unpolarised object. It is conjectured that invisible particles called Axions (more specifically Axion Like Particles) can mediate such force between these two objects. There are several ongoing and proposed experiments like QUAX_gSgP, J-PARC, SMILE, ARIADNE, Eöt-Wash which are dedicated to measure such kind of force. But no such force has been detected so far experimentally. As there are no astrophysical observations which can limit these forces, we propose several astrophysical observations that can be used to constrain the monopole-dipole force.

A geological survey conducted by National Oceanic and Atmospheric Administration (NOAA), in the USA, reveals that, on average, the Earth possesses one polarized electron among every 10 million electrons. The sun consist of protons and neutrons (combine nucleons) is considered to be in unpolarised state . Thus we propose that if the mass of the axion is smaller than the inverse of the Earth to Sun distance, the monopole-dipole force can potentially manifest between the Earth and the Sun, with the Earth regarded as a polarized entity. The new monopole-dipole force is $F \propto r^{-2}$, for large distances which is similar to the gravitational force between the objects and can be considered as a correction to the gravitational force. Thus, the effect of gravity can be used to constrain such hypothetical macroscopic forces. In our study, we have used Perihelion precession of the Earth, gravitational light bending and Shapiro time delay to constrain the monopole-dipole force. The result we found that perihelion precession of the Earth puts the tightest constraint on the monopole dipole force strength.

Source/Reference of the Work: <https://doi.org/10.1103/PhysRevD.108.103024>



The figure describes that a pseudo-scalar axion which coupled to the polarised electrons in the Earth and unpolarised nucleons in the Sun mediate a long range force.



The figure depicts that the shaded regions (above the curves) are excluded. It clearly shows perihelion shift gives a tight constraint of the monopole-dipole strength. Thus, if monopole-dipole force exists then its strength ($g_S g_P$) should be smaller than 10^{-16} for the axion mass range $m_a \leq 10^{-18}$ eV.

The Author



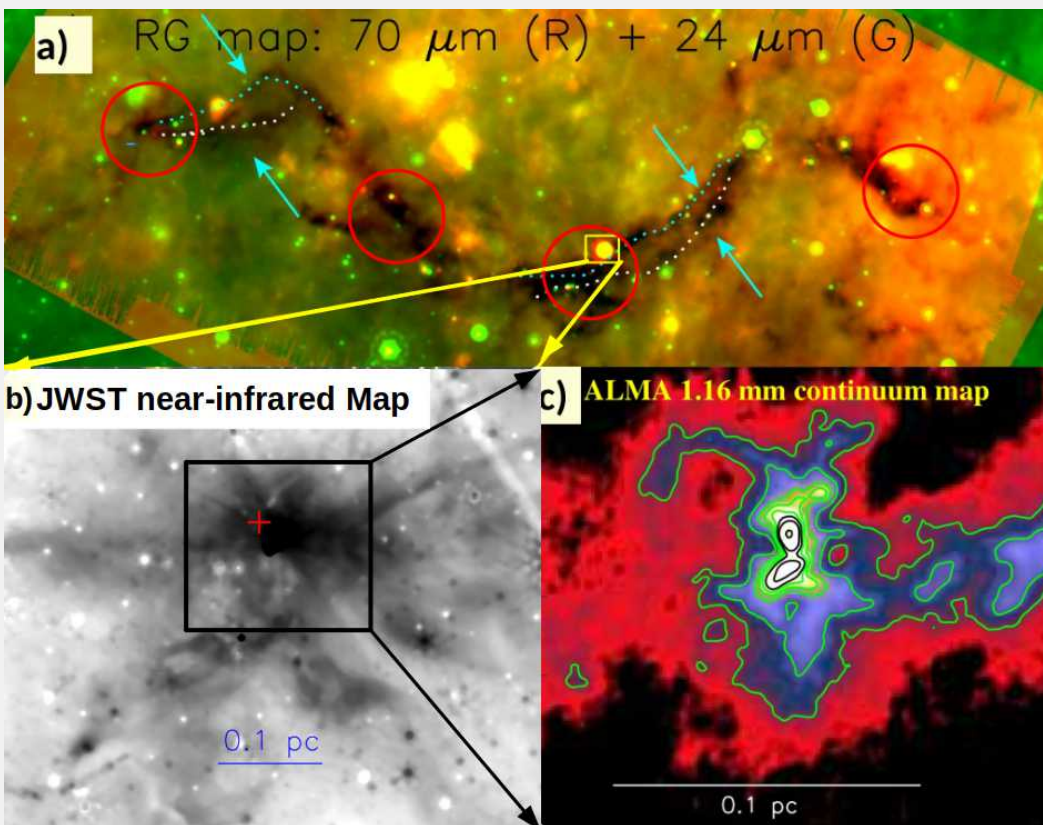
Lokesh Kumar Dewangan

Galactic 'Snake' IRDC G11.11-0.12: a site of multiple hub-filament systems and colliding filamentary clouds

(*Dewangan, Lokesh Kumar; Bhadari, Naval Kishor; Maity, Arup Kumar; Eswaraiah, C.; Sharma, Saurabh; Jadhav, Omkar Ratan*)

Massive stars ($M > 8 M_{\text{sun}}$) greatly impact galaxy evolution through their strong radiative and mechanical feedback. However, their formation processes remain unknown. It is thought that massive stars form in dense massive hubs originating from converging parsec-scale gas filaments (i.e., hub-filament system (HFS)). To investigate ongoing star formation processes, a multi-scale and multi-wavelength study of the 'Snake' nebula or IRDC G11.11-0.12 or G11 (distance ~ 2.92 kpc; length ~ 27 pc) has been conducted. Spitzer infrared images hint at the presence of at least two sub-filaments (in absorption) and reveal four infrared-dark HFS candidates (extent < 6 pc) toward G11 (see Figure 1a). For the first time, in the direction of a promising massive protostar G11P1, high-resolution near-infrared (NIR) images from the James Webb Space Telescope (JWST) reveal an embedded infrared-dark HFS candidate below the physical scale of ~ 0.55 pc (i.e., G11P1-HFS; see Figure 1b). The ALMA 1.16 mm continuum map shows multiple finger-like features surrounding a dusty envelope (extent ~ 18000 AU) toward the central hub of G11P1-HFS (see Figure 1c). The center of the envelope (< 8000 AU scale) hosts embedded NIR sources associated with radio continuum emission, showing the presence of forming massive stars. Overall, the G11 site has been investigated as a unique target hosting multiple infrared-dark HFS candidates at multiscale.

Source/Reference of the Work:: <https://doi.org/10.1093/mnras/stad3384>



a) Two color composite image (red: $70 \mu\text{m}$, green: $24 \mu\text{m}$) of "Snake" nebula. Four HFSs and two dark sub-filaments are marked by circles and dotted curves, respectively. b) Zoomed in view of a region hosting massive protostar G11P1 in JWST NIR images. c) An even closer view of G11P1 observed by ALMA, revealing the presence of an elongated dusty structure.

New insights in the bubble wall of NGC 3324: intertwined sub-structures and a bipolar morphology uncovered by JWST

(Dewangan, Lokesh Kumar; Maity, A. K.; Mayya, Y. D.; Bhadari, N. K.; Bhattacharyya, S.; Sharma, S.; Banerjee, G)

Massive stars ($M > 8 M_{\text{sun}}$) play a crucial role in shaping the interstellar environment through the release of substantial radiative and mechanical feedback. Despite the significance of these contributions, our understanding of the underlying physical processes remains incomplete. In this context, one can study the anatomy of photodissociation regions surrounding ionized regions (known as HII regions) powered by massive stars. A multi-scale and multi-wavelength investigation has been carried out of a promising Galactic bubble NGC 3324 (distance ~ 2.2 kpc; see the left panel of Figure 1), which is excited by two massive stars. Star formation signatures have mostly been traced on one side of the ionization front, which lies on the molecular cloud's boundary. The target area in this work is the bubble rim, and is highlighted by a box in the left panel of Figure 1.

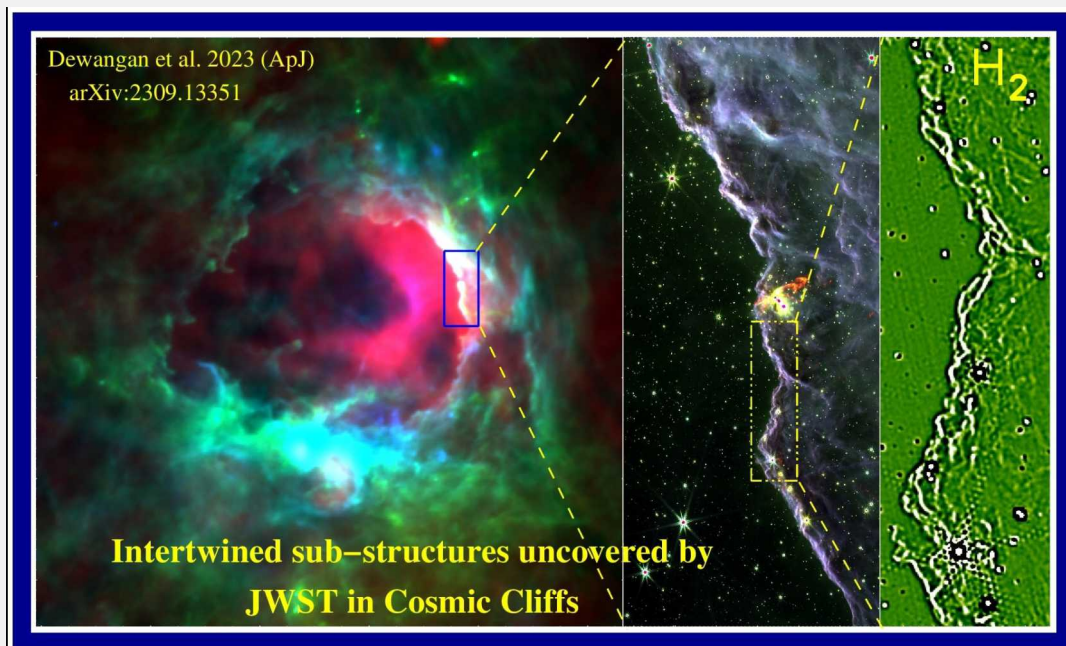
Using the high-resolution and high-sensitivity data from the James Webb Space Telescope (JWST), the present work reveals intertwined substructures toward the bubble wall of NGC 3324 below a physical scale of 4500 AU, at the interface between the HII region and the molecular cloud (see the middle and right panels in Figure 1). The elongated structures are associated with the $3.3 \mu\text{m}$ polycyclic aromatic hydrocarbon (PAH) emission, the $4.05 \mu\text{m}$ ionized emission, and the $4.693 \mu\text{m}$ H₂ emission (see the middle panel of Figure 1). The continuum subtracted H₂ emission reveals numerous intertwined substructures (see the right panel in Figure 1). The intertwined substructures are delineated in spatial regions corresponding to the transition zone from neutral to H₂, indicating that these structures originate from a force imbalance between thermal and ram pressure. This imbalance leads to an instability commonly referred to as “thin-shell” instability. Moreover, high-resolution JWST images have revealed a bipolar HII region driven by a candidate massive star.

Source/Reference of the Work: <https://doi.org/10.3847/1538-4357/ad004b>

The Author



Lokesh Kumar Dewangan



Left panel: Large scale view of NGC 3324 using a three-color composite map (SUMSS 843 MHz (in red), Herschel 160 μm (in green), and 70 μm (in blue) images). Middle panel: a three-color composite map produced using the JWST F470N (4.693 μm H₂ emission; in red), F444W (4.05 μm ionized emission; in green), and F335W (3.3 μm PAH emission; in blue) images. Right panel: the “Edge-DoG” processed JWST F470N–F444W (continuum-subtracted H₂ emission) image.

Matter effect in presence of a sterile neutrino and resolution of the octant degeneracy using a liquid argon detector

(Animesh Chatterjee, Srubabati Goswami, **Supriya Pan**)

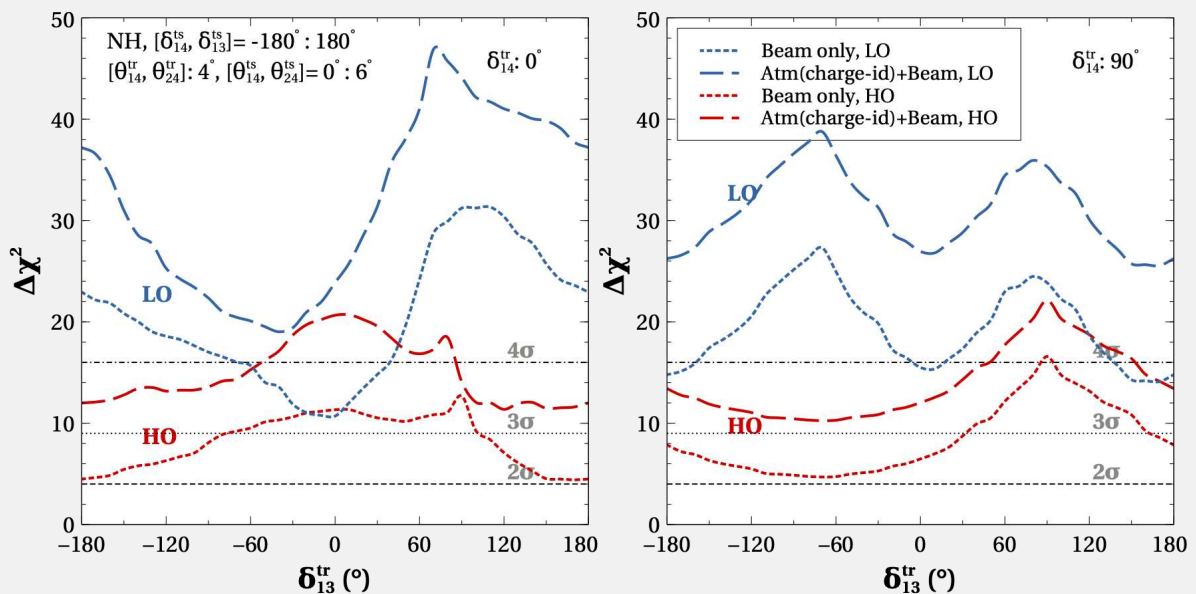
The Author



Supriya Pan

Neutrinos (ν) are the elementary particles with no charge and tiny mass. Three types (flavours) of neutrinos are produced in numerous natural and artificial sources: electron (ν_e), muon (ν_μ) and tau (ν_τ) type neutrinos. Different neutrino flavours keep switching between their identities while travelling. This phenomenon of neutrino oscillation is explained through a mathematical framework where the flavour states are produced through finite mixing of three independent mass-states of neutrinos with mass eigenvalues m_1, m_2, m_3 . The parameters driving the neutrino oscillations are three mixing angles $\theta_{12}, \theta_{13}, \theta_{23}$, one complex phase δ_{CP} , and the two mass squared differences Δ_{21}, Δ_{31} ($\Delta_{ij} = m_i^2 - m_j^2$). The unknowns of oscillation frameworks are: the sign of Δ_{31} , i.e., if the $m_3 > m_1$ or $m_3 < m_1$, the octant of θ_{23} , i.e., if $\theta_{23} < 45^\circ$ (lower octant/LO) or $> 45^\circ$ (higher octant/HO) and value of δ_{CP} . The anomalous results of LSND and MiniBooNE experiments can be solved in presence of an additional neutrino, known as sterile neutrino, that doesn't interact with particles of standard model. This signifies a new 3+1 oscillation framework with an extra mass state of mass m_4 and mass-squared difference $\Delta_{41} \sim 1\text{eV}^2$. To better understand the behaviours of oscillation probabilities in this framework, we have obtained their analytical expressions using two approximation methods, namely OMSD and Cayley-Hamilton formalism. A study of analytical probabilities suggested that higher baselines and energy will elevate the sensitivity to the octant of 23. This made us explore the possibility of determining the octant of θ_{23} considering both beam and atmospheric neutrinos with large baselines and energies in the context of an upcoming neutrino experiment DUNE. The numerical simulations of beam and atmospheric events resulted in increased sensitivity of $>4\sigma$ for $\theta_{23}^{\text{true}} = 41^\circ$ (LO) and $>3\sigma$ for $\theta_{23}^{\text{true}} = 49^\circ$ (HO).

Source/Reference of the Work: <https://doi.org/10.1103/PhysRevD.108.095050>



Sensitivity to the octant of θ_{23} with beam only (dotted) and beam + atmospheric (dashed) analysis as a function of $\delta_{13}^{\text{true}}$ for true values of $\delta_{14} = 0^\circ$ (left) and 90° (right) and $\theta_{14}^{\text{true}} = \theta_{24}^{\text{true}} = 4^\circ$ in NH. The blue and red curves represent true values of $\theta_{23} = 49^\circ$ (HO), 41° (LO).

The Luna structure, India: A probable impact crater formed by an iron bolide

(K.S. Sajinkumar, S. James, G.K. Indu, Saranya R. Chandran, Devika Padmakumar, J. Aswathi, S. Keerthy, M.N. Praveen, N. Sorcar, J.K. Tomson, **Anil Chavan**, Subhash Bhandari, M. Satyanarayanan, R. Bhushan, A. Dabhi, Y. Anilkumar)

The Luna structure of India has been rumored to be an impact crater for more than a decade without any convincing evidence. The structure (1.5-1.8 km) is prominently visible in the low-lying Banni Plains of the tectonically active Kutch Basin as a circular morphological feature with a less-prominent rim. Luna area is strewn with melt-like rocks having high specific gravity and displaying wide range of magnetic properties. It contains minerals like wüstite, kirschsteinite, ulvöspinel, hercynite, and fayalite. The whole rock analysis denotes PGE enrichment, with notably higher average concentrations of Ru (19.02 ppb), Rh (5.68 ppb), Pd (8.64 ppb), Os (6.03 ppb), Ir (10.63 ppb) and Pt (18.31 ppb). The target is not exposed at Luna, owing to the overlying thick sequence of Quaternary sediments. The mineralogical and geochemical signatures points to an impact into a target, which is rich in clay with elevated calcium and silica (sand/silt) content. Geochemical data suggests an iron or stony-iron meteorite as the potential projectile at Luna. The silt layer containing plant remnants, underlying the strewn layer, yielded a radiocarbon age of 6905 years, making Luna the biggest crater to result from an iron bolide within the last 10,000 years

Source/Reference of the Work: <https://doi.org/10.1016/j.pss.2023.105826>

The Author



Dr. Anil Chavan



Panoramic view of Luna impact captured by UAV, revealing the circularity of the structure

संविधान दिवस Constitution Day

भारत सरकार द्वारा यह निर्णय लिया गया है कि हमारे संविधान को अपनाने के दिन के उपलक्ष्य में हर साल "संविधान दिवस" मनाया जाएगा। अंतरिक्ष विभाग, बंगलुरु से प्राप्त निर्देशों के अनुसार, 26 नवंबर 2023 को पीआरएल में संविधान दिवस के रूप में मनाया जाना है।

The Government of India has decided that "Constitution Day" would be celebrated every year to commemorate the day of adoption of our Constitution. As per the directives received from Department of Space, Bengaluru, 26 November 2023 is to be observed as Constitution Day in PRL.

पीआरएल में संविधान दिवस, गुजरात राज्य स्तरीय हिंदी तकनीकी संगोष्ठी के उद्घाटन समारोह के दौरान शुक्रवार, 24 नवंबर 2023 (25-26 नवंबर को सप्ताहांत) को मनाया गया।

The Constitution Day was celebrated in PRL on Friday, 24th November 2023 (25th- 26th November being weekend) during the inaugural ceremony of Gujarat State Level Hindi Technical Seminar.

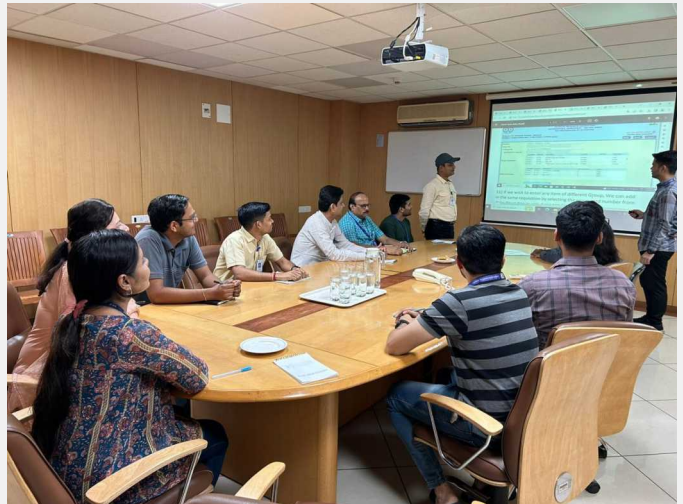
इस अवसर पर, 24.11.2023 (शुक्रवार) को के.आर. रामनाथन सभागार में सभी पीआरएल सदस्यों और सेमिनार के प्रतिभागियों द्वारा "संविधान की प्रस्तावना" का वाचन किया गया।

On this occasion, the "PREAMBLE OF THE CONSTITUTION" was read by all the PRL members and the participants of the Seminar on 24.11.2023 (Friday) in K.R. Ramanathan Auditorium.



Demonstration and training on transition from Manual to Online Stock issue requisition

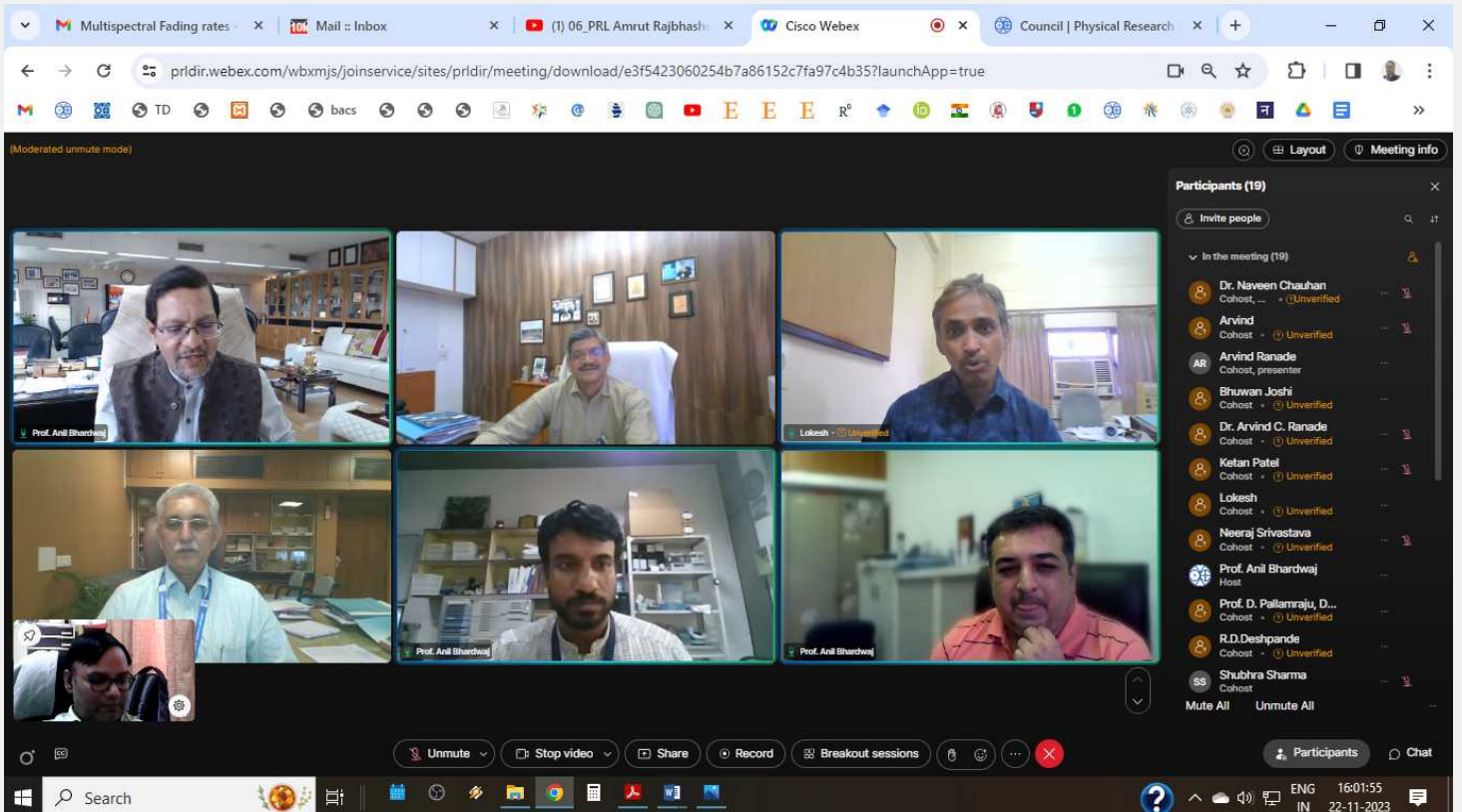
- 55 NOS. OF STOCK ITEMS ARE MAINTAINED AT MAIN STORES.
- TILL NOW, IT WAS ISSUED THROUGH OFFLINE STOCK ISSUE VOUCHER.
- NOW STOCK ITEMS ARE ISSUED THROUGH ONLINE MODULE
- TRAINING WAS SCHEDULED ON 23/11/2023 AT CNIT COMMITTEE ROOM,
- THE PURPOSE OF THIS TRANSITION IS TO ACHIEVE BETTER ACCOUNTIBILITY, TRANSPARENCY AND USER FREINDLY.



PRL Amrut Rajbhasha Vyakhyaan - 6



"पीआरएल अमृत राजभाषा व्याख्यान (PARV)" का छठा व्याख्यान 22 नवंबर, 2023 को आयोजित किया गया था। डॉ. अरविंद सी रानडे, निदेशक, नेशनल इनोवेशन फाउंडेशन, गांधीनगर ने इस कार्यक्रम को प्रसिद्ध वक्ता के रूप में सम्मानित किया। व्याख्यान का विषय था "तृणमूल नवप्रवर्तन एवं नवप्रवर्तक - आत्मनिर्भर भारत की पहचान (राष्ट्रीय नवप्रवर्तन प्रतिष्ठान का सफर और सफल प्रयास)"। डॉ. अरविंद सी रानडे ने अपने व्याख्यान के दौरान चरणबद्ध कार्यशैली पर जोर दिया, राष्ट्रीय नवप्रवर्तन प्रतिष्ठान के विभिन्न कार्य क्षेत्रों और उपलब्धियों जैसे पेटेंट, पौधों की किस्मों का पंजीकरण, प्रौद्योगिकी हस्तांतरण, प्रौद्योगिकी विकास, प्रसार और प्रसार पर विस्तार में चर्चा की गई। इसके साथ ही उन्होंने नेशनल इनोवेशन फाउंडेशन के प्रयासों से छात्रों, तृणमूल नवप्रवर्तकों, पारंपरिक ज्ञान धारकों और जनमानस के जीवन में आ रहे महत्वपूर्ण बदलावों और भारत को आत्मनिर्भर बनाने में इन नवाचारों की भूमिका पर प्रकाश डाला। एक प्रेरणादायक प्रश्न-उत्तर सत्र द्वारा श्रोताओं को विषय के बारे में अधिक जानने और बातचीत के बाद व्यक्तिगत अंतर्दृष्टि विकसित करने का अवसर मिला।



The 6th lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on November 22, 2023. Dr. Arvind C Ranade, Director, National Innovation Foundation, Gandhinagar honored the event as the renowned speaker. The topic of Vyakhyaan was "तृणमूल नवप्रवर्तन एवं नवप्रवर्तक - आत्मनिर्भर भारत की पहचान (राष्ट्रीय नवप्रवर्तन प्रतिष्ठान का सफर और सफल प्रयास)". During his lecture, Dr. Arvind C Ranade emphasized on the phased working style, various work areas and achievements of the National Innovation Foundation such as patents, registration of plant varieties, technology transfer, technology development, propagation and dissemination were discussed in detail. Along with this, he highlighted on the important changes coming in the lives of students, Trinamool innovators, traditional knowledge holders and public mind due to the efforts of National Innovation Foundation and the role of these innovations in making India self-reliant. A stimulating question-and-answer session allowed listeners to learn more about the topic and develop individualized insights after the talk.

You Tube Link: [https://www.youtube.com/watch?](https://www.youtube.com/watch?v=dRPM1em1_pU&list=PL12xjTGd3ldgQXLe9_O8ygpF92DY2hj6P&index=6)

[v=dRPM1em1_pU&list=PL12xjTGd3ldgQXLe9_O8ygpF92DY2hj6P&index=6](https://www.youtube.com/watch?v=dRPM1em1_pU&list=PL12xjTGd3ldgQXLe9_O8ygpF92DY2hj6P&index=6)



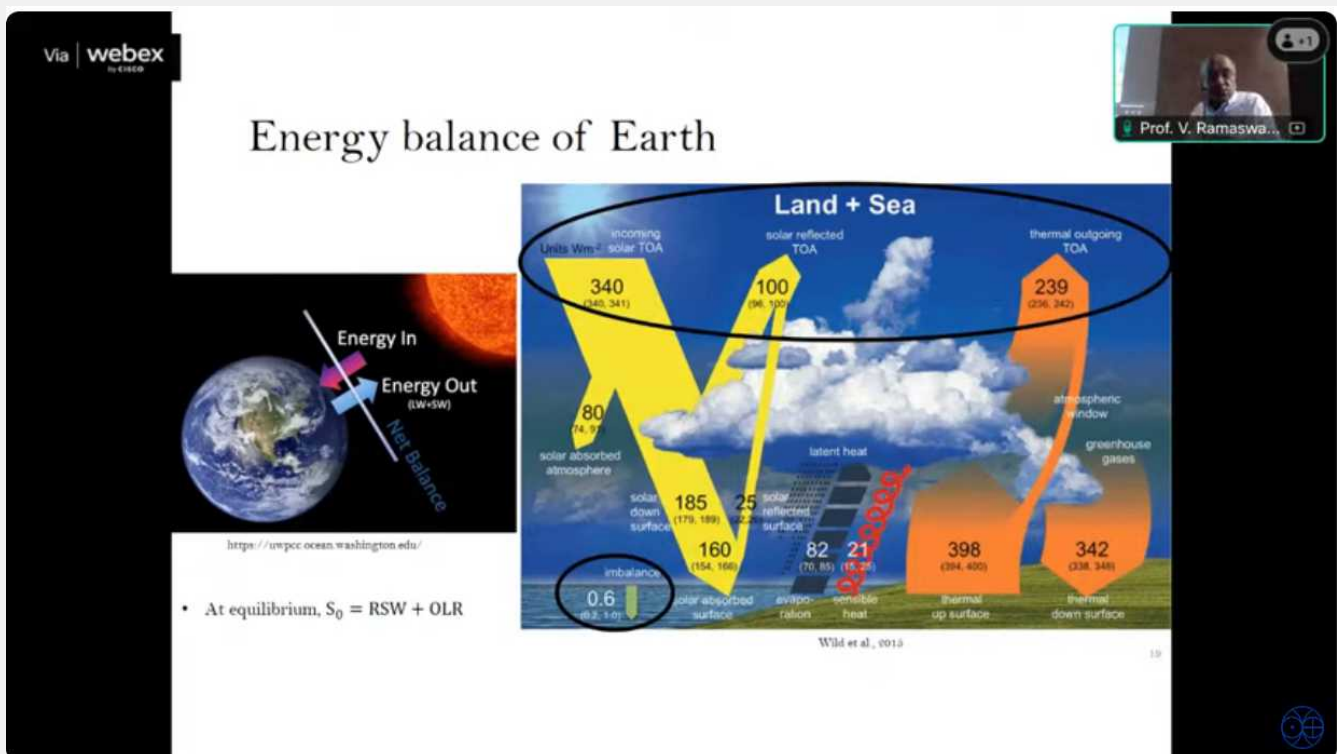
PRL Ka Amrut Vyakhyaan - 86



86th Amrut Vyakhyaan was delivered by Prof. V. Ramaswamy (Director, NOAA/Geophysical Fluid Dynamics Laboratory, and Professor, Atmospheric and Oceanic Sciences Program, Princeton University), on 17 November 2023. He delivered the Vyakhyaan on the exciting topic of "Planet Earth in Energy Imbalance: The Symptoms of Climate Change".

From observations, theory, and numerical simulations, clear evidence of an increasing energy imbalance in the Earth System has been found. The consequence of this increased energy in Planet Earth becomes a causative factor for climate change. This has been manifested in the form of changes in temperatures and heat waves, changes in precipitation and its extremes, flooding and droughts, melting of ice and snow, sea-level changes, and acidification of the oceans. During the Vyakhyaan, Prof. Ramaswamy talked about Earth's radiation budget and the implications of heat imbalance, greenhouse effect, and compositional changes of aerosols on climate change. Also talked about the outcome of climate change in the hydrologic cycle and global precipitation rate, observed in the 20th and 21st centuries. He discussed the importance of Earth observations and the essence of climate modelling for understanding the mechanisms of climate change and quantification of future climate variability and changes.

You Tube Link: https://www.youtube.com/watch?v=KYNh_EfsXfo&list=PL12xjTGd3ldjDz1bDNY69Bqerw7QPuddM&index=3



Inter Centre Sports Meet (ICSM)

National Remote Sensing Centre Hyderabad has hosted Inter Centre Sports Meet (ICSM) in Hyderabad. The event unfolded across two phases, each contributing to the vibrancy of the overall experience.

Phase I: Outdoor Games (16.11.2023 to 20.11.2023) saw the active participation of 14 dedicated members from PRL (including contingent manager) showcasing their prowess in Athletics, Track and Field. Meanwhile, Phase II: Indoor Games (23.11.2023 to 26.11.2023) witnessed a robust contingent of 28 members, (including 1 Contingent Managers), competing fervently in Table Tennis, Badminton, Chess, Carom, and Bridge.

The spirited PRL contingent not only exhibited athleticism but also demonstrated a remarkable spirit of unity and sportsmanship, reflecting the core values inherent in such collaborative events. The commitment to excellence was evident throughout both phases.

Noteworthy Achievements:

Phase I:

- 100 Meters Running (Women Open): Ms. Shreya Mishra secured the prestigious 3rd Prize Bronze Medal, underscoring her exceptional athletic abilities.
- Outstanding performances were also delivered by Ms. Shreya Mishra and Mr. Vinayak in various running events.

Phase II:

- Badminton (Women Singles): Ms. Bireddy Ramya achieved a historic milestone by securing the 3rd Place Bronze Medal, marking the first-ever podium finish for PRL in this event category.
- Table Tennis Men Doubles: Dr. Goutam Kumar Samanta and Shri Atul A. Manke clinched the 3rd Place Bronze Medal, while Dr. R. P. Singh and Shri Anirban Ghosh secured an impressive 4th Place. The latter pair remains eligible for seeding in the next indoor event.
- Bridge: The Bridge team made PRL proud by securing the 3rd Place Bronze Medal in both the Team of Four Duplicate and Progressive/Board a Match events.
- Bridge Team Members: Alok Shrivastava, Tejas N. Sarvaiya, Soma Koted, Dinesh Mehta, Pradeep K Sharma.
- In the Master Pair event, the pair of Soma Koted & Dinesh Mehta claimed the 4th position, while Alok Shrivastava & Tejas Sarvaiya secured the 5th position.

The PRL contingent not only showcased exceptional skills but also exemplified unity and sportsmanship across a diverse range of Outdoor and Indoor Games. The participants exhibited commendable discipline throughout the events, adhering strictly to established rules and regulations, thereby ensuring a fair and sportsmanlike environment.



3rd Symposium on “Meteoroids, Meteors and Meteorites: Messengers from Space”

- The 3rd symposium on “Meteoroids, Meteors and Meteorites: Messengers from Space” (MetMeSS-2023) was held at PRL main campus during 1 to 3rd Nov. 2023. The aim of the symposium was to bring prominent researchers to present their latest results on various topics that advances our understanding of the formation of solar system and evolution.
- The symposium witnessed active participation from several academic and research institutes, that includes, Universities, CSIR labs., IIT’s, NISER, IISER, IIST, GSI and ISRO units.
- The symposium comprised nine sessions, early solar system formation process, Chandrayaan missions, shock effects in solids, Martian meteorites, achondrites, analogue studies, sample return mission and curation, meteorite collection and field studies, dust, meteors and comets, astrobiology and organics.
- Results from latest meteorites falls in India were presented in the symposium.
- Scientific works on Chandrayaan 3 lander and rover payloads were presented.
- A special talk on noble gases in Mars was presented via online mode.
- This symposium yielded to bring together the researcher in the above scientific field on one platform for the discussion.



गुजरात राज्य स्तरीय हिंदी तकनीकी संगोष्ठी 2023 - अवलोकन

राजभाषा हिंदी के प्रचार-प्रसार के लिए भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद द्वारा गुजरात राज्य स्तरीय हिंदी तकनीकी संगोष्ठी- 2023 का आयोजन दिनांक 24 नवम्बर, 2023 को किया गया। इसका मुख्य विषय था : “नवीन विचार और पहल”। इस कार्यक्रम के मुख्य अतिथि श्री यशवंत यू. चव्हाण, प्रधान मुख्य आयकर आयुक्त, गुजरात थे। इसके लिए गुजरात के विभिन्न कार्यालयों से लेख प्राप्त हुए एवं उनकी पावरपॉइंट प्रस्तुतियां दी गईं, इन लेखों के विषय निम्न हैं:

Gujarat State Level Hindi Technical Seminar- 2023 was organized by Physical Research Laboratory, Ahmedabad on 24 November 2023 for the promotion of Official Language Hindi. Its main theme was: “Innovative Ideas and Initiatives”. The chief guest of this program was Shri Yashwant U. Chavhan, Principal Chief Commissioner of Income Tax, Gujarat. For this Seminar, articles were invited from various offices of Gujarat and their PowerPoint presentations were given, the topics of these articles are as follows:

1. इसरो की परियोजनाओं में स्पेस स्टार्टअप की भूमिका और स्वदेशीकरण - श्री रंजन परनामी, सैक
2. आर एफ आई डी (रेडियो फ्रीक्वेंसी पहचान) टैग्स तकनीक (कृष्णा मदद करो) से पीड़ित नारी की मदद प्रणाली - सुश्री नेहा गौर, सैक
3. नैनो पदार्थों का अंतरिक्ष अभियानों में उपयोग - श्री योगेश घोटेकर, सैक
4. साफ्टवेयर परिभाषित उपग्रह : अवधारणा, अवसर एवम् चुनौतियाँ - श्री जे. पी. सिंह, सैक
5. स्मार्ट वाटर मीटर ऐप - श्री शुभम गुप्ता, राष्ट्रीय जल विकास अभिकरण, वलसाड
6. शब्दावली वार्तालाप एप्लीकेशन - श्री राजेन्द्र गायकवाड़, सैक
7. अंतःस्थापित निष्क्रिय तकनीक- ईपीटी - श्री दीपक अग्रवाल, सैक
8. आईटी परिसंपत्तियों की सूची प्रबंधन - श्री गिरीश पड़िया, पीआरएल
9. साइबर-सुरक्षा एवं व्यक्ति विशेष - श्री प्रशांत जांगिड़, पीआरएल
10. ऑप्टिकल डोमेन संपीडन आधारित कैमरा: अभिकल्पना एवं विकास - श्री जितेंद्र कुमार, सैक
12. मुद्रित इलेक्ट्रॉनिक्स : अंतरिक्ष अन्वेषण में नवाचार - श्री दिनेश अग्रवाल, सैक
13. कार्टोग्राफिक कैमरा के अग्र छोर इलेक्ट्रॉनिक्स के विकास में आधुनिकतम अति सूक्ष्म कनेक्टरों तथा फ्लेक्सि रिजिड प्रिंटेड सर्किट बोर्ड की महत्वपूर्ण भूमिका - श्री अमरनाथ, सैक
14. जल संरक्षण नवीन प्रयास - श्री अर्पण बाजपेयी, सेंट्रल बैंक
15. हिमालय में भूवैज्ञानिक समय से बाढ़, जंगलों की आग, जलवायु बदलाव और इंसानी दखल की समझ - डॉ. शुभा शर्मा, पीआरएल
16. संस्थागत कैंटीनों के संबंध में पहल और नवाचार/नवीनता: PRL कैंटीन का एक मामला अध्ययन - श्रीमती ऋचा, पीआरएल
17. अंतरिक्ष एवं ग्रहों पर मानव की आभासी उपस्थिति - श्री प्रशांत गुप्ता, सैक
18. अंतरिक्ष अन्वेषण में नवीन विचार और पहल - श्री योगेश पार्थ, सैक



हिंदी संगोष्ठी की झलकियाँ

Dr. Arvind Bhatnagar Memorial Lecture-03

The 3rd Dr. Arvind Bhatnagar Memorial lecture was organised on 29th Nov. 2023 at USO-PRL, and was delivered by eminent physicist Prof. Helen Mason OBE. Prof. Mason is a solar scientist at the University of Cambridge. Her field of research is solar physics, in particular the ultraviolet and X-ray spectrum of the Sun. She has worked on many joint UK, NASA, ESA, Japanese and ISRO space projects including SOHO (Solar and Heliospheric Observatory), Hinode, SDO (Solar Dynamics Observatory) and XSM, Chandrayaan-2's Solar X-ray Monitor. The title of the lecture was "Reaching for the Sun". The lecture reviewed the contemporary understanding about the dynamic Sun from solar space missions. The lecture was in hybrid mode and along with PRL fraternity, it was physically attended by students and faculties from various prestigious academic institutions of Udaipur.

YouTube Link: <https://youtube.com/live/Jk8yAINzVYA?feature=share>



Lab Visit of CSSTEAP Students

Under the aegis of the UN-affiliated Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), the 13th Post Graduate Course on Satellite Meteorology and Global Climate (SATMET-13) and the 27th Post Graduate Course on Remote Sensing and Geographic Information System (RSGIS-27) are currently being conducted by SAC, Ahmedabad and IIRS, Dehradun respectively. As part of their programme, the students of these courses visited some laboratories at PRL (Main Campus) on 23 November, 2023.

At the Aerosol Characterization Laboratory in the Space and Atmospheric Science Division, they were quite interested in knowing what aerosols are and their impact on climate. The different kinds of aerosols and their role in radiative transfer and climate were discussed. The various instruments and techniques deployed to measure aerosol characteristics were demonstrated and explained by Prof. S. Ramachandran, in addition to global model simulations of aerosols and their impact on climate. Questions were asked on global warming and climate change, and the role aerosols play in climate and climate change. At the Geosciences Division, the students were briefed about the activities of the Division by Prof. S. Kumar and Prof. A D. Shukla. After initial interaction, the students were taken to the following 3 laboratories: (a) IWIN Laboratory (water analysis using Isotopic Ratio Mass Spectrometer), (b) GEOSIL Laboratory (Geosciences Stable Isotope Laboratory: Isotopes of C, N, O and S in all types of geological samples), and (c) Thermal Ionization Mass Spectrometer (TIMS) which is used for analysing long-lived radioactive isotopes of Sr, Nd, Pb etc.



PRL Monthly Publications Digest (November 2023)**Astronomy & Astrophysics Division [6]**

1. Yamini K. Rao, B. Mondal, Giulio Del Zanna, N. P. S. Mithun, S. V. Vadawale, K. K. Reeves, Helen E. Mason, Anil Bhardwaj, 2023, Multiwavelength Observations of a B-class Flare Using XSM, AIA, and XRT, *The Astrophysical Journal*, Date of Publication: 27/11/2023
2. Namita Uppal, Shashikiran Ganesh, Mathias Schultheis, 2023, Warp and flare of the old Galactic disc as traced by the red clump stars, *MNRAS*, Date of Publication: 15/11/2023
3. Dewangan, Lokesh Kumar, Maity, A. K., Mayya, Y. D., Bhadari, N. K., Bhattacharyya, Suman, Sharma, Saurabh, Banerjee, Gourav, 2023, New Insights in the Bubble Wall of NGC 3324: Intertwined Substructures and a Bipolar Morphology Uncovered by JWST, *The Astrophysical Journal*, Volume 958, Issue 1, id.51, 12 pp., Date of Publication: 10/11/2023
4. Prantik Nandi, A. Chatterjee, A. Jana, S. K. Chakrabarti, Sachindra Naik, S. Safi-Harb, H.K. Chang, and Jeremy Heyl, 2023, Survey of Bare Active Galactic Nuclei in the Local Universe ($z < 0.2$). I. On the Origin of Soft Excess, 2023, *Astrophysical Journal Supplement Series*, Vol 269, id.15, 20 pp, Date of Publication: 08/11/2023
5. Dewangan, Lokesh Kumar, Bhadari, N. K., Maity, A. K., Eswaraiah, C., Sharma, Saurabh, Jadhav, O. R., 2023, Galactic 'Snake' IRDC G11.11-0.12: a site of multiple hub-filament systems and colliding filamentary clouds, *Monthly Notices of the Royal Astronomical Society*, stad3384, <https://doi.org/10.1093/mnras/stad3384>, Date of Publication: 03/11/2023
6. Panja, Alik, Dewangan, Lokesh Kumar, Baug, Tapas, Chen, Wen Ping, Sun, Yan, Sinha, Tirthendu, Mondal, Soumen, 2023, Observational Evidence of the Merging of Filaments and Hub Formation in G083.097+03.270, *The Astrophysical Journal*, Volume 958, Issue 1, id.17, 10 pp., Date of Publication: 01/11/2023

Atomic Molecular and Optical Physics Division [5]

1. Chahat Kaushik, A. Aadhi, Anirban Ghosh, R. P. Singh, S. Dutta Gupta, M. Ebrahim-Zadeh, and G. K. Samanta, 2023, Dynamically tunable broadband output coupling of optical oscillators based on non-cyclic geometric phase mirror, *APL Photonics*, Date of Publication: 16/11/2023
2. Anil Devara, Monika Devi, Neha Ati, Mukesh C.P., Zakir Khan, Vrushab Mahesh, Ajithprasad Pottentavida, Naveen Chauhan, Akash Pandey Gopesh Jha, 2023, Diversity of MIS 3 Levallois Technology from Motravulapadu, Andhra Pradesh, India - Implications of MIS 3 Cultural Diversity in South Asia, *Frontiers in Earth Science*, Date of Publication: 14/11/2023
3. B. K. Sahoo and B. Ohayon, 2023, All-optical differential radii in zinc, *Phys. Rev. Research* 5, 043142 (2023); <https://doi.org/10.1103/PhysRevResearch.5.043142>, Date of Publication: 13/11/2023
4. Kartika Goswami, Santunu Kumar Panda, Linto Alappat, Naveen Chauhan, 2023, Luminescence for sedimentary provenance quantification in river basins: A methodological advancement, *Quaternary Geochronology*, Date of Publication: 11/11/2023
5. Monika Devi, Naveen Chauhan, Ashok K. Singhvi, 2023, Post-violet infrared stimulated luminescence (pVIRSL) dating protocol for potassium feldspar, *Quaternary Geochronology*, Date of Publication: 10/11/2023

Geosciences Division [4]

1. Bhowmik, H. S., Tripathi, S. N., Shukla, A. K., Lalchandani, V., Murari, V., Devaprasad, M., Shivam, A., Bhushan, R., Prevot, A. S. H., and Rastogi, N., 2023, Contribution of fossil and biomass-derived secondary organic carbon to winter water-soluble organic aerosols in Delhi, India, *Science of The Total Environment*, 168655., Date of Publication: 27/11/2023
2. Iglesias-Rodríguez, M., R. Rickaby, Arvind Singh, and J.A. Gately, 2023, Laboratory experiments in ocean alkalinity enhancement research, *State of the Planet*, Date of Publication: 27/11/2023
3. Gupta, P., Christopher, S.A., Patadia, F., and Rastogi, N., 2023, The unusual stubble burning season of 2020 in northern India: a satellite perspective, *International Journal of Remote Sensing*, 44:21, 6882-6896., Date of Publication: 15/11/2023
4. Shubhra Sharma, Anil D. Shukla, 2023, Mid-Holocene climate-glacier relationship inferred from landforms and relict lake sequence, Southern Zaskar ranges, NW Himalaya, *Geomorphology*, Date of Publication: 06/11/2023

Planetary Sciences Division [2]

1. Siddhi Y. Shah, S. A. Haider, O. Korablev, 2023, Impact of Mars GDS 2018 on the Chemistry of Water, Nitrogenated and Deuterated Cluster Ions: NOMAD Observations, *JGR Planets*, Date of Publication: 16/11/2023
2. R. P. Bourman, C. V. Murray-Wallace, D. Panda, S. Buckman, D. Banerjee, D. D. Ryan, and L. T. White, 2023, Tsunami or Storm? A high-level coastal boulder field on the southern tip of Eyre Peninsula, South Australia, *Australian Journal of Earth Sciences*, Date of Publication: 02/11/2023

Theoretical Physics Division [2]

1. Animesh Chatterjee, Srubabati Goswami, Supriya Pan, 2023, Matter effect in presence of a sterile neutrino and resolution of the octant degeneracy using a liquid argon detector, *PHYSICAL REVIEW D*, Date of Publication: 30/11/2023
2. Debashis Pachhar and Tanmay Kumar Poddar, 2023, Constraints on monopole-dipole potential from tests of gravity, *Physical Review D*, Date of Publication: 14/11/2023

Udaipur Solar Observatory [1]

1. Sandeep Kumar, Dinesha V. Hegde, Nandita Srivastava, Nikolai V. Pogorelov, Nat Gopalswamy, and Seiji Yashiro, 2023, Rotation of a Stealth CME on 2012 October 5 Observed in the Inner Heliosphere, *The Astrophysical Journal*, Date of Publication: 16/11/2023

Awards & Honours

(1) **Dr. R P Singh**, Senior Professor, Atomic, Molecular and Optical Physics Division of PRL has been elected as a **Fellow of NASI (The National Academy Of Sciences, India)**.

(2) **Dr. Bijaya Sahoo**, Senior Professor, Atomic, Molecular and Optical Physics Division of PRL has been elected as a **Fellow of NASI (The National Academy Of Sciences, India)**.

(3) Top 2% for single recent year, data pertain to citations received during calendar year 2022

Prof. Manmohan M. Sarin (4th year in a row)

Prof. Sanjeev Kumar

Prof. B.K Sahoo (4th year in a row)

Top 2% for career-long, data are updated up to the end of 2022

Prof. Sarin, Manmohan M.

Prof. Joshipura, Anjan S.

Prof. Kota, V. K. B.

Prof. B.K Sahoo

(Late) Prof. Rao, N. N.

(4) **Mr. Anirban Ghosh**, Senior Scientific Assistant-A, Atomic, Molecular and Optical Physics Division of PRL has received the **URSI Young Scientist Award** to attend **URSI General Assembly and Scientific Symposium (URSI GASS 2023)** at Sapporo, Japan during 18 - 27 August 2023.

(5) **Mr. Rishikesh Sharma**, Scientist/Engineer-SC, Astronomy and Astrophysics Division of PRL has received **The Best Poster Award** in the "**Modern Engineering Trends in Astronomy conference (META-2023)**" held at Raman Research Institute, Bengaluru during 01-04 November 2023.

(6) **Dr. Navinder Singh**, Professor, Theoretical Physics Division of PRL has been nominated **as the member of Board Of Studies (BoS) for Post-Graduate in Physics, Nano Science and Engineering**, of the **I.G Gujral Punjab Technical University (IKGPTU)** for the period of 2 years (2023-2025)

Visitors

(1) **Prof. Helen Elizabeth Mason**, Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge, UK visited PRL from 26.11.2023 to 03.12.2023 in connection with Scientific discussion with Scientists and Research Scholars in Ahmedabad and Udaipur on XSM observations.

(2) **Prof. Rahul Sinha**, IMSc Institute for Mathematical Sciences, Chennai and University of Hawaii visited during 6-7 November, 2023.

Heartily welcome to our new members



NAME: Mr. Sandeep P.S.

DESIGNATION: Purchase and Stores Officer (On Deputation)

DATE OF JOINING: 01.11.2023

DIVISION: Purchase Section



NAME: Dr. Jalaja Bhadreshkumar Pandya

DESIGNATION: Post Doctoral Fellow

DATE OF JOINING: 02.11.2023

DIVISION/AREA: Theoretical Physics Division



NAME: Mr. Ranjan Kumar

DESIGNATION: Post Doctoral Fellow

DATE OF JOINING: 07.11.2023

DIVISION/AREA: Astronomy & Astrophysics Division



NAME: Dr. Debika Debnath

DESIGNATION: Post Doctoral Fellow

DATE OF JOINING: 15.11.2023

DIVISION/AREA: Theoretical Physics Division

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