



## Newsletter of the Physical Research Laboratory



# Participants of the MetMESS Conference

November, December 2024



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#### Global changes in aerosol single scattering albedo during COVID-19

## The Author



Kamran Ansari

#### (Kamran Ansari, S. Ramachandran)

The Coronavirus disease 2019 (COVID-19) lockdowns provided a rare and unique event when the emissions of anthropogenic aerosols and their precursors were reduced on a global scale. These realworld observations are crucial not only for the validation of model results but also for providing the constraints for simulating the present as well as future emission scenarios. A comprehensive analysis is performed on the global changes in aerosol optical depth (AOD, column content) and single scattering albedo (SSA, composition) using Moderate resolution imaging spectrometer (MODIS) and Ozone Monitoring Instrument (OMI) observations, and two highly spatially resolved model simulations (MERRA-2 and CAMS) during the COVID (2020) and normal (2015-2019) period, for the first time. During COVID lockdowns, most regions in the world (Asia, North America, Europe, and Australia) experienced a reduction in AOD, with the reduction in South Asia being the most significant (-23%). In spite of the significant reduction in AOD, the absolute change in OMI retrieved SSA is <4% globally during COVID period compared to the normal period, and this change is not significantly different compared to the long-term changes and year-on-year variability in SSA. The absolute change in the model SSA during COVID is also small (<3%). The change in aerosol radiative forcing at the surface is directly linked to the change in AOD rather than the change in SSA, as the change in SSA is smaller compared to the larger change in AOD. These findings on the changes in columnar aerosol characteristics during COVID will be very crucial for examining the projected climate impact and undertaking mitigation measures with implications to air pollution and climate.

Source/Reference of the Work: https://doi.org/10.1016/j.atmosenv.2024.120649



Figure: Global changes in (a) MODIS retrieved aerosol optical depth (AOD at 0.55 µm) (absolute) and (b) OMI retrieved single scattering albedo (SSA at 0.388 µm) (% change) during spring and summer seasons of COVID (2020) relative to the normal (2015-2019) period. Black dots indicate statistically significant changes at 95% confidence level calculated using two-tailed Student's t-test.



## The Author



Arup Kumar Maity

Cloud–Cloud Collision: Formation of Hub-filament Systems and Associated Gas Kinematics. Mass-collecting Cone–A New Signature of Cloud–Cloud Collision

#### A. K. Maity, T. Inoue, Y. Fukui, L. K. Dewangan, H. Sano, N. K. Bhadari, and O. R. Jadhav

Massive stars, with masses exceeding 8 solar masses, significantly influence their host galaxies through intense radiative and mechanical feedback. Hub-filament systems (HFSs) have been identified as promising environments for massive star formation. In these systems, molecular gas and dust are funneled through filaments toward the central hub, which becomes the densest region, ideal for the formation of massive stars. Despite their significance, the origins of HFSs remain elusive. Interestingly, recent observational studies of some massive star-forming regions suggest a possible connection between the collision of molecular clouds and the formation of HFSs. To explore this aspect, an analysis of magneto-hydrodynamic simulation data has been conducted, where a spherical turbulent molecular cloud collides with a plane-parallel sea of denser gas at about 10 km/s. The collision leads to shock compression, forming filaments mostly perpendicular to the magnetic field. These filaments, shaped into a cone, evolve through non-gravitational initially, followed by gravitational gas attraction to form the HFS. The formation process involves turbulence, shock compression, magnetic fields, and gravity. Position-velocity diagrams reveal gas flow toward the cone's vertex, where high-density objects collapse, with the magnetic field curving toward the collision, providing key signatures of cloud-cloud collisions.

Source/Reference of the Work: https://doi.org/10.3847/1538-4357/ad7098



Figure Caption: The top and bottom panels show the column density maps at 0.2 Myr and 0.7 Myr, respectively. The color bars are in units of  $log(N(H_2) [cm^{-2}])$ . The arrow in the top-left panel indicates the direction of collision. Rectangles represent the positions of the sink particles. The filaments are marked by arrows in the bottom-right panel.



#### **Dancing Lunar Dusts**

#### Trinesh Sana, S. K. Mishra

#### The Author



**Trinesh Sana** 

During the Surveyors and Apollo missions, a strange glow is observed on the horizon of the Moon following the local sunset. This "Lunar Horizontal Glow" is thought to be caused by the intricate dynamics of the dust particles floating above the lunar surface, scattering sunlight. This celestial choreography of the dust particles akin to dancing is primarily driven by electrostatic forces generated by the continual bombardment of solar wind and highly energetic UV photons on the lunar surface and dust particles. After five decades since the observation of the LHG, which predicts a dusty plasma environment on the Moon, we revisited the phenomenon of dust charging within the lunar photoelectron sheath and its subsequent dynamics. We have studied the dynamical evolution of the dust particles undergo a periodic hopping trajectory and sustain above the lunar surface for a significant time. In other cases, the dust particles are found to re-impact the surface after a single ballistic hop. We further identify that the discrete charging of lunar dust may play a crucial role in influencing dust dynamics, especially in the presence of tenuous plasma environments. This study is essential for understanding the fundamental processes that configure dusty plasma atmosphere and shape surface evolution over Moon and other airless bodies across the Solar System.

Source/Reference of the Work: https://doi.org/10.1063/5.0225693



Figure Caption: Time evolution of position, velocity, and charge of the dust particles of different sizes launched from the surface.



# Investigation of signal enhancement in nanoparticle enhanced molecular LIBS of graphite

#### Swetapuspa Soumyashree and Prashant Kumar





Swetapuspa Soumyashree

In the present study, we have investigated the time evolution of molecular LIBS (MLIBS) and nanoparticle enhanced molecular LIBS (NEMLIBS) of graphite samples using 10 nm gold nanoparticles (AuNPs) for delays up to 100  $\mu$ s. A systematic study of signal enhancement observed in the CN violet band (B2 + X2 +) and C2 Swan band (d3 g a3 u) was carried out. For acquisition delays of a few  $\mu$ s to tens  $\mu$ s, we have observed typically 1–2 orders of optical signal enhancement in these molecular bands of the graphite target using Au NPs. We have studied the mechanism of signal enhancement in the context of lifetime and plasma parameters viz., rotational and vibrational temperature of molecular bands as well as electron number density. The relative enhancement observed in C2 and CN bands, which are produced through different routes/mechanisms, has been explained through our analysis. The enhancements observed in NEMLIBS at higher delays are due to the increase of atomic species in the plasma which are antecedent of the molecules formed. This is evident through higher electron number density and slightly lower vibrational temperature in the case of NEMLIBS as observed in our analysis.

#### Source/Reference of the Work: https://doi.org/10.1039/D4JA00089G



Figure Caption: Comparison of signal enhancements of C2 and CN molecular bands at 2 and 50  $\mu$ s. As compared to the earlier time delay of 2  $\mu$ s, a significant 1–2 orders of signal enhancement is seen in the molecular bands in the later delays of 50  $\mu$ s.



# Umbral flashes and their association with running penumbral waves: a study using MAST Ca II 8542 Å narrow-band observations

#### Sandeep K. Dubey, Shibu K. Mathew and A. Raja Bayanna



The Author

Sandeep Kumar Dubey

Umbral flashes (UFs) are one of the most dynamic phenomena observed in the sunspot umbra at the chromospheric heights. In this paper, we present spectroscopic observations of UFs in the Ca II 8542 Å line recorded by a narrow-band imager working with the Multi-Application Solar Telescope (MAST). The deduced data are analysed to obtain various properties of the UFs occuring at different locations inside the umbral boundary. An intensity enhancement of up to 30% or more was observed at the location of UFs, with a periodicity ≈3 min. The line-of-sight (LOS) velocity of UFs was estimated using bisector application to the emission profile resulting from the removal of mean umbral and the mean quiet Sun (QS) line profiles. The emission profiles resulting from removing the mean umbral profile were observed to better represent the emission component of the UF line profile. Both up-flows and down-flows of the order  $\approx 5$  km s-1 were associated with the UFs with an average up-flow of  $\approx 1$  km s-1. Out of all UFs analysed, 31% were observed to be associated with down-flows in case of removal of the mean umbral profile from the UF line profile. We observed multiple radially propagating LOS velocity disturbances (≈20-40 km s-1) in the penumbra, which might be associated with the UFs, even though we could not establish a one-to-one correspondence. The horizontally propagating LOS velocity disturbances could produce the visual effect of running penumbral waves, which produce intensity fluctuations in intensity images when observed at the line-centre wavelength. The simultaneous photospheric HMI observations showed no distinct intensity or velocity signatures corresponding to the UFs observed in the chromospheric Ca II 8542 Å line.

#### Source/Reference of the Work: https://doi.org/10.1093/mnras/stae2426



Figure Caption: Temporal variation of LOS velocity over radial cuts across the sunspot. Panels A and B show velocity variations averaged over angular extents of 340 –350 and 330 –340 , respectively. Multiple propagating velocity disturbance can be seen in the penumbra, originating inside the umbral boundary. The radial propagation speed of the velocity fronts are mentioned on respective fronts. The vertical and horizontal axes represent advancing time and radial distance, respectively. Umbral and penumbral boundaries are shown with vertical lines on both panels.

## The Spectrum – November, December 2024



### Modeling the Magnetic Vectors of Interplanetary Coronal Mass Ejections at Different Heliocentric Distances with INFROS)

#### Ranadeep Sarkar, Nandita Srivastava, Nat Gopalswamy, and Emilia Kilpua



The Author

Nandita Srivastava

This work utilizes the state-of-the-art analytical model INterplanetary Flux ROpe Simulator (INFROS) dedicated to forecasting the strength of the southward component (Bz) of the magnetic field embedded in interplanetary coronal mass ejections (ICMEs). Interplanetary evolution of six ICMEs and their interactions with high speed and high density streams was studied using INFROS. The selected ICMEs were observed in sequence by two radially-aligned spacecraft positioned at varying heliocentric distances, providing a unique opportunity to study their radial evolution. We determined the intrinsic flux rope (FR) properties of each ICME near the Sun obtained from the remote-sensing observations from spacecraft positioned at multiple vantage points, including STEREO, SOHO, and SDO. The near-Sun FR properties thus obtained were then used as input to INFROS in order to model the ICME evolution at different heliocentric distances. By comparing the model outputs with the in -situ observations of the ICMEs obtained at the radially aligned spacecraft, such as MESSENGER, VEX, STEREO, and Wind, we found that for the isolated CMEs, the model outputs at both spacecraft are in good agreement with in situ observations. However, for most of the interacting events, the model correctly captures the CME evolution only at the inner spacecraft beyond which the ICME evolution no longer remains self-similar. Our findings indicate that constraining the INFROS model with innerspacecraft observations significantly enhances the prediction accuracy at the outer spacecraft for the CMEs undergoing self-similar expansion, achieving a 90% correlation between observed and predicted Bz profiles. We conclude that the assumption of self-similar expansion provides a lower limit to the magnetic field strength estimated at any heliocentric distance, based on the remote-sensing observations which is crucial from the perspective of forecasting space weather impact.

Source/Reference of the Work: https://iopscience.iop.org/article/10.3847/1538-4365/ad5835



Figure Caption The magnetic field profiles of the ICME sequentially detected by MESSENGER and STEREO-B for the CME of November 4, 2011. The black solid lines denote the observed magnetic vectors of the ICME while the gray-shaded regions are the ensemble results obtained from the model predictions. The cyan dashed lines represent the ensemble model results corresponding to the lowest impact distance at STEREO-B. The red curves mark the best fit of the magnetic vectors at MESSENGER.



# Effect of area divergence and frequency on damping of slow magnetoacoustic waves propagating along umbral fan loops

#### Ananya Rawat and Girjesh Gupta

Waves play an important role in the heating of the solar atmosphere, however, observations of wave



The Author

Ananya Rawat

propagation and damping from the solar photosphere to corona through chromosphere and transition region are very rare. Recent observations have shown 3-min slow magnetoacoustic waves (SMAWs) propagation along fan loops from the solar photosphere to corona. In this work, we investigated the role of area divergence and frequencies on the damping of SMAWs propagating from the photosphere to the corona along several fan loops rooted in the sunspot umbra. Simultaneous sunspot images obtained from AIA 193 Å, AIA 171 Å, AIA 304 Å, IRIS 2796 Å, AIA 1700 Å, and HMI continuum passbands were used along with HMI Dopplergram and IRIS 2796 Å spectroscopic data. These images provide insights into different layers of the solar atmosphere, revealing coronal temperatures of 1.6 MK and 0.7 MK, transition region temperature of 50,000 K, chromospheric temperature of 10,000 K, temperature minimum region of 5000 K, and photospheric temperature of 6000 K, respectively. In Figure 1, we present sunspot images observed from these passbands as labeled. It is evident from the images that the appearance of sunspot varies significantly across different atmospheric layers, which emphasizes the complexities involved in their dynamics. We study the Fourier power spectra of oscillations along fan loops at each atmospheric height which showed significant enhancements in 1-2 min, 2.3-3.6 min and 4.2-6 min period bands. The amplitude of intensity oscillations in different period bands and heights were extracted after normalizing the filtered light curves with low-frequency background. We found damping of SMAW energy flux propagating along the fan loop 6 with damping lengths  $\approx$  170 km and  $\approx$  208 km for 1.5-min and 3-min period bands. We also showed the decay of total wave energy content with height after incorporating area divergence effect and presented the actual damping of SMAWs from photosphere to corona. Actual damping lengths in this case increased to  $\approx$  172 km and  $\approx$ 303 km for 1.5-min and 3-min period bands. All the fan loops showed such an increase in actual damping lengths, which indicates that the waves are losing energy faster (i.e., damping length is short) when the area divergence effects are not considered. This is due to the fact that wave energy is getting redistributed across the loop cross-sections due to effect of area divergence. This clearly demonstrates the importance of the area divergence effect while studying the damping of waves. Results also showed some frequency-dependent damping of SMAW energy fluxes with height where high-frequency waves are damped faster than low-frequency waves.

Source/Reference of the Work: https://doi.org/10.1093/mnras/stae1889





Figure 1: Left panel: Images of the sunspot observed from different passbands sensitive to different temperatures as labeled. The fan loop system is clearly visible in the AIA 171 Å image. Identified loop foot-points in the corona and lower atmosphere are marked with asterisks and small circles respectively. Additionally, for visualization purposes, we have drawn the traced coronal loops in the AIA 171 Å image. Contours on the images represent the umbra-penumbra boundary. Right panel: Variation of cross-sectional area with height for loop 6. The vertical bars represent errors in the cross-sectional area.



Figure 2: Variation of average wave energy fluxes (left panel) and total wave energy content (right panel) within the loop cross-sectional areas with atmospheric heights.



## Swachhta Hi Seva Campaign 2024

PRL has celebrated the Swachhta hi Seva Campaign. To kick start the Campaign on 27.09.2024, mass Swachhta Pledge has been undertaken by all PRL members. Further, all Division Heads were requested to sensitize each staff member/research personnel/trainee including contractual staff members, attached to them, to keep one's working place and area neat and clean. Few glimpses of the pledge are appended below: -



## Swachhta Jagrukta Samvad at Kendriya Vidyalaya School :

PRL Swachhta Pakhwada Committee organised a Jagrukta Samvad by expert Dr. R D Deshpande, Retired Sr. Professor & former Registrar, PRL on the topic "Cleanliness, Sanitation and Hygiene – essential for health, wealth and prosperity" in Kendriya Vidhyalaya (SAC), Vastrapur, Ahmedabad. Dr. R.D. Deshpande who is considered among PRL community and to their known as motivational speaker and friendly in nature. He very interactively conveyed to the audience comprising students of Class 9 & 10 that how keeping ourselves clean, sanitized and by adopting hygiene is essential for one's health and for gaining knowledge as wealth and prosperity in our surrounding.

The Principal, present student as well as teacher appreciated the efforts of the committee and requested to organise such events in future in their school. A quiz were organized by Swachhta Committee after the Jagrukta Samvad for students. The session was followed by a tree Plantation in the premises of school.











## Interactive Session on holistic health

An Interactive Session on holistic health and Well-being of PRL Employees and Contractual Staff was conducted in PRL K R Ramanathan Auditorium on 17.10.2024 by Dr. Punit Chaturvedi, Assistant Professor, National Institute of Ayurveda, AYUSH Ministry.





Safaimitra Suraksha Shivir – A Preventing Health Checkup Camp

A Preventive Health Checkup Camps/Shivir were organized in various campuses of PRL under Swachhta Hi Seva Campaign for contractual employees, horticulture workers, housekeeping workers, etc.

Based on the examination & pathological reports, the contractual employees were advised for future course of action as per their respective diagnosis







## Cleanliness Drive – PRL Mt. Abu Campus:

A cleanliness drive was done by the PRL Mt. Abu Campus employees also on 16.10.2024 in and around the campus.



## School Visit for Swachhta Jagrukta Samvad - PRL Mt. Abu

PRL Mt. Abu employees visited Govt. Upper Primary School, Salgoan – 307 501 and conducted a session of awareness for the school children, distributed hygiene kit and plant saplings





Atmospheric Science Laboratory for aerosol measurements over Gurushikhar, Mt. Abu

Gurushikhar in Mt. Abu is a high altitude site (1680 m above mean sea level), and it remains in the free troposphere during winter but lies within the boundary layer during pre-monsoon and monsoon seasons. Aerosol measurements over Gurushikhar will provide a regional background. Moreover, this site is ideally located to investigate the effects of long range transport and the transformations of aerosols. This site experiences frequent dust storms during pre-monsoon season. Hence, in order to delineate natural aerosols from anthropogenic aerosols, and quantify their impact on radiative forcing, which is quite uncertain and difficult at present, a laboratory using a port-a-cabin has been set up on 18 October 2024 with an objective to measure in situ the aerosol vertical profiles, size distribution, spectral aerosol optical depths, single scattering albedo, asymmetry parameter, black carbon aerosols, scattering coefficient and weather parameters at Gurushikhar, Mt. Abu. At present, the atmospheric science laboratory in Gurushikhar is equipped with an aethalometer and a nephelometer to measure the aerosol absorption and scattering coefficients, respectively, in addition to a weather station. The expected outcomes include the spatial and temporal heterogeneity in aerosol characteristics and their dynamical nature, delineation and quantification of natural and anthropogenic aerosol components, and therefore a more accurate and reliable quantitative estimate of aerosol radiative forcing. The quantitative results can provide observational constraints to help improve regional model simulations of aerosols and associated climate change, and can serve as the ground truth for satellite retrievals, validation and calibration.



(a) Front and (b) side view of the atmospheric science laboratory in Gurushikhar. (c) Inside view with aethalometer and nephelometer. (d) Terrace of the port-a-cabin with air sample inlet and weather station



## **Gujarat State Level Hindi Competition 2024**

"शब्द मंथन-प्रश्न मंजरी Shabd Manthan-Prashna Manjari"

भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद द्वारा वर्ष 2024 के लिए गुजरात राज्य स्तरीय हिंदी प्रतियोगिता "शब्द मंथन– प्रश्न मंजरी– 2024" का आयोजन किया गया। इस प्रतियोगिता में गुजरात राज्य के विभिन्न केंद्र सरकार कार्यालयों के कर्मचारियों ने भाग लिया । यह प्रतियोगिता शुक्रवार, 18 अक्टूबर 2024 को 1300 बजे से 1800 बजे तक आयोजित की गई। इसमें पूरे गुजरात राज्य से 21 संगठनों से 59 सदस्यों ने भाग लिया।

Physical Research Laboratory, Ahmedabad organized Gujarat State Level Hindi Competition "Shabd Manthan- Prashna Manjari-2024" for the year 2024. Employees from various Central Government offices across the state of Gujarat participated in this competition. This competition was held on Friday, 18 October 2024 from 1300 hrs to 1800 hrs. 59 members from 21 organizations from all over the state of Gujarat participated in it.

क्रमांक) कार्यालय का नाम

- नेशनल इस्टीट्यूट ऑफ डिजाइन, अहमदाबाद National Institute of Design, Ahmedabad 1
- ओएनजीसी कैम्बें ONGC Cambay 2
- अंतरिक्ष उपयोग केंद्र, अहमदाबाद Space Applications Centre, Ahmedabad 3
- पीएम श्री स्कूल जवाहर नवोदय विद्यालय अहमदाबाद PM Shri School Jawahar Navodaya Vidyalaya Ahmedabad 4
- ईपीएफओ, क्षेत्रीय कार्यालय, नरोडा EPFO, Regional Office, Naroda 5
- पीएमश्री जवाहर नवोदय विद्यालय ,वडनगर, मेहसाणा 6 PM Shri Jawahar Navodaya Vidyalaya, Vadnagar, Mehsana
- केंद्रीय भंडारण निगम Central Warehousing Corporation 7
- मंडल रेल प्रबंधक कार्यालय, अहमदाबाद Divisional Railway Manager Office, Ahmedabad 8
- वित्त एवं संचार लेखापरीक्षा कार्यालय, अहमदाबाद Finance & Communication Audit Office, Ahmedabad 9
- कर्मचारी राज्य बीमा निगम (ईएसआईसी), क्षेत्रीय कार्यालय अहमदाबाद 10 Employees State Insurance Corporation (ESIC), Regional Office Ahmedabad
- केंद्रीय प्रशासनिक अधिकरण, अहमदाबाद Central Administrative Tribunal, Ahmedabad
- 11 हिंदुस्तान पैट्रोलियम कार्पोरेशन लिमिटेड, अहमदाबाद Hindustan Petroleum Corporation Limited, Ahmedabad 12
- कृषक भारती सहकारी लिमिटेड, सूरत Krishak Bharati Sahakari Limited, Surat 13
- केंद्रीय माल व सेवा कर एवं उत्पाद शुल्क, अपील आयुक्तालय, सूरत 14
- Central Goods & Services Tax & Excise, Appellate Commissionerate, Surat
- महानिदेशक लेखापरीक्षा (केन्द्रीय) अहमदाबाद Director General of Audit (Central) Ahmedabad 15
- दि न्यू इंडिया एश्योरेंस कंपनी लिमिटेड, अहमदाबाद 16
- The New India Assurance Company Limited, Ahmedabad
- पासपोर्ट कार्यालय, सूरत Passport Office, Surat 17
- मौसम केंद्र अहमदाबाद Meteorological Centre Ahmedabad 18
- बैंक ऑफ़ इंडिया (वडोदरा अंचल) Bank of India (Vadodara Zone) 19
- भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद Physical Research Laboratory, Ahmedabad 20
- काकरापार गुजरात स्थल, परमाणु ऊर्जा स्टेशन Kakrapar Gujarat Site, Nuclear Power Station 21



प्रतियोगिता की शुरूआत प्रो. अनिल भारद्वाज, निदेशक, पीआरएल के संबोधन से हुई। प्रथम चरण में तीन चक्र रखे गए 1. वर्ग पहेली 2. स्मृति कौशल 3. प्रश्न उत्तर ओएमआर शीट पर तथा प्रथम चरण के बाद दूसरे चरण के लिए अंतिम 9 टीम्स को चुना गया। उसके बाद दूसरे चरण में 1. प्रश्न उत्तर 2. ड्म शराड्स 3. गाना पहचानो 4. फिल्मी डायलॉग आदि प्रकार के चक्र थे। इस प्रतियोगिता को मनोरंजक करने के लिए दर्शकों के लिए भी प्रश्न रखे गए थे। सभी प्रतिभागियो ने बड़े ही उत्साह से प्रतियोगिता का आनंद लिया। सभी ने प्रतियोगिता के अंत में अपने विचार रखे एवं सभी ने दोबारा पीआरएल आने की तथा भविष्य में भी ऐसे आयोजन करवाते रहने की इच्छा व्यक्त की। वे पीआरएल के ऐतिहासिक परिचय से भी भाव–विभोर हुए। प्रो. अनिल भारद्वाज, निदेशक पीआरएल ने सभी विजेताओं को ट्रॉफी, मैडल एवं मैग्नेट देकर उनका सम्मान किया। उपरोक्त प्रतिभागियों में से निम्नलिखित कार्यालयों नें द्वारा प्रथम, द्वितीय, तृतीय के साथ–साथ दो सांत्वना पुरस्कार प्राप्त किए–

The competition started with the address of Prof. Anil Bhardwaj, Director, PRL. In the first phase, three rounds were held 1. Crossword 2. Memory Skills 3. Question Answer on OMR Sheet and after the first round, final 9 teams were selected for the second round. After that, in the second round, there were rounds like 1. Question Answer 2. Dumb Charades 3. Identify the Song 4. Filmy Dialogue etc. Questions were also there for the audience to make this competition entertaining. All the participants enjoyed the competition with great enthusiasm. Everyone expressed their views at the end of the competition and everyone expressed their desire to come to PRL again and requested to organize such events in future as well. They were also overwhelmed by the historical legacy of PRL. Prof. Anil Bhardwaj, Director PRL honored all the winners by giving them trophies, medals, and magnets. Among the above participants, the following offices received first, second, third as well as two consolation prizes-

स्थान कार्यालय का नाम

प्रथम अंतरिक्ष उपयोग केंद्र, अहमदाबाद द्वितीय पीएम श्री स्कूल जवाहर नवोदय विद्यालय, अहमदाबाद तृतीय कृषक भारती सहकारी लिमिटेड, सूरत सांत्वना ओएनजीसी कैम्बे सांत्वना केंद्रीय माल व सेवा कर एवं उत्पाद शुल्क, अपील आयुक्तालय, सूरत

अंत में धन्यवाद ज्ञापन के साथ कार्याक्रम का औपचारिक समापन हुआ। The programme ended with vote of thanks.

कार्यक्रम की कुछ झलकियाँ Glimpses of the event:













## Garba celebration at PRL-2024

Garba Night was celebrated in PRL on 19.10.2024. Almost 700 participated in the colourful, vibrant celebration bringing together teams for an evening of traditional music, dance, and cultural festivities. The venue was transformed into an arena of colourful attire, rhythmic beats, and energetic dance circles. All were embraced in the spirit of Navratri, showcasing their best moves and fostering team spirit. A key highlight of this year's Garba Night was the introduction of the inaugural Inter-Division Garba competition. Ten divisions competed, each bringing their unique style and enthusiasm to the dance floor. The competition was fierce yet friendly, with teams displaying creativity, coordination, and passion in their performances. After an evening of spirited performances, the Purchase and Stores Division emerged victorious, captivating the judges with their impressive Garba moves and synchronized performance. The runner-up positions were awarded to the Admin+Accounts Division, and also, Director's Office+ Dean's Office+ Registrar's Office.

Glimpses of the Garba Celebration:





## PRL Ka Amrut Vyakhyaan - 97



The 97th PRL Ka Amrut Vyakhyaan was delivered by Prof. Narinder Mehra (Honorary Emeritus scientist, ICMR, Former Dean and National chair of All India Institute of Medical Sciences, New Delhi,

Vice President (International Affairs), INSA) on 21st October 2024. He delivered the Vyakhyaan on the topic of climate change and antimicrobial resistance, titled "The twin crises of climate change and antimicrobial resistance: impact on health".

Antimicrobial resistance (AMR) is when microorganisms, like bacteria, viruses, fungi, and parasites, evolve to no longer respond to medicines used to treat infections and diseases. Due to which, treatment and management of common infections has become challenging. During the Vakhayyan, Prof. Mehra, introduced various challenges for human health for the next 50 years, including climate change, environmental pollution and antimicrobial resistance. He emphasised that climate change and antimicrobial resistance is a intertwined deadly combination for human health. He highlighted that research suggests AMR could cause 40 million deaths by 2050, thus understanding and evolution of climate change and antimicrobial resistance is essential to design the preventive measures and policies. He talked about the global risk landscapes and polycriss factors issued by the world health forum and BRICS science academy, that are fatal for sustainable life. He then emphasised that human health is the composite effect of soil health, animal health, plant health, air quality and water quality, thus all these factors should be addressed in one health framework. And then discussed the joint action plans that have been considered by India as well as other countries to prompt one health concept. He also emphasised that studies have found in India the average life expectancy is reduced by 5 years due to air pollution. He discussed various acts introduced by various countries for reducing air pollution and also how they have managed to reduce air pollution significantly. He then talked about India's clean air plans launched in January, 2019 to reduce particulate pollution level by 40% by 2025-26 and what we have achieved so far. He also discussed how artificial intelligence can impact the health sector, in particular its advantage in catching deadly diseases at their pre stages by analyzing health related data and images. Towards the end of the Vyakhyaan, he discussed about the United Nations 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries in a global partnership to address the global challenges, including climate change and environmental degradation. Also discussed the road map to Viksit Varat by the Government of India and the new Bio-E3 policy, i.e the biotechnology for economy, environment and employment. He urged that people should join hands with the governments for a better life and sustainable world. His talk was illuminating on many aspects of human health and the role of the environment on it.

YouTube Link: https://www.youtube.com/live/wuLgkE-AT1g





## PRL Amrut Rajbhasha Vyakhyaan - 17





"पीआरएल अमृत राजभाषा व्याख्यान (पर्व)" का 17वां व्याख्यान 23 अक्टूबर, 2024 को के.आर. रामनाथन सभागार में ऑफ़लाइन मोड में आयोजित किया गया था।। इस अवसर की प्रख्यात वक्ता सुश्री नुपूर बीरेनभाई ओझा, क्लिनिकल मनोवैज्ञानिक, जीआईपीएस अस्पताल, अहमदाबाद थीं।

The 17th lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on October 23, 2024 at K.R. Ramanathan Auditorium in offline mode. The eminent speaker for the occasion was Ms. Nupoor Birenbhai Ojha, Clinical Psychologist, GIPS Hospital, Ahmedabad.

सुश्री नुपूर बीरेनभाई ओझा ने बड़ौदा के महाराजा सयाजीराव विश्वविद्यालय से क्लिनिकल मनोविज्ञान में मास्टर डिग्री प्राप्त की है। वह विगत दो वर्षों से GIPS अस्पताल में मनोवैज्ञानिक के रूप में सेवा दे रही हैं। जीआईपीएस अस्पताल में अपने क्लिनिकल अनुभव के दौरान, नुपूर ओजा ने एक सहानुभूतिपूर्ण और व्यक्ति–केंद्रित दृष्टिकोण अपनाया है। अपनी विशेषज्ञता और अनुभव के साथ, वह व्यक्तिगत, पारिवारिक और सामूहिक सत्रों के माध्यम से रोगियों को मानसिक स्वास्थ्य सेवाएं प्रदान करती हैं।

Ms. Nupoor Birenbhai Ojha holds a Master degree in Clinical Psychology from Maharaja Sayajirao University of Baroda. She has been serving as a Psychologist in GIPS Hospital for last two years. Throughout her clinical experience at GIPS Hospital, Nupoor Ojha has adopted an empathetic and person-centered approach. With her expertise and experience, she provides mental health services to patients through individual, family and group sessions.

व्याख्यान का शीर्षक था "कार्यस्थल पर भावनाओं का संयम एवं समन्वय"/ The Vyakhyaan was titled "Managing emotions at workplace"।

व्याख्यान के दौरान सुश्री ओझा. समझाया कि भावनाएँ हमारे पेशेवर जीवन को आकार देने में महत्वपूर्ण भूमिका निभाती हैं। खुशी और कृतज्ञता जैसी सकारात्मक भावनाएं उत्पादकता, रचनात्मकता और नौकरी से संतुष्टि बढ़ा सकती हैं। इसके विपरीत, क्रोध और हताशा जैसी नकारात्मक भावनाएं प्रदर्शन में बाधा डाल सकती हैं, रिश्तों को नुकसान पहुंचा सकती हैं और तनाव का कारण बन सकती हैं। कार्यस्थल पर सफलता के लिए भावनाओं का प्रभावी प्रबंधन आवश्यक है।

During the Vyakhyaan, Ms. Ojha. explained that emotions play an important role in shaping our professional lives. Positive emotions like happiness and gratitude can increase productivity, creativity, and job satisfaction. On the contrary, negative emotions such as anger and frustration can hinder performance, damage relationships, and cause stress. Effective management of emotions is essential to succeed in the workplace.

उन्होंने आगे कहा कि माइंडफुलनेस, ध्यान और तनाव प्रबंधन तकनीक जैसी रणनीतियाँ व्यक्तियों को अपनी भावनाओं को नियंत्रित करने और अधिक लचीलेपन के साथ चुनौतीपूर्ण परिस्थितियों का सामना करने में मदद कर सकती हैं।

She further added that the strategies such as mindfulness, meditation, and stress management techniques can help individuals regulate their emotions and face challenging situations with more resilience.



प्रस्तुति के बाद, एक इंटरैक्टिव प्रश्नोत्तर सत्र हुआ जिसने दर्शकों को विषय के बारे में नए दृष्टिकोण और अतिरिक्त विवरण दिए। Following the presentation, there was an interactive Q&A session that gave the audience new perspectives and additional details about the topic.







Glimpses from the event



## CNIT Division Nukkad – Chai Pe Byte on "Know Your Computer (KYC) -1

The 6th CNIT Division Nukkad – Chai Pe Byte on Know Your Computer (KYC)-1 was held on 23.10.2024 in hybrid mode. 44 participants attended the session. In the session, 80% discussion was in Hindi and 20% discussion was in the English.

The event was also part of various activities to be undertaken during the Vigilance campaign pe-riod (16th August 2024-15th November 2024) as a precursor to Vigilance Awareness Week-2024, based on Department of Space (DOS) and Central Vigilance Commission (CVC) instruc-tions/guidelines.

The main objective of the initiative "Chai Pe Byte" is to share the experiences & knowledge, un-derstand users' IT related problems, find their possible solution and strengthen the overall bonding between CNIT Division and PRL colleagues, which in turn will improve the overall func-tioning of PRL IT services/ facilities.

Mr. Tejas Sarvaiya, Sci/Engineer-SF welcomed all the participants and gave the overview of the session. Dr. Namit Mahajan, Professor welcomed all participants and briefed on Vigilance Awareness Week and Cyber Security aspects. Mr. Tejas Sarvaiya presented the overall defense-in-depth approach taken by CNIT to secure the PRL IT infrastructure.

Mr. Girish Padia, Sci/Engineer-SD delivered the talk on Know Your Computer (KYC)-1 with live demonstration on how user can secure their PC/Laptop having Windows 11 OS and improve the performance. Mr. Girish highlighted the importance of talking small yet significant measures to safeguard our PC/Laptop and emphasized how these incremental steps can collectively improve cyber security postures. There were multiple questions/doubts raised by the participants. Fol-lowing is the overall outcome of the session.

1. User awareness is very important to secure the devices.

2. User shall enable Two Factor Authentication on all the supported application.

3. Periodically, user shall review their PC/Laptop installed software/application and uninstall the unused software/application.

4. Periodically, user shall check OS Updates, Antivirus updates and if there is any issue, they should report to CNIT division.

5. User shall secure not only their office PC/Laptop but shall also secure their home PC/Laptop, Mobile and Smart Appliances (TV, Microwave, Air Conditioners etc.).

6. User should be very careful while sharing their personal information.

The session proved highly beneficial, providing users with actionable tips to strengthen PC secu-rity and improve performance. The attendees overwhelmingly expressed gratitude for the valu-able insights and commanded the CNIT division's innovative "CNIT Nukkad – Chai Pe Byte" initi-ative. CNIT team thank all the PRL users for their cooperation and help.

The detailed report of the session is available on CNIT Division Website, accessible within PRL LAN. URL: https://www.prl.res.in/prl-eng/cc/intranet/chaipebyte.









Glimpses from the event

The Spectrum – November, December 2024



#### **Outreach Activities at USO-PRL**



## 1. Visit of research students from MNIT, Jaipur

Research students (M.Tech and Ph.D) along with a faculty member Dr. Ravi kumar Maddila from Department of Electronics and Communication Engineering, Malviya National Institute of Technology, Jaipur (MNIT) visited Udaipur Solar Observatory on 25/10/2024. A talk on "Enigmatic Sun" was given by Mr. Satyam Agarwal (PDF) to introduce the visitors to Sun, Solar observations and observational facilities at USO. They have visited different observational facilities at the observatory and interacted with scientists at USO. Prof. Nandita Srivastava briefed about the Respond program of ISRO to MNIT faculty and researchers and how they can participate in the program for collaborative research.



#### 2. Visit of students from Gurunanak Girl's P.G. College, Udaipur

35 Students (B. Sc.) along with faculty members from Department of Physics, Gurunanak Girl's P.G. college Udaipur visited Udaipur Solar Observatory on 22/11/2024. A talk on "The Sun – Daytime Star" was given by Mr. Ravi Chaurasiya (SRF) to introduce the visitors to Sun, Solar activity, and observational facilities at USO. They have visited different observational facilities at the observatory and interacted with scientists at USO.

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## **Vigilance Awareness Week 2024**

The Vigilance Awareness Week (VAW) 2024 was observed at PRL from 28th October 2024 to 3rd November 2024, in line with the Circular issued by the Central Vigilance Commission (CVC) and the endorsement from the Department of Space (DOS). The theme for this year's observance was "सत्यनिष्ठा की संस्कृति से राष्ट्र की समृद्धी" / "Culture of Integrity for Nation's Prosperity."

As part of the observance, all PRL staff members took the Integrity Pledge at their respective workplaces on 28th October 2024. In addition to the offline Integrity Pledge, staff members were encouraged to take the Integrity e-Pledge through the CVC portal (https://pledge.cvc.nic.in), with a total of 72 staff members completing the e-pledge. Additionally, PRL as an organization also took the Integrity e-Pledge, and the certificate received has been shared below.

An offline essay writing competition was held on 12th November 2024 as part of VAW-2024, with 17 participants from all PRL campuses taking part. The winners of this competition will be recognized during the Republic Day celebrations on 26th January 2025.

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VAW 2024 के दौरान पीआरएल स्टाफ सदस्यों द्वारा ली गई सतर्कता जागरूकता शपथ Vigilance Awareness Pledge undertaken by PRL staff members during VAW 2024

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#### One-day Lab visit of students from GUJCOST under GujSAC BHAVIKA program

The Gujarat Council on Science and Technology (GUJCOST), Department of Science & Technology, Government of Gujarat, conducted GujSAC BHAVIKA (Gujarat SAC BHAvi Valgnanik KAryakram) in collaboration with the Space Applications Centre (SAC) Ahmedabad. This program was organised from 16th to 23rd November – 2024, for the students of 9th to 12th class standards, aiming to inspire the next generation of space scientists and engineers from Gujarat. In this program, a total of 90 students (30 girls and 60 boys) and 10 teachers from 33 districts across the Gujarat participated.

A one-day Lab visit of these students and teachers was arranged at PRL Thaltej campus on 22nd November, 2024. In this visit, students and teachers interacted with the PRL scientists. The following lab visits / instrument displays were arranged for the students: 1) Astrochemistry & Astrobiology Lab, 2) Accelerator Mass Spectrometer (AMS), 3) APXS & XSM payloads, 4) ASPEX payload (SWIS + STEPS), 5) Solar telescope along with Solar spectrum, and 6) Thaltej mechanical workshop. All the students under GujSAC BHAVIKA program were excited after seeing the labs and work being carried out at PRL. Some of the glimpses of the events are as follow:

![](_page_26_Picture_4.jpeg)

![](_page_26_Picture_5.jpeg)

![](_page_27_Picture_0.jpeg)

![](_page_27_Picture_1.jpeg)

![](_page_27_Picture_2.jpeg)

![](_page_28_Picture_0.jpeg)

![](_page_28_Picture_1.jpeg)

## PRL Ka Amrut Vyakhyaan - 98

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On November 20, 2024, Professor Hisayoshi Yurimoto (Distinguished Professor in the Department of Earth and Planetary Systems at Hokkaido University, Japan), delivered the 98th PRL ka Amrut Vyakhyaan. Professor Yurimoto is a distinguished cosmochemist and planetary scientist with vast experince in analyzing various planetary materials and leading several sample return missions.

During his Amrut Vyakhyaan, titled "Asteroid Sample Return," Professor Yurimoto emphasized the critical role of sample return missions in advancing our understanding of the solar system's formation and evolution. He highlighted the valuable insights gained from the JAXA missions, Hayabusa-1 and Hayabusa-2, which successfully collected samples from the asteroids Itokawa and Ryugu, respectively, backed with mineralogical, elemental and isotopic evidences.

He highlighted the distinct formation and evolutionary history of the two asteroids, Itokawa and Ryugu, both originating approximately 4.6 billion years ago. Asteroid Itokawa, classified as an S-type asteroid, provides evidences close to LL-type ordinary chondrites which has experienced significant thermal metamorphism. Temperatures reaching up to 800°C, likely are driven by the decay of short-lived radionuclides such as 26AI, supported by oxygen isotope thermometry and 26AI-derived chronologies. Finally, a major impact event, occurring approximately 1.6 billion years ago, severely disrupted the parent body, resulting in the formation of the current 0.5-kilometer-sized rubble pile asteroid. Whereas, Ryugu which is classified as a Ctype asteroid, (characteristic of carbonaceous bodies) with enrichment in neutron isotope of heavy elements places Ryugu in a region of the Solar System isotope dichotomy plot consistent with CI-type meteorites, suggesting a primitive origin. It also displays evidence of aqueous alteration, with the presence of minerals such as magnetite and dolomite. Oxygen isotopic compositions and Mn-Cr analyses indicate these minerals formed from aqueous fluids at temperatures around 40°C, likely resulting from the internal heating and melting of ice within the parent body. Ryugu also exhibits a bimodal distribution of oxygen isotopes, consistent with a mixture of high-temperature (e.g., olivines) and low-temperature minerals. Interestingly, isotopic signatures of 54Fe and 50Ti for Ryugu minerals lie along with that of CI chondrites and comet Wild 2, suggesting the parent body accreted/originated in the outer regions of the protoplanetary disk, potentially within the cometary formation zone. In conclusion, Itokawa, likely accreted within the non-carbonaceous zone of the Solar System, demonstrates an evolutionary history primarily characterized by thermal metamorphism. Conversely, Ryugu, formed within the cometary region, exhibits evidence of extensive aqueous alteration. These contrasting evolutionary pathways serve to emphasize the diverse origins and subsequent histories of asteroids within our Solar System.

Professor Yurimoto concluded the Vyakhyaan by expressing keen interest in ISRO's forthcoming Lunar sample return mission, Chandrayaan-4, and extended his sincere best wishes for its success.

![](_page_28_Picture_8.jpeg)

![](_page_28_Picture_9.jpeg)

![](_page_29_Picture_0.jpeg)

#### International Conference on "Meteoroid, Meteor and Meteorites: Messengers from Space: (MetMESS) 2024"

The Physical Research Laboratory (PRL), Ahmedabad, hosted the International Conference on "Meteoroids, Meteorites, and Messengers from Space" (MetMeSS-2024) from 20-22 November 2024. This in-person gathering convened international experts to present and discuss recent advancements in meteoritic and planetary science. The conference encompassed a broad spectrum of research areas, including meteor phenomena and space weathering, extraterrestrial organic molecules in the interstellar medium and meteorites, surface and subsurface processes on terrestrial planets and small bodies, astrochemistry, astrobiology, and terrestrial analogues. The conference commenced with a welcome address by Prof. Anil Bharadwaj, Director, PRL. Messages of support were conveyed by Shri A.S. Kirankumar, Chairman of the PRL Council of Management, followed by an inaugural video address presented by Dr S. Somanath, Secretary, Department of Space and Chairman, ISRO, highlighting the significance of planetary sciences and future missions. Notably, the conference addressed the increasing importance of laboratory analyses of planetary materials, particularly in the context of upcoming sample return missions such as the proposed Chandrayaan-4 lunar mission. This focus aimed to inform India's future strategic direction in planetary science and space exploration within the global scientific community.

![](_page_29_Picture_3.jpeg)

Group photo of participants : Pre-Conference Karyashala

![](_page_30_Picture_0.jpeg)

![](_page_30_Picture_1.jpeg)

Glimpses of the event at K.R. Ramanathan Auditorium, Navrangpura campus, PRL

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Group photo of the participants

![](_page_31_Picture_0.jpeg)

MetMeSS-2024 served as a vital platform for fostering interest and creating opportunities for emerging researchers in meteoritics. The conference facilitated interaction between PhD candidates, postdoctoral fellows, early-career scientists, and graduate students with established planetary scientists from India and abroad over its seven sessions. Approximately 90 scientific papers were presented at the conference, which was attended by 140 participants from diverse fields within planetary science. Keynote presentations included a plenary talk by Prof. Hisayoshi Yurimoto on asteroid sample return missions (Hayabusa 1 & 2) and sessions were dedicated to diverse topics such as stardust, astrochemistry and astrobiology, differentiated planetary bodies, meteor and space weathering, impact processes, planetary surface and subsurface characteristics, and analogue studies. These sessions, featuring invited talks and contributed presentations, stimulated extensive scientific discourse and promoted collaboration within the field. The conference successfully provided a crucial forum for disseminating cutting-edge research and fostering the next generation of planetary scientists. Several students were felicitated with young researcher awards in recognition of their scientific research presented in the form of an oral talk or poster presentation. A two-day (19-20 November) pre-conference workshop (Karyashala) was conducted as an outreach activity to introduce postgraduate and PhD students to laboratory analytical methods and instrumentation. The conference concluded with a post-conference field trip to the Kutch region of Gujarat, a terrestrial Martian analogue site, led by renowned scientists. This immersive experience gave young researchers valuable insights into field research methodologies and the practical application of planetary science concepts.

![](_page_31_Picture_2.jpeg)

A moment during the field trip at Rann of Kutch, Gujarat, India

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## PRL Amrut Rajbhasha Vyakhyaan - 18

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"पीआरएल अमृत राजभाषा व्याकरण (पर्व)" का 18वां व्याख्यान 25 नवंबर, 2024 को आयोजित किया गया था। इस अवसर के प्रख्यात वक्ता डॉ. जितेंद्र शर्मा, निदेशक, पंडित दीनदयाल उपाध्याय राष्ट्रीय शारीरिक दिव्यांगजन संस्थान, नई दिल्ली थे।

The 18th lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on November 25, 2024. The eminent speaker for the occasion was Dr. Jitendra Sharma, Director, Pandit Deendayal Upadhyaya National Institute for Persons with Physical Disabilities, New Delhi.

डॉ.जितेंद्र शर्मा शिक्षा से स्पोर्ट फिजियोथेरेपिस्ट और सार्वजनिक स्वास्थ्य विशेषज्ञ हैं। डॉ. शर्मा वर्तमान में भारत सरकार के सामाजिक न्याय और अधिकारिता मंत्रालय के तहत दो राष्ट्रीय संस्थानों के प्रमुख हैं, (1) पंडित दीनदयाल राष्ट्रीय शारीरिक दिव्यांगजन संस्थान (नई दिल्ली) 01.09.2023 से अब तक और (2) भारतीय सांकेतिक भाषा अनुसंधान एवं प्रशिक्षण केंद्र, नई दिल्ली 20.08.2024 से अब तक। उनके पास 25 वर्षों से अधिक का शिक्षण और नैदानिक अनुभव है। वह इंडियन एसोसिएशन ऑफ फिजियोथेरेपिस्ट की पंजाब शाखा के पूर्व अध्यक्ष (दो कार्यकाल) हैं। वह आयरिश सरकार फ़ेलोशिप (2000) के प्राप्तकर्ता और कॉमनवेल्थ स्कॉलरशिप (2015) के लिए नामांकित हो चुके है |

Dr. Jitendra Sharma is a Sports Physiotherapist and Public Health Specialist by education. Dr. Sharma is presently the head of two national institutes under the Ministry of Social Justice and Empowerment, Government of India, (1) Pandit Deendayal Upadhyaya National Institute for Persons with Physical Disabilities from 01.09.2023 till now and (2) Indian Sign Language Research and Training Centre, New Delhi from 20.08.2024 till now. He has over 25 years of teaching and clinical experience. He is a former President (two terms) of the Punjab Branch of the Indian Association of Physiotherapists. He is a recipient of the Irish Government Fellowship (2000) and a nominee for the Commonwealth Scholarship (2015).

व्याख्यान का शीर्षक था /The vyakhyaan was titled "शारीरिक दिव्यांगता के क्षेत्र में राष्ट्रीय संस्थानों की भूमिका"

भारत सरकार के दिव्यांगजन सशक्तिकरण विभाग का ध्येय देश की दिव्यांग आबादी की दिव्यांगता के प्रभाव को न्यूनतम करके के साथ–साथ उनका अधिकतम पुनर्वास करके उन्हें विकास की मुख्य धारा से जोड़ना है। इस ध्येय की पूर्ति के लिए, विभाग देशभर के अलग–अलग क्षेत्र में स्थापित राष्ट्रीय संस्थानों और एकीकृत क्षेत्रीय केंद्रों के माध्यम से दिव्यांगजनों और सामान्य आबादी को चिकित्सा एवं पुनर्वास सेवाएं प्रदान करता है।

During the Vyakhyaan, Dr. Sharma briefed about the various type of disabilities. He further informed that, The Department of Empowerment of Persons with Disabilities, Government of India aims to integrate the disabled population of the country with the mainstream of development by minimizing the impact of disability as well as by rehabilitating them to the maximum extent. To achieve this objective, the Department provides medical and rehabilitation services to the disabled and the general population through national institutes and integrated regional centers established in different parts of the country.

![](_page_33_Picture_0.jpeg)

उन्होंने आगे बताया कि विभाग के अंतर्गत दिल्ली, कोलकाता और कटक में संचालित नेशनल इंस्टीट्यूट फॉर लोकोमोटर डिसेबिलिटी, देहरादून में स्थित नेशनल इंस्टीट्यूट फॉर विजुअल डिसेबिलिटी, मुंबई में स्थित नेशनल इंस्टीट्यूट फॉर वॉकिंग एंड हियरिंग डिसेबिलिटी, सिकंदराबाद में स्थित नेशनल इंस्टीट्यूट फॉर मेंटल डिसेबिलिटी और चेन्नई में स्थित राष्ट्रीय बहुदिव्यांगता जन सशक्तिकरण संस्थान, दिव्यांगता के क्षेत्र में चिकित्सा एवं पुनर्वास सेवाएं प्रदान कर रहे हैं। इसके अतिरिक्त विभाग के अंतर्गत हाल ही में मानसिक पुनर्वास सेवाएं उपलब्ध कराने के लिए एक राष्ट्रीय संस्थान मध्य प्रदेश के सीहोर में स्थापित किया गया है।

He further added that under the department, the National Institute for Locomotor Disability operating in Delhi, Kolkata and Cuttack, the National Institute for Visual Disability located in Dehradun, the National Institute for Walking and Hearing Disability located in Mumbai, the National Institute for Mental Disability located in Secunderabad and the National Institute for Empowerment of Persons with Multiple Disabilities located in Chennai are providing medical and rehabilitation services in the field of multiple disabilities. Apart from this, a national institute for providing mental rehabilitation services has recently been established under the Department at Sehore in Madhya Pradesh.

प्रस्तुति के बाद, एक इंटरैक्टिव प्रश्नोत्तर सत्र हुआ जिसने दर्शकों को विषय के बारे में नए दृष्टिकोण और अतिरिक्त विवरण दिए। Following the presentation, there was an interactive Q&A session that gave the audience new perspectives and additional details about the topic.

![](_page_33_Picture_4.jpeg)

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#### ISRO Structured Training Program 2024 @ PRL, Ahmedabad

The ISRO Structured Training Program (ISRO-STP) 2024, held from 25.11.2024 to 29.11.2024, at the Physical Research Laboratory (PRL) in Ahmedabad, focused on the theme "Multi-Wavelength Astronomy with Ground- and Space-based Facilities."

The training programme was attended by 38 participants from 15 different DOS/ISRO centers, all nominated by their respective centers. The program was designed to provide participants, regardless of their specific work areas, with a comprehensive understanding of multi-wavelength astronomy. The training featured a series of lectures covering a broad spectrum of ground- and space-based astronomy, including optical, infrared, submillimetre, meter, ultraviolet, and X-ray wavelengths. PRL experts from various domains also provided insights into topics such as solar eruptive phenomena, space weather, planetary exploration, and sample return missions. Hands-on experience was facilitated through eight different group studies which provided deeper understanding of a few selected topics to the smaller groups.

As part of the ISRO Structured Training Program (ISRO-STP) 2024, participants had the opportunity to engage in both educational and cultural activities that complemented their training. On 26.11.2024, participants enjoyed an excursion to Sabarmati Ashram and Atal Bridge. On 27.11.2024, Prof. J. S. Ray delivered an extramural lecture titled "Isotopes as Time Capsules: Unlocking the Evolution of Earth's Interior" enriching the participants' learning experience.

The program concluded on 29.11.2024 with a visit to PRL's Infrared Observatory at Mount Abu, Rajasthan, where the participants explored the operation of the 1.2m and 2.5m telescopes and also visited the Dilwara Temple, making the experience both educational and memorable. Overall, all the participants greatly enjoyed this training program and provided a very positive feedback.

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#### Industry Meet-2024

Physical Research Laboratory, Ahmedabad organised an industry meet on 28 November 2024 in which 35 companies and their 60 delegates participated from various places of the country. The event brought together PRL scientists, industry professionals, and innovators to explore the latest trends, challenges, and opportunities within the fundamental scientific research and its industrial applications. The event featured keynote talks, group discussions, and networking opportunities, offering attendees valuable insights into specific topics like Analytical techniques, Space technology and electronics, Optics and LASER and Computation analytics. Various group discussions addressed by PRL scientists offered diverse perspective on key points. The exhibits showcased cutting-edge products, services, and solutions from leading companies in the industry, with live demonstrations and products. The industry meet was a successful event that provided invaluable learning experiences and networking opportunities. Attendees left with a deeper understanding of research trends and actionable insights that will shape their strategies moving forward. The event underscored the importance of innovation and collaboration in driving the future of research industry collaboration.

![](_page_35_Picture_3.jpeg)

Glimpses from the event

![](_page_36_Picture_0.jpeg)

#### Inter-Area Volleyball tournament - 2024

The volleyball tournament has a long history in the sporting culture of the Physical Research Laboratory (PRL) and it remains one of the most cherished and popular events. Continuing this proud tradition, PRL Inter-Area Volleyball Tournament 2024 was organized from 25 November to 05 December 2024, among six teams (i.e., ASTRO, AMOPH, GSDN, PSDN, SPASC, and THEPH + Admin) and showcased an exceptional display of hustle, fight, competition, and, most importantly, sportsmanship. The tournament was inaugurated by Prof. Anil Bhardwaj (Director, PRL) with a celebratory cake-cutting ceremony, followed by the Veterans Match between the Director's Team and the Dean's Team, which highlighted the volleyball skills of PRL veterans. The winner of the Veterans Match was Dean's Team.

After an intense 15 league matches filled with numerous nail-biting encounters, the top three teams advancing to the knockout stages were decided only on the final day of the league phase. The last league match between ASTRO and PSDN was one of the most dramatic moments of the tournament, with ASTRO winning by a slim 0.003-point ratio, clinching a spot in the eliminator against THEPH + Admin. SPASC secured the top position in the points table and qualified directly for the finals. Meanwhile, THEPH + Admin and ASTRO finished in second and third positions, respectively, setting up an eliminator clash between the two teams. THEPH + Admin won the eliminator, qualifying for the finals.

The highly anticipated final match of the tournament took place on 05 December 2024, featuring an electrifying clash between SPASC and THEPH + Admin. The event was graced by the presence of Prof. Anil Bhardwaj (Director, PRL), Prof. D. Pallamraju (Dean, PRL), and an enthusiastic crowd of PRL members, all gathered to witness the ultimate showdown. In the thrilling final match, SPASC won with a commanding 3-0 victory. With this win, SPASC clinched their third consecutive championship title, showcasing their absolute dominance throughout the tournament by not losing a single set. In the prize distribution, Director, PRL presented the Veteran, Referee, Runner-up, and Winner trophies and medals. Congratulations to all participants and winners, and we look forward to continuing to support their journeys towards success.

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## **PRL Monthly Publications Digest**

### October 2024

## Astronomy & Astrophysics Division [04]

1. Shrabani Kumar, G. C. Dewangan, P. Gandhi, I. E. Papadakis, N. P. S. Mithun, K. P. Singh, D. Bhattacharya, A. A. Zdziarski, G. C. Stewart, S. Bhattacharyya, and S. Chandra, 2024, Multi-epoch UV–X-Ray Spectral Study of NGC 4151 with AstroSat, The Astrophysical Journal, 975:73, Date of Publication: 25/10/2024, Impact Factor: 4.8

2. Sanjay Baliwal, Rishikesh Sharma, Abhijit Chakraborty, Akanksha Khandelwal, K.J. Nikitha, Boris S. Safonov, Ivan A. Strakhov, Marco Montalto, David W. Latham, Allyson Bieryla, Neelam J.S.S.V. Prasad, Kapil K. Bharadwaj, Kevikumar A. Lad, Ashirbad Nayak, 2024, Discovery and characterization of a dense sub-Saturn TOI-6651b, Astronomy & Astrophysics, Date of Publication: 25/10/2024, Impact Factor: 5.4

3. Birendra Chhotaray, Sachindra Naik, G. K. Jaisawal and Goldy Ahuja, 2024, Optical and X-ray studies of the Be/X-ray binary IGR J06074+2205, 2024, Monthly Notices of the Royal Astronomical Society, 534, 2830–2847, Date of Publication: 16/10/2024, Impact Factor: 4.8

4. Maity, A. K.; Inoue, T.; Fukui, Y.; Dewangan, Lokesh Kumar; Sano, H.; Yamada, R. I.; Tachihara, K.; Bhadari, N. K.; Jadhav, O. R. , 2024, Cloud-Cloud Collision: Formation of Hub-filament Systems and Associated Gas Kinematics. Mass-collecting Cone-A New Signature of Cloud-Cloud Collision, The Astrophysical Journal, Volume 974, Issue 2, id.229, 24 pp.; DOI: 10.3847/1538-4357/ad7098, Date of Publication: 15/10/2024, Impact Factor: 4.8

#### Space & Atmospheric Sciences Division [03]

1. Ruchita Shah, Som Sharma, Dharmendra Kumar Kamat, Kondapalli Niranjan Kumar, Prashant Kumar, Rohit Srivastava, 2024, Cloud characteristics and their role in the 2024 United Arab Emirates extreme rainfall events, Remote Sensing Letters, Date of Publication: 13/10/2024, Impact Factor: 1.4

2. G. Mitra, A. Guharay and I. Paulino , 2024, Signature of a zonally symmetric semidiurnal tide during major sudden stratospheric warmings and plausible mechanisms: a case study, Scientific Reports, Date of Publication: 11/10/2024, Impact Factor: 3.8

3. K. Rajagopal, S. Ramachandran and R.K. Mishra, 2024, Seasonal variation of particle number concentration in a busy urban street with exposure assessment and deposition in human respiratory tract, Chemosphere, Date of Publication: 08/10/2024, Impact Factor: 8.1

## Atomic, Molecular and Optical Physics [01]

1. Zhi-Ming Tang, Yuan-Fei Wei, B. K. Sahoo, Cheng-Bin Li, Yang Yang, Yaming Zou, and Xue-Ren Huang, 2024, Blackbody-radiation Zeeman shifts in optical clocks: The role of fine-structure intramanifold resonances, Phys. Rev. A 110, 043108 (2024); https://doi.org/10.1103/PhysRevA.110.043108, Date of Publication: 10/10/2024, Impact Factor: 3.0

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## **Geosciences Division** [02]

1. D'Souza Nishitha, Keshava Balakrishna, A.K. Sudheer, Gaddam Mahesh, 2024, Reconstructing the past environmental conditions of southwestern India using estuarine sediment core, Environmental Chemistry and Ecotoxicology, Date of Publication: 01/10/2024, Impact Factor: 9.0

2. Partha Sarathi Jena, Ravi Bhushan, Sanjit Kumar Jena, Shivam Ajay, A.K. Sudheer, 2024, Spatial variability in residence time of Beryllium in the Indian Ocean, Journal of Environmental Radioactivity, Date of Publication: 09/10/2024, Impact Factor: 1.9

#### November 2024

#### Astronomy & Astrophysics Division [01]

1. Chattopadhyay S., Joshi V., Ramaprakash A. N., Modi D., Kohok A., Chung H., 2024, A new photolithography based technique to mass produce microlens+fibre based Integral field units (IFUs) for 2D spectroscopy, SPIE, Date of Publication: 06/11/2024, Impact Factor:

#### Planetary Sciences Division [01]

1. Sana Ahmed and Kinsuk Acharyya, 2024, The extent of formation of organic molecules in the comae of comets showing relatively high activity, Icarus, Date of Publication: 19/11/2024, Impact Factor:

#### Atomic, Molecular and Optical Physics [02]

1. Vardaan Mongia, Abhishek Kumar, Shashi Prabhakar, Anindya Banerji, R. P. Singh, 2024, Investigating device-independent quantum random number generation, Physics Letters A, Date of Publication: 28/11/2024, Impact Factor: 2.3

2. R. J. Wasson, A. L. Amaral, J. Rouwenhorst, K. Fifield, N. Chauhan, T. Pietsch, D. M. Alongi, F. Tirendi and A. K. Singhvi, 2024, Timor-Leste: preliminary assessment of a rapidly eroding landscape in the Coral Triangle, Marine and Freshwater Research, Date of Publication: 18/11/2024, Impact Factor: 1.8

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## Visitors

1. Mr. Rubin Luca Moreno of IONPLUS AG, Switzerland visited PRL, Ahmedabad during the period 11.11.2024 to 15.11.2024 in connection with Installation of Scientific Equipment "AGE3 & CHS 2 procured from IONPLUS AG and impart of training to the concerned staff.

2. Mr. Piduru Kiran from Markes International Limited, UK visited PRL, Ahmedabad on 15.11.2024 in connection with discussions on Scientific equipment and performance analysis of TD and airsever supplied by Markes International Ltd.

3. Prof. Hisayoshi Yurimoto from Isotope Imaging Laboratory, Hokkaido University, Japan has visited PRL from 18.11.2024 to 25.11.2024 in connection with attending MetMeSS 2024 conference.

4. Ms. Werner Stephanie Christine from The University of Oslo, Noway has visited PRL from 18.11.2024 to 25.11.2024 in connection with attending MetMeSS 2024 conference.

5. The following foreign nationals have visited PRL, Ahmedabad during the period from 19.11.2024 to 25.11.2024 for attending the MetMeSS 2024 Conference:-

- o Mr. Mason Nigel John from University of Kent, UK
- o Mr. Mahesh Anand from School of Physical Sciences, UK
- o Ms. Milijkovic Katarina from School of Earth & Planetary Science, Australia
- o Mr. Adrien M Darwin Vuillaume from CAMECA SAS, France

6. The following foreign nationals from Space Research Centre, Polish Academy of Sciences, Wroclaw, Poland have visited Udaipur Solar Observatory, Udaipur from 23.11.2024 to 25.11.2024 and PRL, Ahmedabad from 26.11.2024 to 28.11.2024 in connection with Scientific discussion on ongoing observational programme on Solar Physics: -

o Ms. Anna Jadwiga Kepa

- o Mr. Tomasz Maciej Mrozek
- o Mr. Marek Jerzy Steslicki

7. Dr. Bhupal Dev from Washington University, USA visited PRL, Ahmedabad during 23.11.2024 to 30.11.2024 for collaborative research work in Theoretical Physics Division and to deliver two seminars.

8. "On 29.11.2024, Ms. Shruti Bhatporia, Ph.D. candidate at the University of Cape Town, South Africa, visited the Udaipur Solar Observatory, Udaipur, to deliver a talk at the USO Divisional Seminar on the topic 'Fast Radio Bursts: A Recent Discovery in the Field of Transients.

9. On 22.11.2024, a group of 28 UG and PG students, along with 2 faculty members from Guru Nanak Girl's P.G. College, Udaipur, visited the Udaipur Solar Observatory for an educational trip.

10. During November 2024, the following have visited Infrared Observatory, PRL, Mount Abu:-

- o Additional Director General of Police from Madhya Pradesh Police
- o Thirty four (34) ISRO-STP 2024 participants and Five (5) STP Committee members
- o Seventeen (17) DOS/ISRO staff members,
- o Two (2) BARC/TIFR Employees,

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o Four (4) Defense personnel o A group of Seven (7) students o Fourteen (14) General Public

11. Prof. Narinder Mehra, Honorary Emeritus Scientist, ICMR, Former Dean and National Chair of All India Institute of Medical Sciences, New Delhi and Vice President (International Affairs), INSA visited PRL on 21.10.2024 to deliver talk in PRL Ka Amrut Vyakhyaan.

12. Dr. Debashis Banerjee, Saha Institute of Nuclear Physics, Kolkata visited PRL from 03.10.2024 to 04.10.2024 and delivered talks.

13. Mr. Ardamon Sten, Junior Research Fellow from Indian Institute of Technology, Kanpur visited PRL from 14.10.2024 to 25.10.2024 to work with Dr. Paramita Dutta, Assistant Professor of Theoretical Physical Division on a Project

14. Dr. Punit Chaturvedi, Assistant Professor, National Institute of Ayurveda, Ayush Ministry has visited PRL on 17.10.2024 for an interactive session on holistic health during the Swachhta hi Seva Campaign.

15. Dr. Sai Chaitanya Tadepalli, Indiana University, USA visited PRL on 22.10.2024 to deliver a talk.

16. Nine (9) students from various IITs, Fourteen (14) defense personnel and Fifteen (15) General Public have visited Infrared Observatory, Mount Abu during October 2024.

17. Dr. Rahul Yadav, Postdoctoral Fellow from Laboratory for Atmospheric and Space Physics, Boulder Colorado, USA visited Udaipur Solar Observatory, Udaipur on 04.10.2024 to deliver a talk.

18. Eight Post Graduate students, one Technical Staff and a faculty member from Malviya National Institute of Technology, Jaipur (Dept. of Electronics & Communication Engineering) have visited Udaipur Solar Observatory, Udaipur on 25.10.2024.

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## **Awards & Honours**

(1)**Prof. Abhijit Chakraborty**, Senior Professor, Astronomy & Astrophysics Division of PRL, has been elected as a **Fellow of NASI (The National Academy of Sciences, India)**.

(2)Dr. K. Durga Prasad, Sci./Eng.-SF, Planetary Sciences Division of PRL has been invited to serve as an external member of the Trans-Disciplinary Research Board (AU TDRHub) of Andhra University, Visakhapatnam.

(3)**Ms. Mansi Gupta**, Senior Research Fellow, Space & Atmospheric Sciences Division of PRL has won the **Best poster award in the 9th surface Ocean-Lower Atmosphere Study (SOLAS) Open Science Conference (OSC)** held at NIO, Goa during 10-14 November 2024.

(4)**Ms. Jyoti Limbat**, Senior Assistant at the Registrar's Office of PRL, participated in an **Essay writing competition at the** नगर राजभाषा कायाान्वयन सममति (नराकास) Level and won second prize.

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NAME: DR. UDIT KHANNA

**DESIGNATION: ASSISTANT PROFESSOR** 

**DATE OF JOINING:** 07.10.2024

**DIVISION:** THEORETICAL PHYSICS DIVISION

NAME: MR. SAMEER PATIDAR

**DESIGNATION: SCIENTIST/ENGINEER-SC** 

DATE OF JOINING: 17.10.2024

**DIVISION:** ATOMIC, MOLECULAR & OPTICAL PHYSICS DIVISION

NAME: MR. CHITRODA JAY HITESHKUMAR

**DESIGNATION: SCIENTIST/ENGINEER-SC** 

**DATE OF JOINING:** 17.10.2024

**DIVISION: ASTRONOMY & ASTROPHYSICS DIVISION** 

NAME: MR. BHAVESH RAJ SINGH NEHRA

**DESIGNATION: SCIENTIST/ENGINEER-SC** 

DATE OF JOINING: 17.10.2024

**DIVISION:** PLANETARY SCIENCE DIVISION

NAME: MR. ARUN

**DESIGNATION: SCIENTIST/ENGINEER-SC** 

**DATE OF JOINING**: 17.10.2024

**DIVISION:** SPACE & ATMOSPHERIC SCIENCES DIVISION

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## Obituary

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Late Shri Maganlal B. Kalal Cook-B		
Date of Birth	01.01.1950	
Date of Joining	01.10.1970	
Date of retirement	31.12.2009	
Date of Death	28.11.2024	

Teary Eyes<sup>,</sup> for our Departed Member

The Spectrum – November, December 2024

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# THE SPECTRUM

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#### **Cyber Security Awareness**

## Cyber Security Awareness – WhatsApp Security

Jigar Raval, Computer Networking & Information Technology Division

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Download WhatsApp only from the authorized stores. Never use any unknown link or unknown source to download it.

Never accept files or begin download from the messages sent to you from unknown numbers.

To block an unknown number, open that particular chat window go to more option and block.

Never send/share private information like bank account details, PINs or passwords through WhatsApp.

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Never respond to suspicious messages received from unknown numbers.

Deactivate/Delete WhatsApp Account if you lose your phone.

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UPDATE

Enable two-factor authentication, to ensure that nobody can set up your WhatsApp account without knowing the

Make sure cloud backups are OFF. They are not safe for any critical information when sharing with the cloud

Manage WhatsApp Web effectively, Ensure logout from all the computers/ devices after use.

Never trust message that claims to come from WhatsApp and demands payment for the service.

Restrict Access to Your Profile Photo, Status, Last Seen to your contacts list. OR Apply restriction suitably.

Enable Silence unknown callers to protect you from suspicious fraud calls going through and allow you to decide which

Always keep updated version of WhatsApp and keep Antivirus updated with the latest signature.

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The Spectrum – November, December 2024

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Mr. Abhishek Kumar	Member

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Website (Hindi)

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