

*Newsletter of the Physical Research Laboratory*

# THE SPECTRUM



## Image of the Month

*Participants of 2nd Winter School in Solar Physics at the  
Udaipur Solar Observatory*

*January 2025*

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## On the Influence of the Solar Wind on the Propagation of Earth-impacting Coronal Mass Ejections

(Sandeep Kumar, Nandita Srivastava, Nat Gopalswamy, and Ashutosh Dash)

### The Author

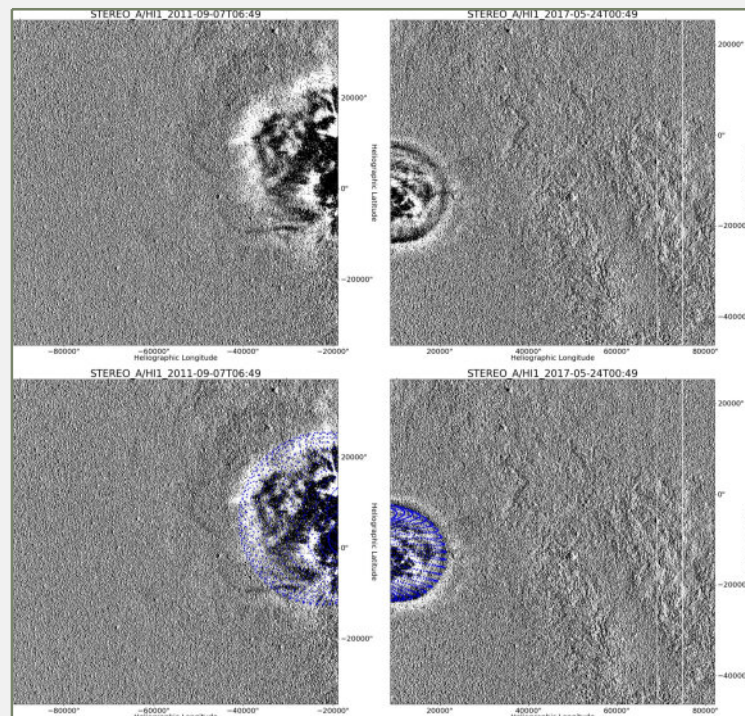


Sandeep Kumar

A study on heliospheric propagation of 15 Coronal Mass Ejections (CMEs) was carried out. About half of these events followed self-similar expansion up to  $40 R_{\odot}$ . The remaining events showed deflection in latitude, longitude, or a tilt change. Our study reveals that CME rotation is a rare phenomenon, as only two events showed significant rotation in the heliosphere. Although CME rotation is well observed phenomenon in the lower corona where the ambient magnetic field dominates, our detailed analysis shows that it requires conducive conditions of both the magnetic field and the background solar wind to favor a persistent rotation of the CME throughout the heliosphere. This is possible in the cases only where we are able to capture the total change in the orientation of the CME (i.e., tilt) by tracking them in the heliosphere over a large distance. Our study is unique as compared to earlier ones that focused on stereoscopic reconstruction of CMEs up to the LASCO/C3 FOV up to  $30 R_{\odot}$ . The results highlight the importance of Heliospheric Imager (HI) observations, which bridge the gap between the near Sun and in-situ measurement at L1 point, improving our understanding of how CMEs move through the heliosphere.

This work was carried out under the Indo-U.S. Science and Technology Forum (IUSSTF) Virtual Network Center project (Ref. no. IUSSTF/JC-113/2019).

**Source/Reference of the Work:** <https://doi.org/10.3847/1538-4357/ad8e63>



**Figure Caption:** The 2011 September 7 CME with velocity  $\approx 850 \text{ km s}^{-1}$  on the left showing a disturbed, noncoherent structure at the heliocentric distance of  $\approx 37$  solar radii estimated from GCS reconstruction. The 2017 May 23 CME, that showed rotation, on the right with velocity  $\approx 400 \text{ km s}^{-1}$  showing a coherent circular structure at  $\approx 48$  solar radii in the HI FOV. The top panel shows the CME structure without the GCS mesh, and the bottom panel shows the CME with the GCS mesh overplotted on it.



## The Author



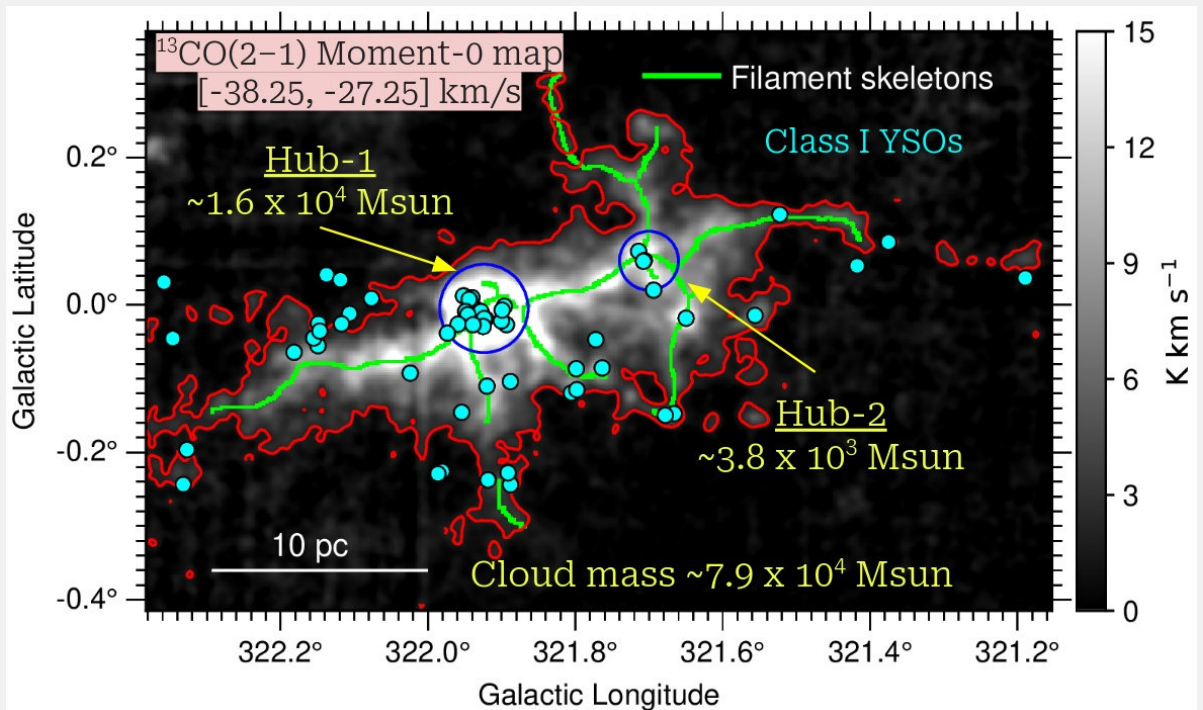
**Arup Kumar  
Maity**

## G321.93-0.01: A Rare Site of Multiple Hub-Filament Systems with Evidence of Collision and Merging of Filaments

(A. K. Maity, L. K. Dewangan, N. K. Bhadari, Y. Fukui, A. Haj Ismail, O. R. Jadhav, Saurabh Sharma, and H. Sano)

Molecular clouds host elongated dense structures called filaments, which often converge at junctions known as hubs, forming hub-filament systems (HFSs). In HFSs, gas and dust flow through filaments into the hub, enabling the formation of massive stars ( $> 8 M_{\odot}$ ) that significantly impact their host galaxies through radiative and mechanical feedback. Despite their importance in massive star formation, the origins and evolution of HFSs remain poorly understood. This study investigates the massive star-forming molecular cloud G321.93-0.01 (G321) to explore the origin and evolution of HFSs. The major outcome of this study is the detection of multiple HFSs in G321. This is a unique result, considering that such complex sites are rare in the literature. Two HFSs exhibit high mass accretion rates ( $> 10^{-3}$  solar mass per year). A significant difference in the evolutionary stages of HFSs is observed in G321 based on the detection of ionized (HII) regions. One of the HFSs shows the signature of collision with a filamentary cloud about 1 Myr ago, suggesting that the collision event may have triggered its formation. In the remaining cases, the constituent filaments exhibit relative velocities ( $\sim 1$  km/s), indicating possible formation through the merging or overlapping of the filaments.

**Source/Reference of the Work:** <https://doi.org/10.3847/1538-3881/ad98ff>



**Figure Caption:** The  $^{13}\text{CO}(2-1)$  integrated intensity (moment-0) map for the target site G321.93-0.01. The filament skeletons identified using getsf are overlaid on the moment-0 map. The extents of two hubs (i.e., Hub-1 and Hub-2) are marked with blue circles and indicated by yellow arrows. Cyan circles denote the positions of Class I YSOs, highlighting ongoing star-forming activity in the target site. The masses of the molecular cloud and the hubs are also provided in the figure.

## हिंदी कार्यशाला **Hindi Workshop** अक्टूबर-दिसंबर **October-December 2024**

अक्टूबर-दिसंबर 2024 तिमाही में 06 दिसंबर 2024 को ऑफलाइन हिंदी कार्यशाला नैनो सिम्स हॉल, पीआरएल, अहमदाबाद में आयोजित की गई। इस कार्यशाला में वक्ता के रूप में श्री प्रदीप सिंह चौहान, वरिष्ठ क्रय एवं भंडार अधिकारी उपस्थित थे। उन्होंने इस कार्यशाला में “मूलभूत/सामान्य क्रय एवं भंडार संबंधी नियम एवं इंडेंट प्रक्रिया” संबंधी प्रशिक्षण दिया। वक्ता ने विस्तार से प्रतिभागियों के प्रश्नों का उत्तर दिया। उन्होंने क्रय एवं भंडार से संबंधी विभिन्न नियमों की चर्चा की। दैनंदिन कार्य सुगमता और सरलता से करने के लिए इस कार्यशाला से सभी प्रतिभागी लाभान्वित हुए। इस कार्यशाला में कुल 70 सदस्यों ने भाग लिया।

An offline Hindi Workshop, for the quarter of October-December, was held on 06 December 2024. It was conducted at Nano Sims Hall, PRL, Ahmedabad. Shri Pradeep Singh Chauhan, Senior Purchase and Stores Officer was present as Speaker for this Workshop. The speaker imparted training and delivered a talk on the subject of “Fundamental/General Purchase and Stores Rules and indent process”. The Speaker addressed the questions of participants in detail. This Workshop will benefit the participants in carrying out their routine work with ease and simplicity. A total of 70 members participated in this workshop.



*Glimpses from the event*

## 7<sup>th</sup> CNIT Division Nukkad – Chai Pe Byte on “Know ISRO/DOS SPACENET Services”

The 7<sup>th</sup> CNIT Division Nukkad – Chai Pe Byte on “Know ISRO/DOS SPACENET Services” was held on December 06, 2024 in hybrid mode during 10:00hrs to 11:30hrs. There were 54 participants in the session. In the session, 80% discussion was in Hindi and 20% discussion was in English.

The primary objective of the “Chai Pe Byte” initiative is to facilitate knowledge sharing and experience exchange, identify and address IT related concerns of users, and explore potential solutions. This initiative aims to foster a stronger bond between the CNIT division and PRL colleagues, ultimately enhancing the overall effectiveness and efficiency of PRL’s IT services and facilities.

Mr. Jigar Raval welcomed all the participants and gave the overview of the session.

Mr. Alok Shrivastava, delivered the talk on “Know ISRO/DOS SPACENET Services” and explained the overall SPACENET setup, Important ISRO/DOS SPACENET Services, How to use SPACENET in PRL. Mr. Alok highlighted important SPACENET services like Sarv Nabh (ISRO/DOS wide file sharing), VAST/VISWAS, Office Orders, Other ISRO/DOS Centers/Units SPACENET Websites, Staff Contact details etc. He briefed about common available SPACENET node (Computer Center of Main Campus and Thaltej Campus) within PRL for accessing ISRO/DOS SPACENET services. Apart from this, due to critical functional requirement, the SPACENET nodes are also given to Director sir and his office, Registrar sir and his office, Dean sir and his office, Administration, Accounts, Stores & Purchase section. Mr. Alok briefed how SPACENET network within PRL has been further segmented to strengthen the cyber security of the network.

PRL Colleagues (Mr. Pradeep Singh Chauhan, Ms. Nandini Rao, Mr. Debi Prasad Pradhan, Dr. Bhushit Vaishanv, Mr. Senthilbabu T J ) shared their SPACENET related queries like how to share files, Operating System Updates, difference of PRLNabh and ISRO/DOS Sarv-Nabh service etc. Following are the overall outcome of the session.

1. As per ISRO/DOS Information Security Policy 2024, both Internet and SPACENET shall be separate physical network.
2. It has been observed that SPACENET is main/primary network in other ISRO/DOS centers/units whereas in PRL Internet is main/primary network. At present, there is limited use of SPACENET in PRL.
3. Apart from very specific functional SPACENET nodes in PRL, common SPACENET facility has been setup in Computer Center both at Main Campus and Thaltej Campus.
4. SPACENET network has been extended to the library of both Main Campus and Thaltej Campus. The Linux OS installation in Computers are in process. This will help PRL fraternity to access library websites of other ISRO/DOS centers/units using those PCs.
5. The dedicated SPACENET node is also available at Udaipur Solar Observatory (USO), Udaipur over dedicated 100Mbps National Knowledge Network (NKN). USO fraternity can access SPACENET from the dedicated one node.
6. To further strengthen the security of SPACENET, PRL only allows Linux OS within SPACENET network.
7. To use SPACENET in PRL, user need a separate SPACENET proxy username and password to



maintain the access logs. Users shall get these details *a priori* to avoid any last moment issues.

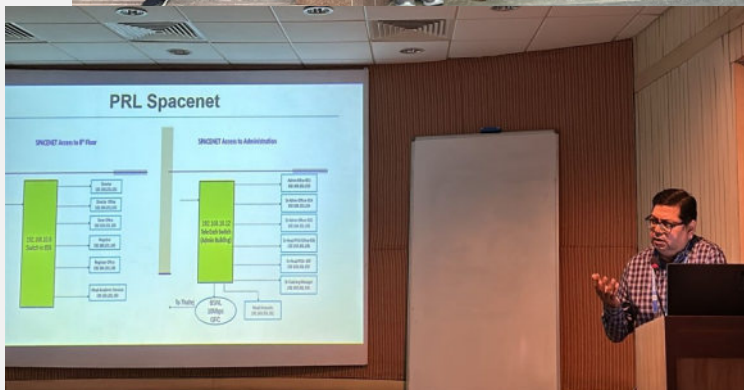
8. Use of Sarv-Nabh for file sharing within ISRO/DOS.

9. CNIT team is working to enable seamless file transfer between SPACENET networks to PRL Intranet/LAN and vis-à-vis.

10. Users are requested to at least once visit CNIT and use SPACENET network to get overall feel of the setup and access mechanism.

The session proved to be highly beneficial as it gave insights on SPACENET services.. Also, there were quick discussion on Element (ISRO/DOS collaboration and messaging service hosted at ISRO HQ), PRLNabh file sharing and collaboration service, cyber security aspects of various services. The attendees overwhelmingly expressed gratitude for the valuable insights and commended the CNIT division's innovative "CNIT Nukkad – Chai Pe Byte" initiative. CNIT team sincerely thank all the colleagues who attended the session and shared their valuable inputs and experience. All the participants have jointly prepared the report.

The report is also available on CNIT Division Website under Intranet Access URL - <https://www.prl.res.in/prl-eng/cc/intranet/chaipebyte>. CNIT will keep all the reports of "Chai Pe Byte" on PRL's website for future reference.



*Glimpses from the event*



## 2nd Winter School in Solar Physics at USO-PRL

The 2nd Winter School in Solar Physics was held at the Udaipur Solar Observatory, PRL from 9th to 13th December 2024. A total of **30 students** representing **12 Universities** and Colleges all across India attended the School. The list of Institutions were as follows - **Andhra University** (Visakhapatnam Andhra Pradesh), **University of Hyderabad** (Hyderabad Telengana), **Fergusson College** (Pune Maharashtra), **St. Teresa's College** (Cochin Kerala), **Maharaja Sayajirao University** (Baroda Gujarat), **St. Joseph's College** (Trichy Tamil Nadu), **Calicut University** (Kozhikode Kerala), **St. Xavier's College** (Mumbai Maharashtra), **St. Xavier's College** (Ahmedabad Gujarat), **Madras Christian College** (Chennai Tamil Nadu), **Jai Narayan Vyas University** (Jodhpur Rajasthan), and **Mohanlal Sukhadia University** (Udaipur Rajasthan). The schedule of the Winter School is briefly summarised below:

### Day 1, December 9th

The students were formally welcomed by Prof. Anil Bhardwaj, Director PRL, who gave an overview of the various facilities, research areas at USO-PRL and the objectives of the Winter School. Prof. Shibu Mathew, Head USO-PRL, also extended his welcome to all the students before the first lecture of the day by Prof. Ashok Ambastha who gave an overview of the structure of the Sun, various solar phenomena, and broadly covered the various domains of Solar Physics. A short movie was shown to the students describing USO's history and its facilities at the end of his talk. The second lecture dealt with astronomical and heliographic coordinate systems by Dr. Rohan Louis followed by a tutorial where students had to calculate the heliographic coordinates of several sunspots using an image of the Sun. The afternoon session, consisted of lectures by Dr. Raja Bayanna who introduced image formation, basic concepts of Geometric and Fourier optics, as well as Adaptive Optics. This was followed by an exercise where students had to calculate distances between different optical elements and focal planes for a specific telescope configuration. During the final tutorial of the day, students were asked to estimate the solar rotation rate by tracking sunspots in time at different latitudes to determine the differential rotation of the Sun.

### Day 2, December 10th

The students were taken to the island Observatory of USO in the morning where they were shown the 50 cm Multi-Application Solar Telescope (MAST) and the 15 cm SPAR telescope. The optical layout of the different post-focus instruments, telescope control system, guider telescopes, telescope pointing and tracking were explained in great detail to them. The half-day visit of the island facilities was followed by lunch at the main office. The afternoon lecture was given by Dr. Brajesh Kumar who introduced the internal solar structure and Helioseismology to the students and followed it up with several basic numerical problems using solar constants and data.

### Day 3, December 11th

The first lecture of Day 3 was on sunspots and its fine structure by Dr. Rohan Louis which covered magnetic and velocity fields, the myriad of small-scale features, the Evershed flow, penumbral formation, and some science highlights using MAST observations. The next lecture after tea comprised an introduction to solar spectroscopy and polarimetry by Prof. Shibu Mathew, describing the concepts of spectrographs, narrow-band filters, wave plates, and liquid crystal retarders. Mr. Sandeep Dubey demonstrated a Python tutorial detailing the theory of Mueller matrices and how the polarisation state could be determined by changing the value of retardance and rotation angles of the polarising element. The afternoon session began with Dr. Girjesh Gupta's lecture on the fundamental problem of solar coronal heating, our current understanding of the various physical processes behind it and the state of research in the field. This was followed by an introduction to Ground-based Radio Astronomy and Instrumentation by Dr. Anshu Kumari. The final tutorial was given by Dr. Rohan Louis where students had to plot



the solar spectral profile under the influence of a magnetic field and determine the field strength from the separation of the Zeeman components.

#### **Day 4, December 12th**

The first lecture of the day was given by Prof. Bhuwan Joshi on the active Sun where he explained the physics of flares, mass ejections and types of filaments/prominences. This was followed by a tutorial by Mr. Kushagra Upadhyay and Dr. Anshu Kumari on identifying the types of radio bursts emanating from the solar corona during the passage of a solar eruption and calculating the shock speed as well as coronal magnetic field. The next lecture was by Prof. Ramit Bhattacharyya where he described the mathematical framework for carrying out MHD simulations of magnetic reconnection in the solar corona. Following lunch, Prof. Nandita Srivastava's lecture described how eruptions from the solar atmosphere were important drivers for space weather and the upper atmosphere of the Earth. The students were then divided into groups and were shown the GONG, e-CALLISTO, and Coudé facilities in the office premises. Day 4 concluded with high tea that was arranged for the students as well as USO faculty, staff and PhD students in the canteen.

#### **Day 5, December 13th**

The final day of the School comprised 2 talks with Dr. Aveek Sarkar, from the Astronomy and Astrophysics division, speaking on the upper solar atmosphere, the dynamics of the solar wind, and the importance of determining the properties of charged particles from in-situ measurements. Prof. Dibyendu Chakrabarty, Head - Space and Atmospheric Sciences division PRL, spoke on the various processes and phenomena contributing to the conditions in the near Earth space environment such as solar flares, CMEs, CIRs, SEPs etc. and the importance of monitoring the Sun for its role in driving space weather. He also described the primary objectives of the Aditya-L1 mission, specifically the ASPEX instrument on board the spacecraft and the working principle of SWIS and STEPS. The final session of the School consisted of the student's feedback, distribution of the participation certificates, and the vote of thanks.



*Glimpses from the event*



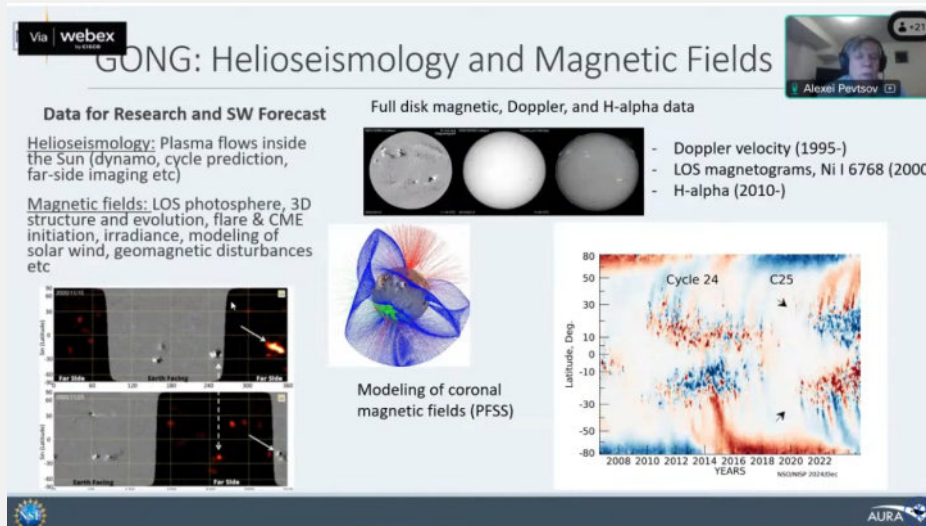
## 99th PRL Ka Amrut Vyakhyaan and 4th Dr. Arvind Bhatnagar Memorial Lecture



The 99th PRL Ka Amrut Vyakhyaan and 4th Dr. Arvind Bhatnagar Memorial Lecture was delivered by Dr. Alexei Pevtsov (Associate Director, National Solar Observatory (NSO), Boulder, Colorado, USA) on 18th December 2024. Dr. Pevtsov is a renowned solar physicist and is known for his contribution to the many heliophysics missions such as HINODE, RHESSI, SDO, SOHO, and TRACE as the program scientist in NASA Headquarters from 2005 till early 2009. Dr. Pevtsov delivered the Vyakhyaan on our nearest star, the Sun. The title was “Research in Synoptic and High-Resolution Solar Physics at the US National Solar Observatory”. This Vyakhyaan was organised as a part of the Dr. Arvind Bhatnagar Memorial Lecture Series in honour of Dr. Arvind Bhatnagar, the founder-Director of Udaipur Solar Observatory, to acknowledge his immense contributions to solar astronomy in India and also establishing several planetaria across India.

Dr. Pevtsov began his Vyakhyaan with the long-standing, scientific association of NSO and USO-PRL through the Global Oscillation Network Group (GONG), a synoptic program of NSO that began in 1995 with six identical observing stations across the globe situated at Big Bear California USA, Cerro Tololo Chile, El Teide Tenerife Spain, Udaipur Solar Observatory India, Learmonth Australia and Mauna Loa Hawaii. Dr. Pevtsov described the various facilities and programmes of NSO that included the new, 4-m Daniel K. Inouye Solar Telescope (DKIST) at Maui Hawaii and the Synoptic Optical Long-term Investigations of the Sun (SOLIS) facility. The presentation also touched upon the need to observe the Sun at both ends of the spatial and temporal spectrum to comprehensively understand the inner workings of our nearest star. He also went on to showcase the future up-gradation of GONG with the ng(Next Generation)-GONG programme that was envisaged to transform solar synoptic observations through modern instrumentation and by studying key, large-scale patterns over the course of a solar cycle. His talk was illuminating on many aspects of NSO’s contribution to the understanding of the Sun and space weather related research.

**YouTube Link:** [https://www.youtube.com/live/rxHio\\_nGdbw](https://www.youtube.com/live/rxHio_nGdbw)





## Grammarly for Education Session: Enhancing Writing and Research at Physical Research Laboratory

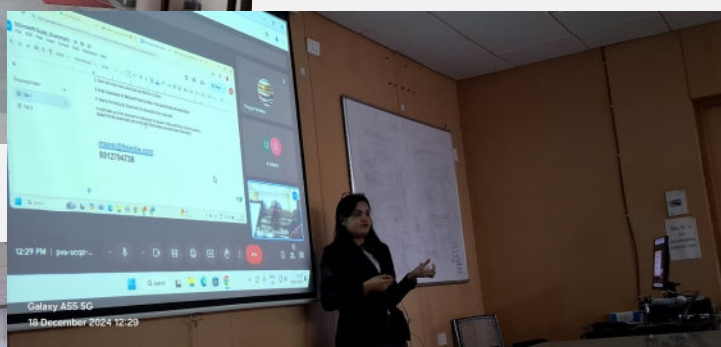
On December 18, 2024, PRL Library hosted an informative session on "Grammarly for Education," a tool aimed at helping students and faculty improve their writing and research. Led by Ms. Mansi Saini, the session focused on maximizing Grammarly's powerful features to enhance writing quality, making it more effective, polished, and academically sound.

The session began with an overview of the institutional license offered to PRL, which provides complete access to Grammarly's premium features at no extra cost for those who sign up with their institutional email IDs. This access allows users to utilize advanced tools for academic papers, research projects, and everyday writing, contributing to improved writing habits and academic success. The session highlighted key Grammarly features such as the Citation Generator, which simplifies the creation of accurate citations in various formats like APA, MLA, and Chicago. It also covered the Authorship feature, which ensures consistent writing style and tone in collaborative work, and the plagiarism checker, which scans over 16 billion web pages to maintain academic integrity. Other tools like tone detection and clarity improvement were discussed to help writers produce more effective content.

The session consisted of a Q&A throughout, where attendees were able to clarify any doubts about Grammarly's usage. Overall, the session demonstrated that Grammarly for Education is an invaluable resource for enhancing writing quality and academic performance, benefiting both students and faculty members at PRL.



*Glimpses from the event*





## Annual Book Exhibition: 19-20 Dec, 2024

The PRL Library hosted a book exhibition for the PRL students and staff on December 19–20, 2024. Over two days, attendees had the opportunity to peruse a vast array of around 600 books that included both scientific and popular topics. The exhibition showcased cutting-edge scientific literature and general books on history, philosophy, literature (Hindi and English), and art. Four renowned booksellers—Kushal Books, Bombay Books, Himanshu Books, and Aanjaneya Books—each with their assortment of books were a part of this program. The event aimed to satisfy changing demands, especially in new scientific sectors, and to broaden the library's holdings. Based on their knowledge and passions, participants suggested books that would enhance both academic achievement and individual pleasure. Researchers shared ideas and insights and the gathering evolved into a forum for information sharing, enabling participants to find fresh materials and bolster their studies and personal growth.

### *Glimpses from the event*



## पीआरएल अमृत राजभाषा व्याख्यान (पर्व)



पीआरएल अमृत राजभाषा व्याख्यान (पर्व)" का 19वां व्याख्यान 26 दिसंबर, 2024 को आयोजित किया गया था। इस अवसर के प्रख्यात वक्ता डॉ. चिराग दवे, संस्थापक और पशु चिकित्सा सर्जन, डॉ. चिराग दवे पेट्स क्लिनिक, अहमदाबाद, गुजरात थे।

The 19th lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on December 26, 2024. The eminent speaker for the occasion was Dr. Chirag Dave, Founder and Veterinary Surgeon, Dr. Chirag Dave Pets Clinic, Ahmedabad, Gujarat.

डॉ. चिराग दवे पशु चिकित्सा पद्धतियों में लगभग तीन दशकों का व्यापक नैदानिक अनुभव रखते हैं। पशु चिकित्सा उत्कृष्टता के प्रति अपनी प्रतिबद्धता प्रदर्शित करते हुए, उन्होंने प्रतिष्ठित बॉम्बे वेटेरनरी कॉलेज से अपनी स्नातक और स्नातकोत्तर दोनों डिग्री पूरी की है। वह वर्तमान में पशु चिकित्सा संचार पर ध्यान केंद्रित करते हुए पीएचडी कर रहे हैं, और पशु स्वास्थ्य के महत्वपूर्ण क्षेत्र में अपनी विशेषज्ञता का विस्तार कर रहे हैं। डॉ. दवे वर्तमान में अहमदाबाद, गुजरात में एक बहु-डॉक्टर, पूर्ण-सेवा पशु चिकित्सा क्लिनिक का नेतृत्व करते हैं, जहां उनका ध्यान नैदानिक उपकरणों को नैदानिक अभ्यास में एकीकृत करने पर है।

Dr. Chirag Dave has extensive clinical experience of almost three decades in veterinary practices. Demonstrating his commitment to veterinary excellence, he has completed both his undergraduate and postgraduate degrees from prestigious Bombay Veterinary College. He is currently pursuing a PhD focusing on veterinary communication, further expanding his expertise in the important area of animal health. Dr. Dave currently leads a multi-doctor, full-service veterinary clinic in Ahmedabad, Gujarat, where his focus is on integrating diagnostic tools into clinical practice.

व्याख्यान का शीर्षक था The vyakhyaan was titled "सह-अस्तित्व का संतुलन: शहरी वातावरण में पशु-मानव संघर्ष" / सह-अस्तित्व का संतुलन: शहरी वातावरण में पशु-मानव संघर्ष "।

व्याख्यान के दौरान, डॉ. दवे ने तेजी से बढ़ते शहरी विस्तार, मनुष्यों और जानवरों (जैसे कुत्तों और बिल्लियों) के बीच संपर्क का तेजी से तनावपूर्ण होना और यह कैसे अक्सर विभिन्न संघर्षों का कारण बनता है, के बारे में जानकारी दी। इसके अलावा, आवारा आबादी, क्षेत्रीय व्यवहार, सार्वजनिक स्वास्थ्य संबंधी चिंताएँ और संसाधन प्रतिस्पर्धा जैसे मुद्दे अक्सर इन तनावों में योगदान करते हैं।

During the Vyakhyaan, Dr. Dave briefed about the rapidly increasing urban expansion, interactions between humans and animals (such as dogs and cats) becoming increasingly tense, and how this often leads to various conflicts. Further, the issues such as stray populations, territorial behavior, public health concerns, and resource competition often contribute to these tensions.

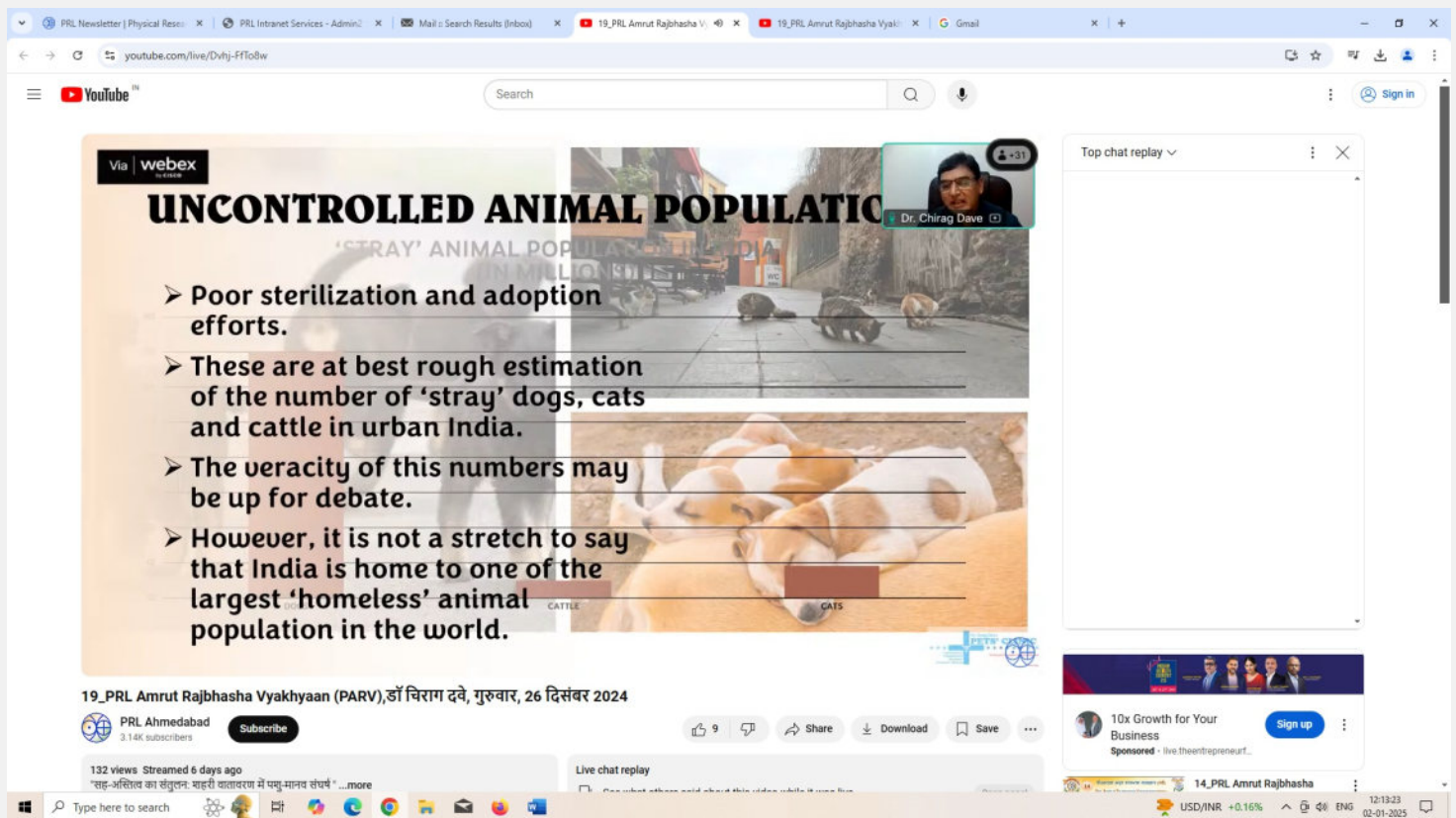
उन्होंने नैतिक विचारों, सार्वजनिक धारणा और प्रभावी संघर्ष समाधान रणनीतियों पर ध्यान केंद्रित करते हुए शहरी वातावरण में पशु-मानव संघर्ष के अंतर्निहित कारणों का पता लगाया। उन्होंने लक्षित नसबंदी कार्यक्रम, टीकाकरण अभियान, व्यवहार प्रबंधन और सामुदायिक शिक्षा पहल के बारे में भी जानकारी दी। व्याख्यान का मुख्य उद्देश्य जानवरों और मनुष्यों दोनों के कल्याण संबंधी चिंताओं को संबोधित करते हुए सह-अस्तित्व को बढ़ावा देना और सुरक्षित, स्वस्थ शहरी वातावरण बनाना था।



He further explored the underlying causes of animal-human conflict in urban environments, focusing on ethical considerations, public perception, and effective conflict resolution strategies. He also informed about the targeted sterilization programs, vaccination campaigns, behavior management, and community education initiatives. The main object of the vyakhyaan was to promote coexistence and create safe, healthy urban environments while addressing welfare concerns for both animals and humans.

प्रस्तुति के बाद एक इंटरैक्टिव प्रश्नोत्तर सत्र आयोजित किया गया, जिसमें श्रोताओं को विषय के बारे में नए दृष्टिकोण और अतिरिक्त जानकारी दी गई।

Following the presentation, there was an interactive Q&A session that gave the audience new perspectives and additional details about the topic.



## कार्यक्रम की मुख्य बातें Glimpses from the Event



## PRL's Exemplary Participation at the 25th Rashtra Katha Shivar

Under the Department of Space, the Physical Research Laboratory (PRL) proudly participated in the prestigious 25th Rashtra Katha Shivar held at Pransala village, located 140 km from Rajkot, Gujarat. The event commenced on December 28, 2024, and concluded on January 05, 2025. Organized by the Shri Vedic Mission Trust under the visionary leadership of Swami Dharmabandhu, this annual national youth camp has been fostering the vision of a strong and vibrant India for the past 24 years. It aims to promote national integration, respect for diversity, social harmony, and the intellectual development of participants.

This year, the Shivar witnessed an overwhelming response, attracting around 16,000 enthusiastic students from elementary to college levels and approximately 1,500 teachers from 23 states and union territories across the country. The event featured exhibitions and demonstrations by esteemed organizations such as the Indian Air Force, Indian Army, Indian Navy, Indian Coast Guard, BSF, CISF, CRPF, ITBP, SSB, RAF, NDRF, ISRO, Homi Bhabha Science and Education Center, Mumbai, and the Meteorology Department.

PRL actively engaged in the event during the initial three days, from December 28 to 30, 2024, under the unified banner of ISRO. Representing PRL were Nishant Kumar (Scientist-D) from PSDN, Aakash Gupta (SRF), and Shivam Parashar (JRF) from SPASC. Their participation was marked by the exhibition of engineering models of the Solar Wind Ion Spectrometer (SWIS) and the Superthermal and Energetic Particle Spectrometer (STEPS), both integral subunits of the ASPEX payload on the Aditya L1 mission.



*Glimpses from the event*

In addition to the ASPEX/Aditya-L1 mission, the PRL team showcased informative standees and posters on Chandrayaan-2's Solar X-ray Monitor (XSM) and Chandrayaan-3's Chandra's Surface Thermophysical Experiment (ChaSTE) and Alpha Particle X-ray Spectrometer (APXS). These exhibits captivated the visiting students, providing insightful explanations about the instruments' workings and inspiring young minds to explore the wonders of space science. The team further engaged students by distributing informative stickers, leaving a lasting impression on their curious minds.

The successful planning and seamless execution of PRL's participation were made possible under the thoughtful guidance and direction of Prof. Anil Bhardwaj (Director, PRL), Prof. Dibyendu Chakrabarty, Dr. Bhushit Vaishnav, Prof. Namit Mahajan, and Prof. Goutam Samanta. Their collective efforts ensured a remarkable and impactful presence at the Shivar.

PRL's participation in the 25th Rashtra Katha Shivar exemplifies its commitment to inspiring the next generation of scientists and contributing to the vision of a scientifically empowered and united India.

## **Death Anniversaries of Late Prof. Vikram A Sarabhai and Late Prof. K R Ramanathan**

On the solemn occasion of December 30th, 2024, marking the death anniversary of the esteemed founder of the Physical Research Laboratory (PRL), Late Professor Vikram A. Sarabhai, and the following day, December 31st, 2024, commemorating the death anniversary of the founding Director of PRL, Late Professor K.R. Ramanathan, a heartfelt tribute was held to honor these distinguished scientific pioneers. The homage took place at the Foyer area of the K.R. Ramanathan Auditorium on Monday, December 30th, 2024.

During the tribute ceremony, the portraits of Professor Vikram A. Sarabhai and Professor K.R. Ramanathan were adorned with garlands as a mark of respect and reverence. A lamp was lit in their memory, symbolizing the enduring light of their remarkable contributions to the field of science.

Professor D. Pallam Raju, Dean of PRL, addressed the gathering of PRL members, reflecting on the profound scientific legacies left by both Professor Vikram A. Sarabhai and Professor K.R. Ramanathan and then paid the floral tribute.

Following Dean's address, PRL members paid their respects by offering floral tributes to the late visionaries, Professors Vikram A. Sarabhai and K.R. Ramanathan.

**PRL Monthly Publications Digest (December 2024)****Atomic, Molecular and Optical Physics**

1. Akhil Pratap Singh, Kenji Sugisaki, Srinivasa Prasanna, Bijaya Kumar Sahoo, Bhanu Pratap Das and Yasunobu Nakamura, 2024, Experimental computations of atomic properties on a superconducting quantum processor, Phys. Rev. A 110, 062620 (2024); <https://doi.org/10.1103/PhysRevA.110.062620> , Date of Publication: 30/12/2024, Impact Factor: 3.0
2. Saumya J. Sarkar, M. Ebrahim-Zadeh, and G. K. Samanta , 2024, Talbot effect based sensor measuring grating period change in subwavelength range, Scientific Reports, 14, 30872 (2024), Date of Publication: 28/12/2024, Impact Factor: 3.8
3. Alok Kumar Kanungo, Rahul Kumar Kaushal , Ravi Bhushan , Naveen Chauhan , Jeewan Singh Kharakwal and Shahida Ansari, 2024, Luminescence and radiocarbon chronology of Bhagatrav: A Sorath Harappan camp site in South Gujarat, Radiocarbon, Date of Publication: 18/12/2024, Impact Factor: 4.6
4. Sandeep Singh, Vimlesh Kumar, and G. K. Samanta, 2024, Fast measurement of group index variation with optimum precision using Hong–Ou–Mandel interferometry, APL Quantum, Date of Publication: 02/12/2024, Impact Factor: New Journal

**Astronomy & Astrophysics Division**

1. Sil, M. ; Das, A. ; Das, R.; Pandey, R. ; Faure, A. ; Wiesemeyer, H. ; Hily-Blant, P. ; Lique, F. ; Caselli, P., 2024, Fate and detectability of rare gas hydride ions in nova ejecta: A case study with nova templates, Astronomy and Astrophysics, Date of Publication: 18/12/2024, Impact Factor: 5.4
2. Ashok K Singal, 2024, Enigmatic factor of  $4/3$  in electromagnetic momentum of a moving spherical capacitor, European Journal of Physics,, Date of Publication: 07/12/2024, Impact Factor:

**Theoretical Physics Division**

1. Gurucharan Mohanta and Ketan M. Patel, 2024, Loop-induced masses for the first two generations with optimum flavour violation, JHEP 12 (2024) 158, Date of Publication: 20/12/2024, Impact Factor: 5.0
2. Amartya Pal, Paramita Dutta, Arijit Saha, 2024, Identifying Bogoliubov Fermi surfaces via thermoelectric response in a d-wave superconductor heterostructure, Physical Review B 110, 245417, Date of Publication: 19/12/2024, Impact Factor:

**Space and Atmospheric Sciences Division**

1. Kshitiz Upadhyay, Kazuo Shiokawa, Duggirala Pallamraju, Artem Gololobov, 2024, Determination of electron heat



flux in the topside ionosphere and its impact on the vertical profile of OI 630.0 nm emission rate during nighttime SAR arcs for different solar activity conditions, *Advances in Space Research*, Date of Publication: 25/12/2024, Impact Factor: 2.6

2. K. Rajagopal, S. Ramachandran, R.K. Mishra, 2024, Size resolved particle contribution to vehicle induced ultrafine particle number concentration in a metropolitan curbside region, *Atmospheric Environment*, Date of Publication: 01/12/2024, Impact Factor: 4.2

### **Planetary Sciences Division**

1. Vikas Soni and Kinsuk Acharyya, 2024, Signature of Vertical Mixing in Hydrogen-dominated Exoplanet Atmospheres, *The Astrophysical Journal*, Date of Publication: 02/12/2024, Impact Factor:

### **Udaipur Solar Observatory Division**

1. Kavita Sharma, Anushree Rajwanshi, Sachin Kumar, Rupesh M. Das, Nandita Srivastava, 2024, Predicting Maximum Amplitude and Rise Time of Solar Cycle 25 Using Modified Geomagnetic Precursor Technique, *Solar Physics*, Date of Publication: 16/12/2024, Impact Factor: 2.7

### **Geosciences Division**

1. AV Krishna, A. Tirkey, M. Raman, S. M. Ali, A. Sahay, A. Singh, 2024, Unravelling pre-monsoon phytoplankton: pigment profiles and community structure in the western and central Bay of Bengal, *Marine and Freshwater Research*, Date of Publication: 20/12/2024, Impact Factor: 1.8

### Awards & Honours

- (1) **Ms. Garima Arora**, Sr. Scientific Assistant-A, Planetary Sciences Division, PRL has participated in **Hindi Technical Seminar** held at IIT Jodhpur and won first prize.
- (2) **Prof. Neeraj Rastogi**, Professor, Geosciences Division, and **Prof. Jayesh P Pabari**, Professor, Planetary Sciences Division of PRL have been appointed as members of the **Doctoral Research Committee (DRC)** of Science and Engineering disciplines, respectively, at the Gujarat Technological University (GTU), Ahmedabad.
- (3) **Prof. D. Pallam Raju**, Senior Professor, Space and Atmospheric Sciences Division and Dean, PRL, has been nominated as a Member of the **Academic Council of the Indian Institute of Space Science and Technology, Trivandrum**.

## VISITORS

1. Dr. Sudeep K. Ghosh, Assistant Professor from IIT, Kanpur visited Physical Research Laboratory, Ahmedabad on 04.12.2024 to deliver a talk.
2. Dr. Aadhip Agarwala, Assistant Professor from IIT, Kanpur has visited Physical Research Laboratory, Ahmedabad on 06.12.2024 to deliver a talk.
3. Dr. Saptarshi Mandal, Associate Professor of Institute of Physics, Bhubaneswar visited Physical Research Laboratory, Ahmedabad during 9.12.2024 to 12.12.2024 to deliver a series of lectures and one seminar.
4. Mr. Srikanth Kodeboyina from Blue Eye Soft Corporation, USA visited Physical Research Laboratory, Ahmedabad on 11.12.2024 in connection with Scientific discussion and explore possible collaborative opportunities /tech transfer/ build capacity.
5. Mr. Duncan Trevor Bevis Stacey from Teledyne Technologies Inc., USA visited Physical Research Laboratory, Ahmedabad on 18.12.2024 for Scientific discussion and to explore possible collaborative opportunities on imaging sensors.
6. Prof. Subhendra Mohanty from IIT, Kanpur visited Physical Research Laboratory, Ahmedabad on 19.12.2024 to deliver a talk.
7. Dr. Alexander Warmuth, Senior Researcher from Leibniz Institute for Astrophysics Potsdam (AIP), Potsdam, Germany visited Udaipur Solar Observatory, Udaipur during 01.12.2024 to 14.12.2024 in connection with collaborative scientific work under Indo-German-DST-DAAD project and to deliver a talk in the USO divisional seminar.
8. Dr. Jake Arthur Jack Mitchell from Leibniz Institute for Astrophysics Potsdam, Germany visited Udaipur Solar Observatory, Udaipur during 01.12.2024 to 14.12.2024 in connection with collaborative scientific work under Indo-German-DST-DAAD project.
8. On 22.12.2024, a group of thirty (30) UG & PG students along with four (4) faculty members from Vidhya Bhawan Polytechnic College, Udaipur have visited Udaipur Solar Observatory, Udaipur in connection with scientific educational trip.
9. During December 2024, the following have visited Infrared Observatory, PRL, Mount Abu:
  - Divisional Forest Officer along with 4 others
  - Civil Judge, Sirohi along with 4 others
  - IAS Officer from Gandhinagar along with 3 others
  - Two (2) DOS/ISRO staff members,
  - Four (4) BARC/TIFR Employees,
  - Two (2) students
  - Fifty-six (56) General Public



## NEW JOINEES



**NAME:** DR. KAVIL MEHTA

**DESIGNATION:** POST DOCTORAL FELLOW

**DATE OF JOINING:** 25.11.2024

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



**NAME:** MR. SHIVAM SAXENA

**DESIGNATION:** JUNIOR RESEARCH FELLOW (DST-INSPIRE)

**DATE OF JOINING:** 11.12.2024

**DIVISION/AREA:** PLANETARY SCIENCES DIVISION



**NAME:** DR. AVIK KUMAR DAS

**DESIGNATION:** POST DOCTORAL FELLOW

**DATE OF JOINING:** 19.12.2024

**DIVISION/AREA:** ASTRONOMY & ASTROPHYSICS DIVISION

Hearty Welcome to our New Members!

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