

Newsletter of the Physical Research Laboratory

THE SPECTRUM



Image of the Month

‘A Light Dialogue: On Carving a Niche and Life in Science’

A public discussion hosted by PRL in collaboration with a Science Podcast – Zeroing In in the K.R. Ramanathan Auditorium on 23rd July 2024.

August 2024

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The Author



T. A. Rajesh

Atmospheric black carbon aerosol: Long-term characteristics, source apportionment, and trends

(T. A. Rajesh and S. Ramachandran)

Black carbon (BC) is a primary aerosol that is produced in the atmosphere due to the incomplete combustion of fossil fuels and biomass burning. BC is a significant light-absorbing species and a potential climate warming species after carbon dioxide. The characteristics of BC aerosol, its source apportionment into fossil fuel and biomass (wood fuel) components in order to infer their contribution to the total black carbon emission, and their trends measured using a multi-wavelength aethalometer over an urban location (Ahmedabad) in India covering a 14-year period (2006–2019) are comprehensively investigated. Ahmedabad is a densely populated city, and the human population density has increased by 41% between 2006 and 2019. Due to rapid urbanization, the number of registered total vehicles has increased by 222% during 2006–2019 in Ahmedabad. The average contributions of BC from fossil fuel combustion and wood fuel burning to total BC are 80% and 20%, respectively, which highlights the dominance of emissions from fossil fuel combustion processes. A statistically significant increasing trend is detected in BC mass concentration at the rate of 11% per yr. The contribution of BC from fossil fuel combustion to total BC reveals a statistically significant increasing trend at the rate of 29% per yr, whereas a decreasing trend in the contribution of BC from wood fuel burning at the rate of 36% per yr is detected. The study reveals a significant decrease in wood fuel burning emissions over the past decade, attributed to the adoption of cleaner household cooking fuel and an increase in emissions from fossil fuel combustion. However, the rate of change in BC emissions from fossil fuel combustion and wood fuel burning is different; the rate of decrease in BC emissions from wood fuel burning is higher than that of the increase in fossil fuel emissions due to rapid urbanization and the consistent increase in usage of non-polluting fuel. This comprehensive study is relevant for understanding the impact of urbanization and devising better BC emission control policies.

Source/Reference of the Work: <https://doi.org/10.1016/j.scitotenv.2024.172928>

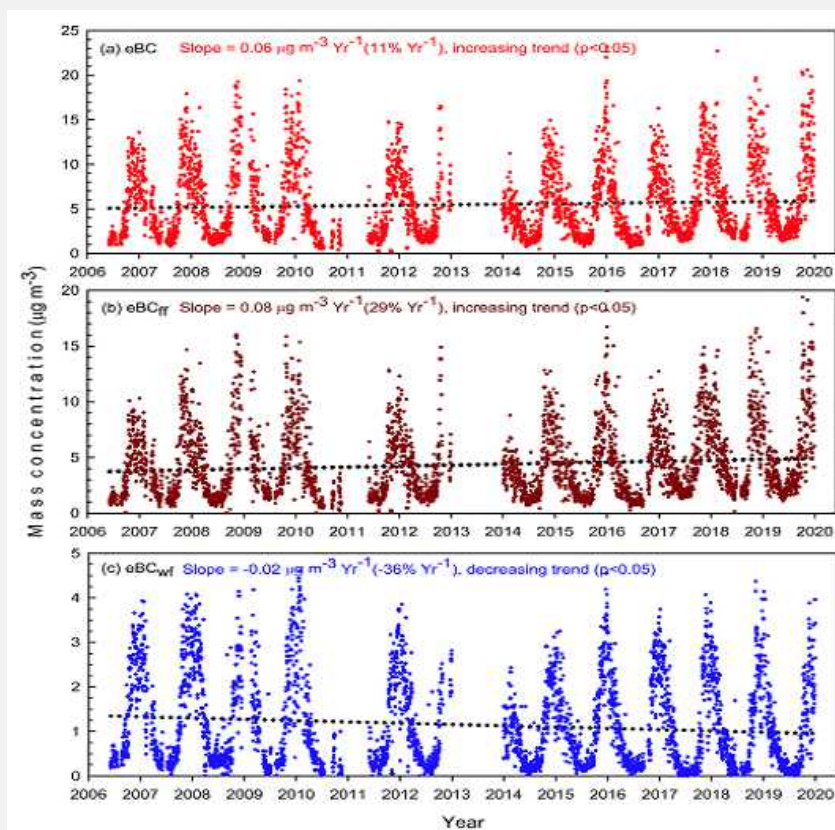


Figure: Long-term trends in eBC mass concentrations over Ahmedabad during the period 2006–2019. The symbols represent the daily mean data in a year and the dotted lines correspond to linear fits. The slope, the rate of increase/decrease along with %, nature of the trend, and the statistical significance are given in each graph.

Thermal Diode effect in Weyl Josephson junctions

(Pritam Chatterjee and **Paramita Dutta**)

The diode effect in semiconductors is a well-known phenomenon. There are recent breakthroughs revealing the diode effect in superconductor junctions. We show the thermal diode effect in the Josephson junction based on Weyl material. We apply an out-of-plane magnetic field to the middle region of the junction and a temperature gradient across the junction. It induces an asymmetry between the forward and reverse thermal currents, causing the thermal diode effect. Interestingly, we show that the sign and magnitude of the thermal diode rectification coefficient are highly tunable by the superconducting phase difference and the external magnetic field and also strongly depend on the junction length. The tunability of the rectification, particularly, the sign-changing behavior associated with higher rectification enhances the potential of our diode to be used as a functional switching component in thermal devices.

Source/Reference of the work: <https://doi.org/10.1088/1367-2630/ad617a>

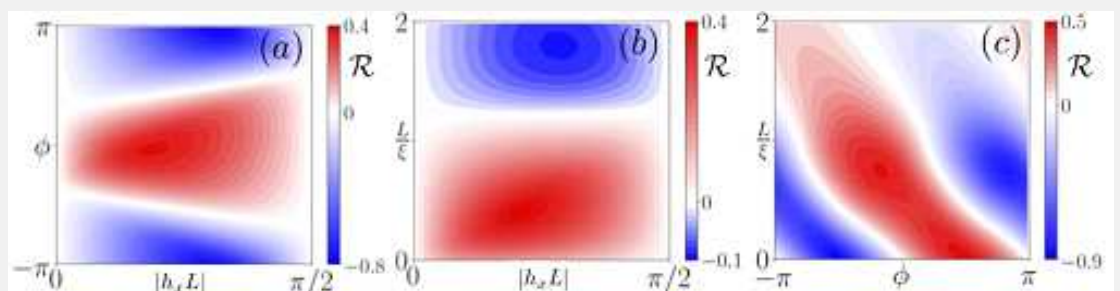
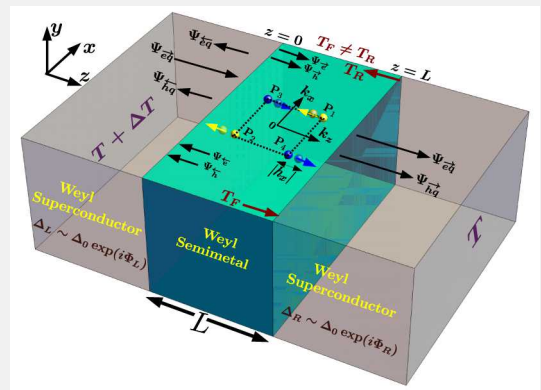


Figure: . Schematic of a thermally-biased inversion-symmetry broken Weyl Josephson junction. The shifting of the Weyl nodes of positive chirality (yellow balls) and the negative chirality (blue balls) in opposite directions by the external Zeeman field leads to an asymmetry between the forward and reverse quasiparticle transmission probabilities



The Author



Shreya Mehta

Phosphate Influx and Dust Deposition Create Zonal and Meridional

(*Shreya Mehta, Rainer Kiko, Helena Hauss, Narendra Ojha, and Arvind Singh*)

Trichodesmium, the most abundant nitrogen fixing microbe in the Tropical Atlantic Ocean, plays a crucial role in regulating the biogeochemical cycles of carbon, nitrogen and phosphorus in that region. The growth of Trichodesmium is controlled by a range of physicochemical factors. However, because of large spatial and temporal variability of these factors and limited availability of data, the role of these factors in governing the Trichodesmium distribution and abundance is not yet fully understood. To address this, we conducted a comprehensive analysis using large-scale field-based data of Trichodesmium abundance to investigate the role of various physical, chemical, and meteorological parameters on the distribution and abundance of Trichodesmium along the zonal and meridional transects of the Tropical Atlantic Ocean.

In this study, we examined the basin-scale distribution pattern of Trichodesmium obtained from Underwater Vision Profiler (UVP5) in the upper 200 m water column of the Atlantic Ocean (25°N–30°S and 70°W–20°E) using a large data set ($n = 33,235$) and tried to constrain the distribution based on various physicochemical parameters. We conclude that along the zonal transect, Trichodesmium abundance is primarily governed by the availability of PO_4^{3-} and high sea surface temperatures. Conversely, the inter-hemispheric variability seems to be influenced by dust deposition (a proxy for iron inputs) and high sea surface temperatures. Furthermore, our estimation of high modeled depth-integrated nitrogen fixation rates based on Trichodesmium underscores its crucial role in the nitrogen budget. These findings provide valuable insight into the role of environmental factors driving Trichodesmium abundance and its significance toward the global nitrogen budget.

Source/Reference of the work: <https://doi.org/10.1029/2024GB008182>

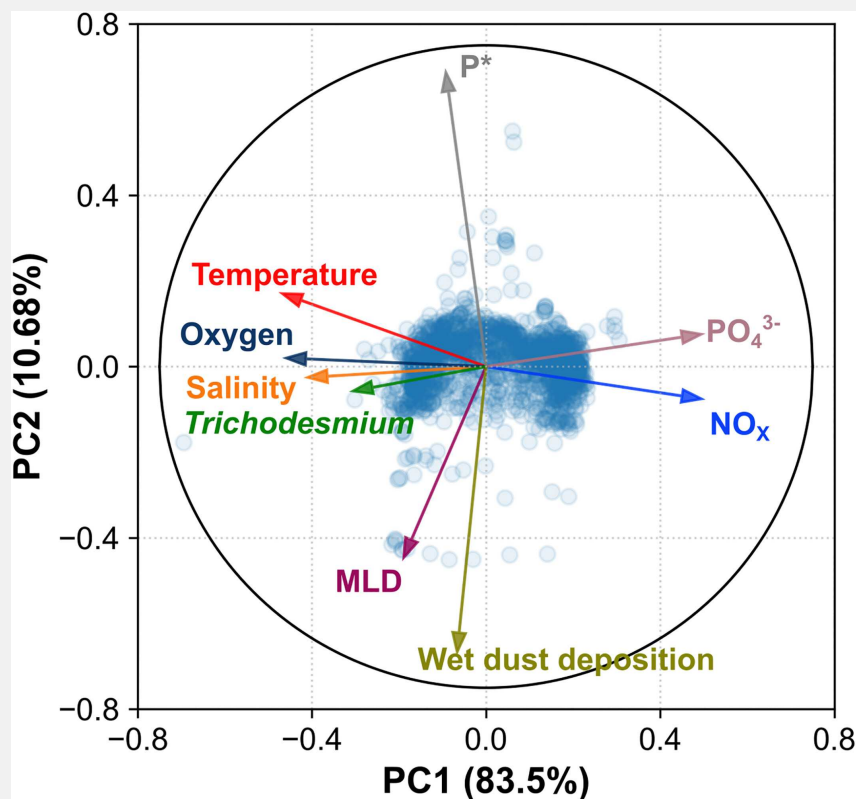


Figure: Principal component analysis of various parameters with Trichodesmium abundance for all the cruises in the Tropical Atlantic Ocean. Each arrow represents a variable, and the degree of their closeness determines the nature of their correlation, that is, if the arrows are close to each other, it signifies a positive correlation, whereas if the arrows point into opposite directions, it signifies a negative correlation.

The Author



Ruchi Pandey

A phenomenological study of the evolution of shock-induced O I emission lines in the spectrum of nova V2891 Cygni

(*Ruchi Pandey, Mudit K Srivastava, and Gargi Shaw*)

Novae are explosive events that occur on the surface of a white dwarf star in a close binary system, where the primary white dwarf accretes hydrogen-rich matter from its secondary, a main-sequence star. Optical and infrared observations have revealed that a small fraction of novae generate dust and molecules following an eruption. Despite the harsh conditions in novae, dust forms relatively quickly after an outburst, typically within mere months. Such novae offer a unique opportunity to observe the real-time formation of circumstellar dust. However, the dust formation process within the expanding nova ejecta has remained an enigma for decades. Despite numerous investigations over the years, the mechanisms underlying dust grain formation in nova ejecta have remained elusive. Recently, a compelling theory was proposed, suggesting that internal shocks within novae may play a crucial role in the development of dust grains. The eruption of nova V2891 Cyg in 2019, observed using the MFOSC-P instrument on the PRL 1.2m Mt. Abu telescope, offers a rare opportunity to explore these shock-induced dust formation processes in nova ejecta. We employed photoionization and collisional ionization phenomenological models to explain the observed shock-induced dust formation characteristics of the nova. Our photoionization models suggest a stratification of oxygen-rich material within the ejecta. A notable finding in our investigation is the abrupt decline in the measured line flux of the O I 1.316 μm emission, coinciding with a short episode of dust formation, which could not be explained by invoking photoionization models alone. Our collisional ionization phenomenological model implies that this emission likely originated from a thin, dense shell characterized by a high density of about $10^{12.5}$ – $10^{12.8} \text{ cm}^{-3}$, likely formed due to strong internal collisions. Moreover, the collisional ionization models successfully reproduced the high-temperature conditions ($\sim 7.07 - 7.49 \times 10^5 \text{ K}$) required to generate the observed high ionization potential ($\text{IP} > 100 \text{ eV}$) coronal lines, which coincided with the epoch of dust formation and the evolution of the O I 1.3164 μm emission line. The results of this study support the hypothesis that internal shocks indeed formed in the ejecta of V2891 Cyg, resulting from collisions between multiple mass ejections and the material behind the shock region, leading to the formation of a dense, thin shell in which dust formed in V2891 Cyg.

Source/Reference of the work: <https://doi.org/10.1093/mnras/stae1719>

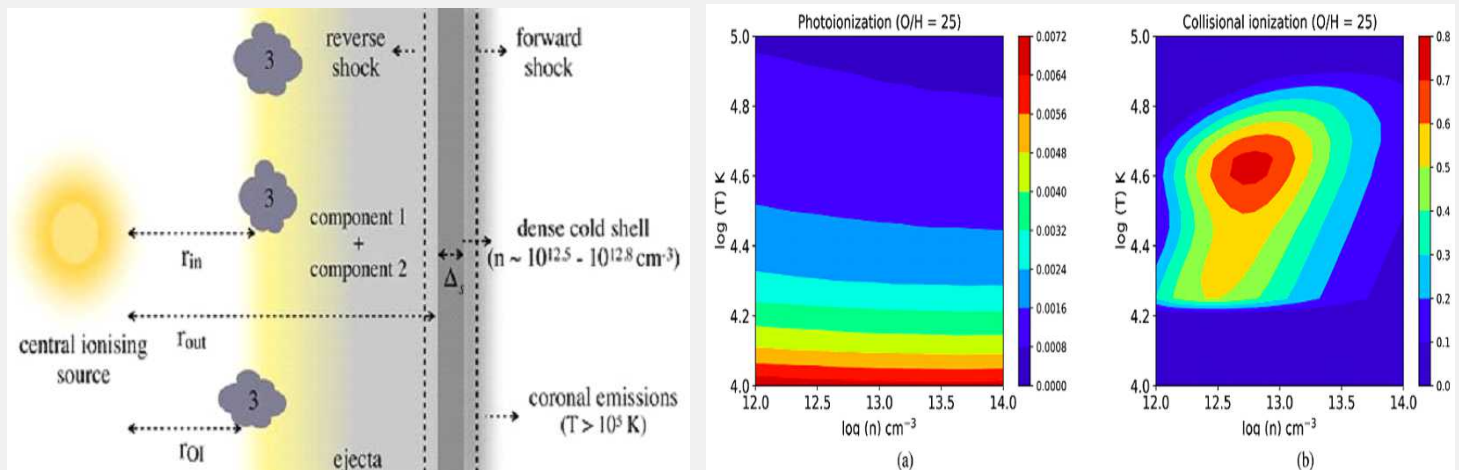


Figure: Schematic diagram of the variation of flux ratio of phenomenological model used for CLOUDY density and temperature. photoionization and collisional ionization models. The contour plot for the variation of flux ratio of O I 1.3164/Pa with the hydrogen density (n) and temperature (T). (a) cloudy models with photoionization case, with $\text{O}/\text{H} = 25$, and (b) with the collisional ionization models for $\text{O}/\text{H} = 20$.

Three Days HPC Workshop - “Parallel Programming and Concepts of AI”

The HPC Committee and CNIT Division of PRL organized three days High Performance Computing (HPC) workshop on “Parallel Programming and Concepts of AI” during July 01-03, 2024. It was organized to celebrate the 1st anniversary of 1PF Param Vikram-1000 HPC facility which was installed and availed for scientific use in June 2023. The main objective of the workshop was to:

1. Foster a community of scientists, researchers and academicians in Parallel Computing and Artificial Intelligence (AI),
2. Provide a platform for knowledge sharing and collaboration and
3. Address challenges and opportunities in various research using HPC and AI

In the inaugural address, Prof. Anil Bhardwaj, Director, PRL, mentioned how the combination of Parallel Programming and AI has opened up the new avenues for innovation and discovery. Prof. Bijaya Sahoo, Chair, HPC Committee, PRL, in his speech, highlighted that the parallel programming is a crucial aspect of an HPC which enables us to harness the power of multiple processors/cores to solve the complex scientific/research problems. He also said that this knowledge sharing will have a lasting impact on the advancement of HPC in various fields.

Prof. Pallamraju D., Dean, PRL expressed his view on AI and told that it has revolutionized the way we approach problems solving in various research domains. Prof. Varun Sheel, Chair, Computer Committee said that the participants will get more insights through hands-on sessions which is a very important aspect to build the HPC aware application. The external expert Mr. Kiran Kannappan, Founder, CEO of Vidatt delivered a series of lectures covering various topics related to the Workshop like Processor Architecture, OpenMP, MPI, Workload Manager Queue System, Debugging for Parallel Programming, Concepts of AI and Python. Mr. Sarath from Vidatt provided his support during Hands-On lab session and gave a few lectures on Python and other programming. Mr. Vaibhav from CNIT demonstrated application performances over GPU and CPU. He also demonstrated how to use Conda to make application platform independently with respect to library and specific version of software requirement. Mr. Jigar Raval, Head, CNIT division presented a talk on the Param Vikram-1000 HPC facility infrastructure to all the participants. Mr. Tejas Sarvaiya, Section Head, ITSN, Mr. Vaibhav Rathore, Sci./Engg.-SD, Mr. Hitendra Mishra, Sci./Engg.-SE and Mr. Alok Shrivastava, Sci./Engg.-SE moderated the sessions during the three days of workshop. Prof. R D Deshpande, Registrar, in his speech during the valedictory function, emphasized over the topics that were covered in the three days. Specifically, he highlighted how we observed a vibrant exchange of ideas and knowledge among the participants through this workshop. Around 45 Scientific/Technical faculties and research scholars of PRL and Universities/Colleges participated in the workshop on invitation basis. The participants gained valuable insights into parallel programming, concepts of AI along with hands-on lab sessions. They also performed hands-on lab exercises on Param Vikram-1000 HPC. We observed that the workshop fulfilled its objective by providing a platform for networking and collaboration among the HPC experts and students. The HPC Committee and CNIT team sincerely thank the Director, PRL, for his constant encouragement and motivation in organizing the workshop. We also thank the Registrar, PRL, and Dean, PRL for their guidance. We thank Prof. Varun Sheel, Prof. Namit Mahajan and Dr. Shanmugam for their support in all the workshop preparation.



The HPC Committee and CNIT Division of PRL organized three days High Performance Computing (HPC) workshop on “Parallel Programming and Concepts of AI” during July 01-03, 2024.

A Light Dialogue: On Carving a Niche and Life in Science

A public discussion hosted by PRL in collaboration with a Science Podcast – Zeroing In in the K.R. Ramanathan Auditorium on 23 July 2024. Zeroing In is a non-profit science communication venture which curates conversations with eminent Indian Scientists from across the globe spanning varied areas of science and research. The guest of honor for the public discussion was Prof. Ravindra Pratap Singh, Senior Professor, PRL.

The audience for the event included 150 school, undergraduate and MSc. Students, accompanied by their respective faculty members, from five different institutes from across Ahmedabad – Maharaja Agrasen School, Adani Foundation School, KV SAC, DPS Bopal, St. Xavier's College and Gujarat University. Rest of the seats in the auditorium was occupied by PRL members.

The event commenced with an opening note and introduction of Physical Research Laboratory by Director, PRL, which also led to a brief interaction session between Prof. Bhardwaj and faculty members of invited institutes. Following this, the main event opened with Prof. R.P. Singh giving an overall view of his research work and this flowed into the rest of the discussion as mitigated by the hosts - Mr. Sahil Mittal, Executive member, Zeroing In and Shreya Mishra, Scientist/Engineer-SC, PRL.

Towards the end of the discussion, questions from the audience were taken up which included questions addressing the understanding of quantum science and technology, upcoming fields, personal experiences and many more. Prof. Singh was felicitated with an artwork designed by the Zeroing In team and the event was declared closed with National Anthem.



Opening note and Introduction of PRL by director, PRL (TOP), Interaction session (Right), Guest of honor Prof. R.P. Singh having public discussion. (Bottom)

94th PRL Ka Amrut Vyakhyaan



The 94th PRL Ka Amrut Vyakhyaan was delivered by Dr. Harshil Mehta (Zonal Head of Emergency Medicine, Marengo CIMS Hospital, Ahmedabad) on 24 July, 2024. He delivered the Vyakhyaan on the pressing topic of cardiac arrests and its immediate treatment, titled “Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR)”. Nowadays, the number of cardiac arrests are seemingly increasing and when it occurs to a person, it creates a panic situation amongst the people around as they are unaware of how to handle such a medical emergency situation. Therefore, it is essential that everyone should possess basic knowledge about it and also should go through some training on Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR), so that a life can be saved. In this Vyakhyaan, Dr. Harshil Mehta addressed this very important medical concern of recent times with his vast experience and expertise. He started the Vyakhyaan, discussing four basic survival rules that one must follow when a person is unconscious around him/her. These include looking for a safe place, calling for help, giving early CPR and early defibrillation, and taking post resuscitation care. Under these rules, he discussed how to check the response of the person, the way of calling for help, and performing CPR before the help arrives. He discussed the sequence of CPR such as chest compression for keeping oxygen-rich blood circulating through the blood, opening the airways by tilting head back and lifting chin upward, and giving rescue breaths. For adults, he stressed upon giving 30 chest compressions in 15 seconds and two rescue breaths after opening airways. He emphasised repeating CPR procedures for five cycles and these five cycles to be completed in two minutes; if the person is still unconscious, continue the CPR cycles until the medical help arrives. He also discussed the CPR rules for babies. He stressed that if the person revived during CPR, then it is also essential to put the person in the recovery position until medical help arrives as it eases the breathing process and also prevents secondary damage of the lungs. He showed the exact way of putting a person in the recovery position. Subsequently, he discussed the importance of the automated external defibrillator (AED), a computerised defibrillator that automatically analyses the heart rhythm and how to use AED during CPR, if available. Towards the end of the Vyakhyaan, he did a live demonstration of CPR on a manikin with the help of the participants of the Vyakhyaan, reminding them the techniques and steps of CPR, and the proper way of doing chest compression, airway opening and breathing manoeuvre. It was a very exciting and memorable Vyakhyaan by Dr. Mehta.

You Tube Link: <https://www.youtube.com/live/LL1dhRF3po>



Workshop on ArcGIS Pro and ENVI from ESRI Professionals

A workshop on learning ArcGIS Pro and ENVI was conducted at PRL Thaltej campus 24th July 2024. Workshop was well attended by nearly 40 participants from the Planetary Sciences, Geosciences, and Atomic Molecular Physics divisions. It was highly interactive and beneficial, with participants engaging in valuable discussions regarding implementation of ArcGIS and ENVI software in their research. The ESRI professionals have presented on various aspects related to data handling, management, representation, processing, and integration using both ENVI and ArcGIS Pro. They demonstrated specific tasks such as boulder identification and mapping, crater detection, image segmentation, SAR interferogram generation, and spectral analysis using Chandrayaan-1 M3 and Mars Reconnaissance Orbiter (MRO) CRISM datasets through live demos and discussions. New tools and techniques added to ENVI and ArcGIS Pro were also discussed, highlighting their applications in both planetary and terrestrial data analysis.

The workshop participants gained significant new insights into the potential of ENVI, ArcMap, and ArcGIS Pro for geospatial data analysis. Participants have provided considerable feedback to the ESRI professionals, especially regarding enhancements needed for easier integration and analysis of planetary datasets. The ESRI professionals have promised to consider the suggestions and further work on improving the tools' applicability.



A workshop on learning ArcGIS Pro and ENVI this was attended by nearly 40 participants.

Meet and Greet program for the New (2024) batch of JRFs

Physical Research Laboratory has recruited 26 Junior Research Fellows (JRFs) in July 2024. To give an orientation about PRL to these newly recruited JRFs, a "Meet and Greet program" was arranged on 26 July 2024, Friday, at 9.30 AM in the K R Ramanathan Auditorium. The programme was led by the director, PRL. The Dean, Heads and Deputy Heads of all the Scientific Divisions, all faculty Members, Registrar, Heads of sections of all Administrative groups, namely, Accounts, Stores & Purchase, Dispensary, Workshop, Library, CNIT and Academic Services attended the programme.

In this programme, new JRFs introduced themselves in detail, including their education details, hobbies, etc. Subsequently, rules with regard to academic administration and academic course work, responsibilities of research fellows, Do(s) & Don't(s), and code of conduct were communicated to the new Junior Research Fellows.

The programme intended to provide orientation to new JRFs and introduce them to PRL's science, facilities, and administration. JRFs were also informed to have lab visits during their first semester through coordination by the Academic Committee. This was a unique programme to welcome new JRFs in the last several years, and JRFs were seemingly happy about this new initiative.

14th PRL Amrut Rajbhasha Vyakhyaan

"पीआरएल अमृत राजभाषा व्याख्यान (पर्व)" का 14वां व्याख्यान 31 जुलाई, 2024 को आयोजित किया गया था। इस अवसर के प्रख्यात वक्ता श्री उत्कृष्ट पांडेय, निदेशक, मार्सेलॉन एगोफार्म्स, पूर्व सहायक कमांडेंट, सशस्त्र सीमा बल थे।

श्री उत्कृष्ट पांडेय ने इलाहाबाद विश्वविद्यालय से अर्थशास्त्र में परास्नातक किया है। वह साढ़े 5 साल बतौर असिस्टेंट कमांडेंट, सशस्त्र सीमा बल, विभिन्न राज्यों में तैनात रहे और झारखण्ड में नक्सल विरोधी अभियान, असम में बोडोलैंड, बिहार में अंतरराष्ट्रीय सीमा पर महत्वपूर्ण सेवाएं दीं। स्वैच्छिक सेवानिवृत्ति लेकर अपने गृह जनपद (प्रतापगढ़, उत्तर प्रदेश) से विभिन्न उच्च मूल्य एवं औषधीय पौधों (चंदन, काली और कस्तूरी हल्दी, काला नमक धान आदि) की कृषिवानिकी एवं प्राकृतिक विधियों से खेती आरम्भ की। एक टिकाऊ और लाभदायक कृषि मॉडल द्वारा ग्रामीण जीवन-स्तर एवं आय को बेहतर बनाने के उद्देश्य से "मार्सेलोन एगोफार्म्स" की स्थापना की।

व्याख्यान का शीर्षक था The lecture was titled "कृषिवानिकी एवं पारंपरिक-प्राकृतिक खेती के माध्यम से आत्मनिर्भरता"।

व्याख्यान के दौरान श्री पांडेय ने बताया कि कृषिवानिकी एवं भारत की परम्परागत पद्धतियों से प्राकृतिक खेती करके रासायनिक उर्वरकों के पर्यावरण एवं स्वास्थ्य पर पड़ने वाले प्रतिकूल प्रभाव को कम किया जा सकता है। विभिन्न औषधीय पौधों को गाँव-गाँव में उगाकर भारतीय एवं वैश्विक बाजार में उत्तम गुणवत्ता के उत्पाद उपलब्ध हो सकते हैं और साथ ही साथ आर्थिक विकास और आत्मनिर्भरता के प्रयासों को और गति दी जा सकती है।

उन्होंने आगे बताया कि कैसे उनका संस्थान देश के विभिन्न हिस्सों के किसानों, स्कूल/कॉलेजों, सरकारी एवं समाजसेवी संस्थाओं के लिए फील्ड विजिट्स एवं ट्रेनिंग कार्यक्रम / ज्ञान-हस्तांतरण सत्र आयोजित करती है, और आवश्यक पौधे एवं तकनीकी सहायता उपलब्ध कराती है। इस पूरी प्रक्रिया में भारत के परम्परागत तौर-तरीकों जैसे कि बागवानी, गौ-पालन, एवं गोबर की खाद के प्रयोग को बढ़ावा दिया जा रहा है। औषधीय सन्दर्भ में अति-उपयोगी होने के बावजूद, चन्दन की कुछ प्रजातियां संकटग्रस्त पाई गयीं थीं, ऐसे में उत्तर भारत की जलवायु के अनुकूल नर्सरी तैयार की गई है।

व्याख्यान के बाद, एक इंटरैक्टिव प्रश्नोत्तर सत्र हुआ जिसने उपस्थित लोगों को विषय पर नए दृष्टिकोण और अतिरिक्त विवरण दिए।

The 14th lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on 31 July 2024. The eminent speaker for the occasion was Shri. Utkrisht Pandey, Director, Marcelon Agrofarm, Former Assistant Commandant, Sashastra Seema Bal.

Mr. Utkrisht Pandey has done his Masters in Economics from Allahabad University. He was posted as Assistant Commandant, Sashastra Seema Bal, in various states for 5½ years and rendered important services in Anti-Naxal operations in Jharkhand, Bodoland in Assam, and on the international border in Bihar. After taking voluntary retirement, he started farming of various high value and medicinal plants (Sandalwood, Black and Musk Turmeric, Black Salt Paddy etc.) from his home district (Pratapgarh, Uttar Pradesh) through agroforestry and natural methods. "Marcelon Agrofarm" was established with the aim of improving rural living standards and incomes through a sustainable and profitable agricultural model. The lecture was titled "कृषिवानिकी एवं पारंपरिक-प्राकृतिक खेती के माध्यम से आत्मनिर्भरता"।

During the vyakhyaan, Mr. Pandey explained that the adverse effects of chemical fertilizers on environment and health can be reduced by natural farming through agroforestry and traditional methods of India. By growing various medicinal plants in every village, good quality products can be available in the Indian and global markets and at the same time efforts for economic development and self-reliance can be given further impetus.

He further elaborated that how their organization arranges field visits and training programmes/ knowledge-transfer sessions for farmers, schools/colleges, Government and social organizations in different parts of the country, and provides necessary saplings and technical support. In the entire process, traditional Indian methods like gardening, cow rearing, and use of cow dung manure are being promoted.

After the vyakhyaan, there was an interactive Q&A session that gave the attendees fresh perspectives and extra details on the topic.

You Tube Link: https://www.youtube.com/watch?v=WB3WGSooCac&list=PL12xjTGd3ldgQXLe9_O8ygpF92DY2hj6P&index=14



PRL Monthly Publications Digest (July 2024)**Astronomy & Astrophysics Division [5]**

1. Verma, Aayushi, Sharma, Saurabh, Dewangan, Lokesh Kumar, Devendra K. Ojha, Kshitiz Mallick, Ram Kesh Yadav, Harmeen Kaur, Tarak Chand, Mamta Agarwal, Archana Gupta, 2024, Investigating the Star-forming Sites in the Outer Galactic Arm, The Astronomical Journal, Volume 168, Issue 3, id.98, 15 pp., DOI: 10.3847/1538-3881/ad5a8b, Date of Publication: 31/07/2024, Impact Factor: 5.3
2. Neelam Panwar, Rishi C., Saurabh Sharma, Devendra K. Ojha, Manash R. Samal, H. P. Singh, and Ram Kesh Yadav, 2024, Low-mass Stellar and Substellar Content of the Young Cluster Berkeley 59, Astronomical Journal, Date of Publication: 24/07/2024, Impact Factor: 5.1
3. Ruchi Pandey, Mudit K Srivastava, and Gargi Shaw, 2024, A phenomenological study of the evolution of shock-induced O I emission lines in the spectrum of nova V2891 Cygni, Monthly Notices of the Royal Astronomical Society, Date of Publication: 13/07/2024, Impact Factor: 4.8
4. Prantik Nandi, Sachindra Naik, A. Chatterjee, S. K. Chakrabarti, S. Safi-Harb, Neeraj Kumari, Narendranath Layek, 2024, Accretion properties of a low-mass active galactic nucleus: UGC 6728, 2024, Monthly Notices of the Royal Astronomical Society, 532, 1185-1198, Date of Publication: 09/07/2024, Impact Factor: 5
5. Jayanand Maurya, Manash Samal, Louis Amard, Yu Zhang, Hubiao Niu, Sang Chul Kim, Yogesh Joshi, Brijesh Kumar, 2024, Origin of extended main-sequence turn-off in open cluster NGC 2355, Monthly Notices of the Royal Astronomical Society, Date of Publication: 02/07/2024, Impact Factor: 5

Geosciences Division [6]

1. Shreya Mehta, Rainer Kiko, Helena Hauss, Narendra Ojha, Arvind Singh, 2024, Phosphate Influx and Dust Deposition Create Zonal and Meridional Biogeochemical Gradients in Trichodesmium Abundance, Global Biogeochemical Cycles, Date of Publication: 31/07/2024, Impact Factor: 5.4
2. AGU Editorial Network, 2024, Challenges Facing Scientific Publishing in the Field of Earth & Space Sciences, AGU Advances, Date of Publication: 17/07/2024, Impact Factor: 8.3
3. Swagatika Chakra, Harsh Oza, Akash Ganguly, Amit Pandey, Virendra Padhya, and R. D. Deshpande, 2024, Finer aspects of spatio-temporal variations in Indian summer monsoon rainfall trend reversals over the last 120 years, Climatic Change, Date of Publication: 17/07/2024, Impact Factor: 5.4
4. Chowdhury, S., H Berthelot, C Baudet, González-Santana, D., Reeder, C.F., S L'Helguen, J Maguer, C Löscher, Arvind Singh, S Blain, N Cassar, 2024, Fronts divide diazotroph communities in the Southern Indian Ocean, FEMS Microbiology Ecology, Date of Publication: 16/07/2024, Impact Factor: 3.5
5. Raghuveer Negi , Naresh Rana, S. P. Sati , Anil D. Shukla, Navin Juyal and Shubhra Sharma, 2024, The Beas river floods 2023: a watershed moment for paradigm shift towards urbanization and development in the Higher Himalayan valleys, Current Science, Date of Publication: 10/07/2024, Impact Factor: 1

6. Deepika Sahoo, Himanshu Saxena, Sipai Nazirahmed, Mohammad Atif Khan, Deepak Kumar Rai, Niharika Sharma, Sebin John, Sanjeev Kumar, A. K. Sudheer, Ravi Bhushan, Arvind Singh, 2024, Winter convective mixing regulates oceanic C : N : P ratios, Limnology and Oceanography, Date of Publication: 08/07/2024, Impact Factor: 4.5

Space & Atmospheric Sciences Division [4]

1. T. A. Rajesh and S. Ramachandran, 2024, Atmospheric black carbon aerosol: Long-term characteristics, source apportionment, and trends, Science of the Total Environment, Date of Publication: 15/07/2024, Impact Factor: 8.2

2. Sovan Saha, Duggirala Pallamraju, Sunil Kumar, Fazlul I. Laskar, Nicholas M. Pedatella, 2024, OI 630.0 nm Post-Sunset Emission Enhancement as an Effect of Tidal Activity Over Low-Latitudes, Journal of Geophysical Research - Space Physics, Date of Publication: 06/07/2024, Impact Factor: 2.8

3. Kshitiz Upadhyay, Duggirala Pallamraju, Supriya Chakrabarti, 2024, Estimation of Downward Heat Flux Into the F-Region From the Inner-Magnetosphere During Stable Auroral Red (SAR) Arc Events in the Daytime Obtained Using OI 630.0 nm Red-Line Emissions, Journal of Geophysical Research - Space Physics, Date of Publication: 05/07/2024, Impact Factor: 2.8

4. Poonam Mangaraj, Saroj Kumar Sahu, Gufran Beig, Ashirbad Mishra, Som Sharma, 2024, What Makes the Indian Megacity Chennai's Air Unhealthy? - A Bottom-up Approach to Understand the Sources of Air Pollutants, Aerosol and Air Quality Research, Date of Publication: 01/07/2024, Impact Factor: 2.8

Theoretical Physics Division [2]

1. Srubabati Goswami, Debashis Pachhar, Supriya Pan, 2024, Constraining the mass-spectra in the presence of a light sterile neutrino from absolute mass-related observables, Physical Review D, Date of Publication: 29/07/2024, Impact Factor: 4.6

2. Pritam Chatterjee and Paramita Dutta, 2024, Quasiparticles-mediated thermal diode effect in Weyl Josephson junctions, New Journal of Physics, Date of Publication: 23/07/2024, Impact Factor: 5.0

Udaipur Solar Observatory [2]

1. Ravi Chaurasiya, A. Raja Bayanna, R. E. Louis, T. M. D. Pereira and S. K. Mathew, 2024, On the Response of the Transition Region and the Corona to Rapid Excursions in the Chromosphere, The Astrophysical Journal (ApJ), Date of Publication: 30/07/2024, Impact Factor: 4.8

2. Yogesh Kumar Maurya, Ramit Bhattacharyya, David I Pontin, and Sanjay Kumar, 2024, Exploring the generation and annihilation of three-dimensional nulls through MHD simulations in initially chaotic magnetic field devoid of nulls, Physics of Plasmas, Date of Publication: 10/07/2024, Impact Factor: 2.0

Atomic, Molecular and Optical Physics [5]

1. Naresh Degda, Nimesh Patel, Malika Singhal, K.V.R. Murthy, Naveen Chauhan, Vishwnath Verma, M. Srinivas, 2024, Luminescence and Dosimetry Investigations of Eu(III) Doped Ca_2CeVO_6 Novel Double Perovskite, Optical Materials, Date of Publication: 23/07/2024, Impact Factor: 3.8
2. Subith Kumar, Anupam Pal, Arash Shiri, G. K. Samanta & Greg Gbur, , 2024, Evolution of C-point singularities and polarization coverage of Poincaré–Bessel beam in self-healing process, Scientific Reports, 14, 16647 (2024), Date of Publication: 18/07/2024, Impact Factor: 3.8
3. Swetapuspa Soumyashree and Prashant Kumar, 2024, Investigation of signal enhancement in nanoparticle enhanced molecular LIBS of graphite, Journal of Analytical Atomic Spectroscopy , Date of Publication: 18/07/2024, Impact Factor: 3.1
4. B. Ohayon, J. E. Padilla-Castillo, S. C. Wright, G. Meijer, and B. K. Sahoo, 2024, Reconciling mean-squared radius differences in the silver chain through improved measurement and ab initio calculations, Phys. Rev. Research 6, 033040 (2024); <https://doi.org/10.1103/PhysRevResearch.6.033040>, Date of Publication: 08/07/2024, Impact Factor: 3
5. Naresh Degda, Nimesh Patel, Malika Singhal, K.V.R. Murthy, Naveen Chauhan, M. Srinivas, 2024, Thermally Stable Luminescence and Dosimetric Features of Ho(III) Activated Tungstate Double Perovskite, Journal of Luminescence, Date of Publication: 04/07/2024, Impact Factor: 3.3

Visitors

1. UK Nationals, Mr. Andrew David, Mr. James Endicott of XCAM Limited, Northampton have visited PRL, Ahmedabad on 09 July 2024 in connection with discussions on Scientific Equipment and presentation on new development for designing the circuit of CCD and SCMOS.
2. Prof. Mishkatul Bhattacharya of Rochester Institute of Technology, New York visited PRL, Ahmedabad during July 16-18, 2024 in connection with Scientific Discussion with Scientists & Research Scholars.
3. Mr Vivek Pandey and Dr J Ravishankar from SAC, Ahmedabad visited Dean, PRL on Monday, 08 July 2024 for an official meeting.
4. Dr. Rupa Mukherjee, Assistant Professor, Dept. of Chemistry, Rajendra College, Chapra, Bihar and an Alumnus of PRL as INSA Visiting Scientist visiting PRL from 08 July 2024 to 05 October 2024.
5. Seven visitors came to Mt. Abu observatory on 24/07/2024.

Awards & Honours



1. **Prof. Anil Bhardwaj**, Director, PRL, has won the coveted **Joint COSPAR and Indian Space Research Organization (ISRO) Vikram Sarabhai Medal** for the year 2024 for his outstanding contributions to space research in developing countries.

2. In **45th COSPAR** Scientific Assembly held in Busan, Korea during July 2024, three (3) of PRL Colleagues were elected for positions in COSPAR Scientific Commissions (SC) [One Chair of Scientific Commission and Two of sub-Commissions], and two (2) of PRL colleagues continue to hold their positions.

3. **Prof. D Pallam Raju**- Elected as the **Chair of Scientific Commission-C (SC-C)**. The Scientific Commission C deals with "Space Studies of the Upper Atmospheres of the Earth and Planets Including Reference Atmospheres". The SC-C has 4 Sub-Commissions and 3 Task Groups. He is the only Indian to rise to this highest elected office of the Chair of a Scientific Commission of COSPAR.

4. **Dr. Megha Bhatt**- Elected as **Chair of Sub-Commission B3**. The Sub-Commission B3 deals with "the Moon", covering all aspects of lunar science and exploration.

5. **Dr. Kavutarapu Venkatesh**-Elected as **Vice-Chair of Sub-Commission C1**. The Sub-Commission C1 deals with "The Earth's Upper Atmosphere and Ionosphere".

6. **Prof. Varun Sheel**- Continues to be **Vice-Chair of Sub-Commission B4**. The Sub-Commission B4 deals with "Terrestrial Planets", including all aspects of the science and exploration of the terrestrial planets Mercury, Venus and Mars.

7. **Prof. S.A. Haider**- Continues to be **Chair of Sub-Commission C3**. The Sub-Commission C3 deals with "Planetary Atmospheres and Aeronomy", and addresses the study of planetary upper atmospheres, ionospheres, and magnetospheres, and associated aeronomical issues.

8. **Dr. Binal Patel**, PDF, Udaipur Solar Observatory of PRL has received **The Best Oral Presentation Award** in the "10th Plasma Scholar Colloquium (PSC-2024)".

9. **Dr. Prabir Kumar Mitra**, former PhD Scholar, Udaipur Solar Observatory of PRL has received **The 2022 International Astronomical Union (IAU) PhD Prize Honorable Mention** for his PhD thesis entitled "Investigations of Initiation and Evolution of Transient Phenomena in Solar Atmosphere".

Hearty welcome to our new members



NAME: Mr. P. Ayush

DESIGNATION: Library Assistant-A

DATE OF JOINING: 01/07/2024

DIVISION/AREA: Library & Information Services



NAME: Dr. Anshu Kumari

DESIGNATION: Reader

DATE OF JOINING: 29/07/2024

DIVISION/AREA: Udaipur Solar Observatory



NAME: Mr. T. Rakesh

DESIGNATION: PDF

DATE OF JOINING: 05/07/2024

DIVISION/AREA: Geosciences



NAME: Ms. H. Nazma

DESIGNATION: PDF

DATE OF JOINING: 23/07/2024

DIVISION/AREA: Astronomy and Astrophysics



NAME: Ms. Manika Singla

DESIGNATION: PDF

DATE OF JOINING: 26/07/2024

DIVISION/AREA: Astronomy and Astrophysics



NAME: Ms. Rohini

DESIGNATION: JRF-DST-CRG

DATE OF JOINING: 01/07/2024

DIVISION/AREA: Planetray Sciences



NAME: Arvind

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Astronomy and Astrophysics



NAME: Mr. Ayush Rana

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Astronomy & Astrophysics



NAME: Mr. Bhavesh Kuli

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Space & Atmospheric Sciences



NAME: Mr. Aditya Mishra

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Geosciences



NAME: Ms. Maitri M. Maheswari

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Geosciences



NAME: Mr. Md. Fahad Alam

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Geosciences



NAME: Mr. P. Jatin

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Atomic, Molecular and Optical Physics



NAME: Ms. Dibyani Singh

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Space & Atmospheric Sciences



NAME: Mr. D. Satyam

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Atomic, Molecular and Optical Physics



NAME: Abhishek

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Space & Atmospheric Sciences



NAME: Mr. H. K. Sachin

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Atomic, Molecular and Optical Physics



NAME: Mr. Samarpan Dutta

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Space and Atmospheric Sciences



NAME: Mr. C. Patil

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Planetary Sciences



NAME: Mr. Shuvendu Roy

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Theoretical Physics



NAME: Mr G. K. Omkar

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Planetary Sciences



NAME: Mr. Manoj

DESIGNATION: JRF

DATE OF JOINING: 15/07/2024

DIVISION/AREA: Planetary Sciences



NAME: Mr. K. N. Bharatkumar

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Theoretical Physics



NAME: Ms. Divya Paliwal

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Udaipur Solar Observatory



NAME: Mr. Ashad Ahmed

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Astronomy and Astrophysics



NAME: Mr. Ashif Ahmad

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Atomic, Molecular and Optical
Physics Division



NAME: Mr. Ayush Tillo

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Theoretical Physics Division



NAME: Ms. S. Subhangini

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Planetary Sciences



NAME: Ms. G. S. Shruti

DESIGNATION: JRF

DATE OF JOINING: 16/07/2024

DIVISION/AREA: Udaipur Solar Observatory



NAME: Ms. M. Nilima

DESIGNATION: JRF

DATE OF JOINING: 18/07/2024

DIVISION/AREA: Geosciences



NAME: Ms. S. Mansa

DESIGNATION: JRF-SERB-DST-SWARNAJAYANTI
FELLOW

DATE OF JOINING: 29/07/2024

DIVISION/AREA: Geosciences

Superannuation



Name of the employee	Prof. R. P. Singh
Designation at the time of superannuation	Senior Professor
Date of Birth	07.07.1964
Date of Joining PRL	04.10.1996
Date of Superannuation	31.07.2024

*We love all that you did. Now go and do
all that you love.*

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