Newsletter of the Physical Research Laboratory

THE SPECTRUM

During Dr. K. Kasturirangan's last visit to PRL, 30-31 January 2023

Image of the Month

"In memoriam Dr. K. Kasturirangan (1940-2025)"

May 2025

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The Author

Neha Panwar

Distinct, coeval ring volcanism around the Crisium Basin, Moon, and effect of a veiled Crisium East Basin on the longevity of volcanism in the region

(***Neha Panwar***, *Neeraj Srivastava, Ankita Yadav, Megha Bhatt, Christian Wöhler, Anil Bhardwaj)*

The Crisium Basin (17.0 ºN, 59.1 ºE) is a ~1100 km multi-ring Nectarian basin on the Moon, hosting widespread volcanism within the basin interior and along its rings. While several studies have investigated the basalts of Mare Crisium, volcanic activity along the basin's rings remained poorly understood until now. This study sheds light on the complex magmatic history of the Crisium Basin. Key volcanic regions along the rings of the Crisium Basin such as Mare Anguis, Mare Undarum, Mare Spumans, Lacus Bonitatis, and Marginis West though compositionally distinct, were all found to have been emplaced around the same time (Fig. 1), possibly from different sources. Notably, Mare Anguis hosts the youngest basalts yet reported within the Crisium Basin, emplaced around ~2 Ga. Its location near deep seated lunar faults (LGA) and a proposed ancient impact basin, Crisium East, may have helped sustain this late-stage volcanism. The findings from the study emphasize the role of ancient crustal faults, generated by these hidden basins, in shaping lunar volcanism. The 2 Ga basaltic unit within Mare Anguis represents a compelling target for future lunar exploration, with the potential to enhance our understanding of lunar magmatic processes and the early impact history of the Moon.

Source/Reference of the Work: https://doi.org/10.1016/j.icarus.2025.116641

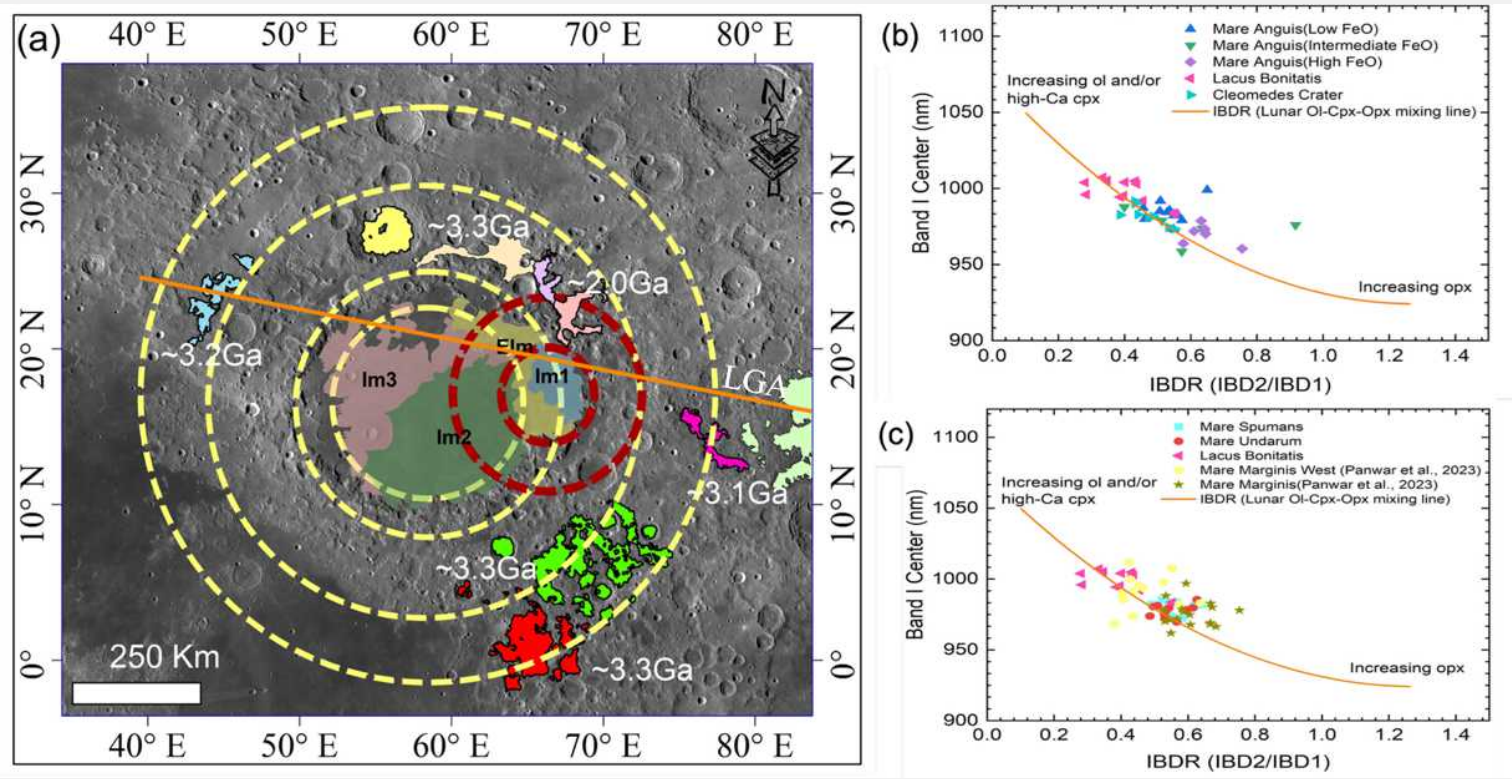


Fig: Temporal distribution of mare units along the rings of the Crisium Basin. The yellow and the red dashed lines indicate the rings of the Crisium and Crisium East Basin, respectively. (b, c) Band I Center vs. IBDR plots highlighting compositional variation in the Crisium Basin ring basalts.

Instantaneous formation of interstellar minerals and mineral quantum dots

The Author

Arijit Roy

(***Arijit Roy***, *Surendra V. Singh, R. Ramachandran, J. K. Meka, M. Ambresh, T. Vijay, P. Janardhan, V. Jayaram, V. Venkatraman, A. Das, H. Hill, Anil Bhardwaj, N. J. Mason, B. Sivaraman.)*

Like on Earth, minerals are often observed in different parts of the interstellar medium as well as in different bodies of our Solar System. Our understanding on the formation pathways of interstellar mineral dust are limited to-date. Our recent experimental investigation on the formation of astrophysical mineral dust revealed that mineral dust in the ISM, such as olivine, are made in the shock environment. Low velocity (Approx. 1.8 km s−1) interstellar shock conditions were simulated in the laboratory using High-Intensity Shock Tubes for Astrochemistry (HISTA), housed in PRL. These conditions enabled the examination of various cosmic mineral dust precursors such as the mixtures of Mg, Fe and SiO2 under shock strengths of approximately 5.6 Mach and temperatures up to 7300 K. Analysis of the processed samples revealed the presence of Mg-rich olivine, forsterite, MgO quantum dots (QD), and magnetite QDs. These results indicate that shockwaves can rapidly induce dust formation in the ISM. Furthermore, we demonstrated that shock processing of mineral dust precursors could contribute to the formation of crystalline silicate dust observed in comets and the creation of chondrules, which are observed in chondritic meteorites. We observed a dependence of melting point of different elements on the morphology of the mineral grains. From the experimental results, we also propose that mineral QD's play a major role in the interstellar emissions which is yet to be explored.

Source/Reference of the Work: https://doi.org/10.1039/D5RA01088H

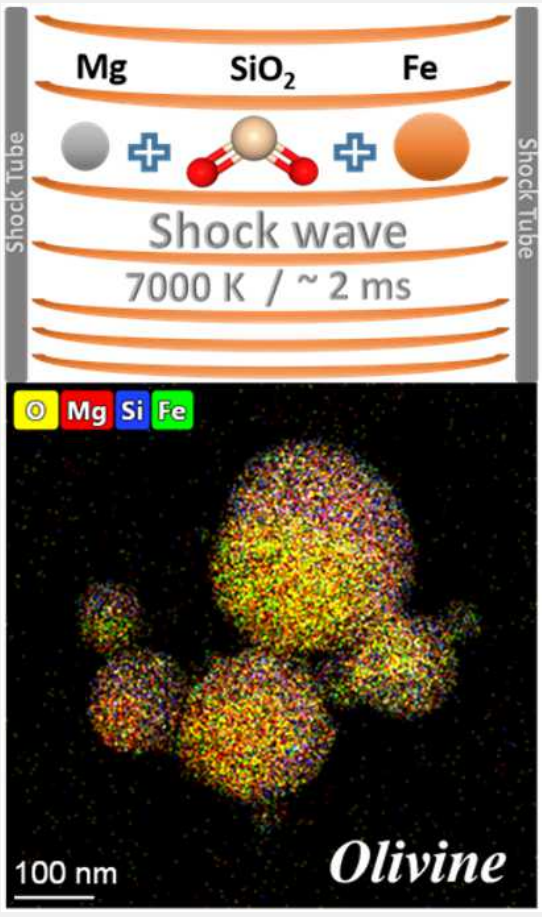


Fig: Pictorial representation of the shock-induced mineral formation from the precursors (Fe, Mg, SiO2).

The Author

Sandeep K. Dubey

Multi-height Study of the Chromospheric Inverse Evershed Flow and its Association with Photospheric Flows

(***Sandeep K. Dubey***, *Shibu K. Mathew, Christian Beck, and Debi P. Choudhary*)

Sunspots are regions of strong magnetic field, comprising a dark central umbra and a brighter penumbra. The magnetic field configuration around a sunspot supports plasma motions at different heights in the solar atmosphere. The two dominant plasma flows around a sunspot are the Evershed flow (EF) and inverse Evershed flow (IEF) observed in the photospheric and chromospheric layers.

We analyzed the inverse Evershed flow (IEF) around a sunspot (NOAA 13131) using line scan observations in the Fe I 6173 Å and Ca II 8542 Å spectral lines, obserced using the narrow band imager of the Multi-application Solar Telescope (MAST), Udaipur, complemented with data products from the Solar Dynamics Observatory's Helioseismic and Magnetic Imager. Line-of-sight (LOS) velocities were obtained for different bisector levels in both spectral lines. Additionally, the Ca II 8542 Å spectra were inverted to retrieve the temperature and velocity stratification over different layers of the lower solar atmosphere. The IEF evolved dynamically in time and with height in the solar atmosphere. The flow speed associated with the IEF channels was on the order of 8 km s−1 in the upper chromosphere, which decreased in the lower layers of the atmosphere. The flow was traced to the lower chromosphere in LOS velocity maps and the upper photosphere in intensity images. The temperature enhancements associated with the IEF were up to 300 K at log T= −2 and 800 K at log T = −6 near the end point of one channel. The overall appearance of the flow along the IEF channels seems consistent with a siphon flow model. We investigated the association of the IEF with the photospheric Evershed flow, but no obvious connection was found in our analysis. We also analysed the effect of the IEF on moving magnetic features (MMF) selected near and away from IEF channels. MMFS moved radially outward with velocities in the 0.2–1 km s−1 range, with no apparent association with the IEF.

Source/Reference of the Work: https://doi.org/10.3847/1538-4357/adc1cd

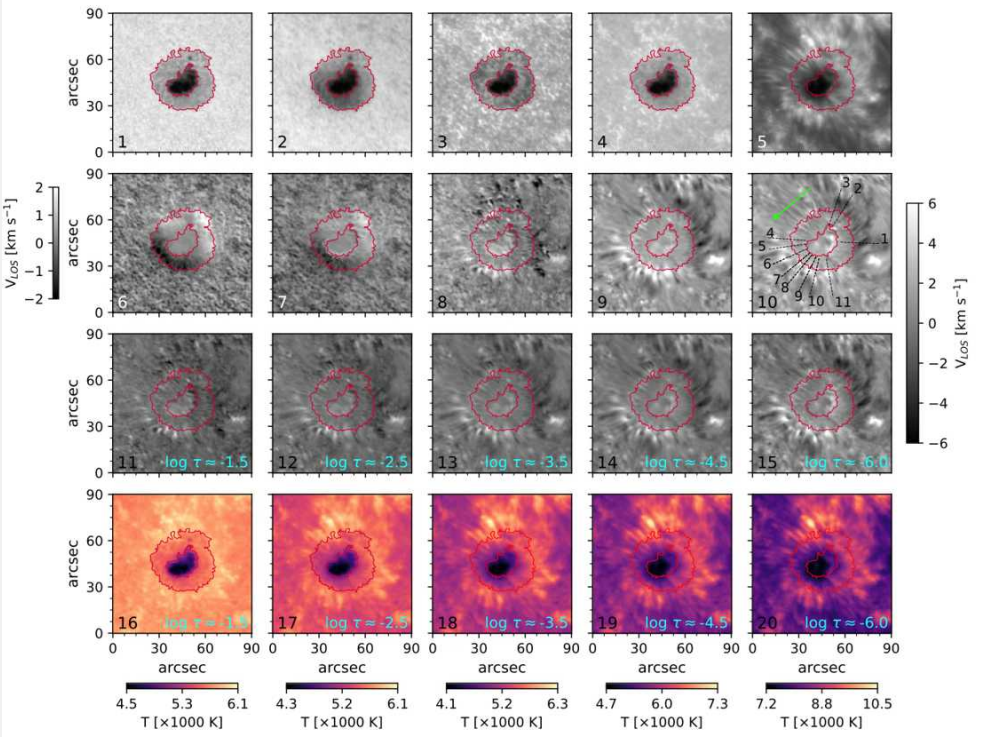


Fig: Top panels labelled 1-5 show the intensity maps across different layers of photosphere and chromosphere. Middle panels from 10-15 show line-of-sight velocity stratification and bottom panels from 16-20 show temperature

The Author

Sipai Nazirahmed

High prokaryotic diversity in the oxygen minimum zone of the Bay of Bengal: Implications for nutrient cycling

(**Sipai Nazirahmed**, *Praveen Rahi, Himanshu Saxena, Arvind Singh, Rakeshkumar Panchal*)

The ocean microbiome plays a central role in regulating ecosystem functioning and driving global biogeochemical cycles. Understanding the ecological roles of marine microbes is therefore essential for unraveling the dynamics of oceanic nutrient cycling. However, the functional diversity and spatial distribution of microbial communities across the world's oceans remain poorly characterized. One particularly understudied region is the northern Indian Ocean, and within it, the Bay of Bengal—harbors the fourth most intense oxygen minimum zone (OMZ) globally. OMZs are recognized as hotspots of microbial diversity and are sites of critical biogeochemical processes, including denitrification, anaerobic ammonium oxidation (anammox), heterotrophic nitrogen fixation, methane oxidation, and sulfur transformations. The low-oxygen conditions in OMZ create unique ecological niches that support specialized microbial communities capable of nitrate/nitrite reduction and sulfur oxidation or reduction. Thus, we investigated the abundance, diversity, and vertical distribution of bacterial and archaeal communities across both coastal and central regions of the Bay of Bengal. We specifically discuss genes responsible for nitrogen and sulfur metabolism to study the nitrogen and sulfur metabolic activity in the euphotic zone and the OMZ of the Bay of Bengal.

We found that the euphotic zone and OMZ waters demonstrate diverse prokaryotic communities. The OMZs of the Bay showed higher bacterial diversity than the euphotic zone (Figure, left). Presence of Planctomyceota, SAR406, SAR324, SUP05 and SAR11 might contribute to carbon, nitrogen and sulfur cycles in the OMZ of the Bay. Furthermore, the prediction analysis highlighted a higher abundance of sulfur and nitrogen metabolism pathways in OMZ whereas organic carbon utilization pathways were dominant in euphotic zone. We found that denitrification process were more abundant than nitrifiers in the oxygen minimum zone, suggesting dominance of denitrification in the Bay of Bengal (Figure).

Source/Reference of the Work: https://doi.org/10.3354/ame02016

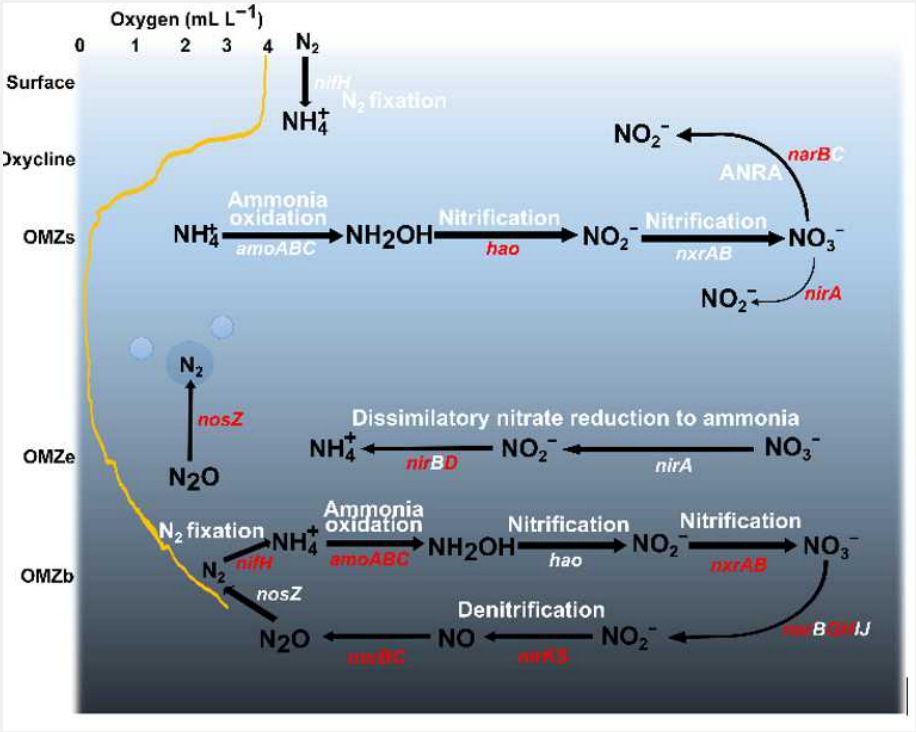


Fig: A schematic illustration of nitrogen cycle in the Bay of Bengal with indication of nitrogen cycling genes.

"My Aryabhatta days at PRL (1972-75)"

by R.N. Mishra

A radio propagation experiment onboard Nike Apache rocket was planned during 1969-1972 by our group headed by Late Prof J S Shirke. I had the responsibility of design and construction of the onboard instruments, that included MF radio receiver and its ferrite loop antenna. The receiver was accommodated in a small package of about 3X4X1 inch size and the antenna placed in an fibreglass nose cone section. The single frequency receiver at 2.53 MHz was supposed to receive signals transmitted from ground based CW transmitter operating at 2.53 MHz . The transmitting antenna was a crossed dipole erected near the telemetry station, and a RF switch was used to switch between the two orthogonal directions of the horizontal polarization. The propagation experiment was successfully conducted from Thumba in the first quarter of 1972. All of were elated to see the goal of our efforts made in the last two - three years, 1969-72.

Around the same time period, the first Indian satellite was also being planned under the banner of the newly formed ISRO. The three onboard scientific instruments were selected one of them being, The Gamma ray experiment of TIFR, and two experiments from PRL. The X ray spectrometer of Prof U R Rao being the second one onboard satellite. The third experiment conceptualised by Prof Satya Prakash and Prof B H Subbaraya ,consisted of two separate instruments, the retarding potential analyser (RPA), and Ultraviolet (UV) photometer, named together as Ionospheric experiment or just IONO. The two PRL experiments were allotted two project code names SAT/P1 for the X ray payload and SAT/P2 for the IONO.

I was assigned new responsibilities to participate in the IONO experiment payload instrument. It was very exciting and proud, moment for me to get an opportunity to contribute towards the first Indian satellite. In fact, I was thinking to apply for a position in the newly formed electronic product company UPTRON. The opportunity to work on the first Indian satellite was a once a lifetime opportunity, and I shelved all other plans and put my entire focus on the new project. I decided to stay put at PRL .The new project required new blood to take up the challenge. Accordingly, engineers and assistants were drafted from other projects of PRL to this newly formed SAT/P2 group of the IONO experiment. Mr K K Goswami had already been working with Prof Satyaprakash. Mr K N Somayajulu worked for a brief period. I was asked by my boss Prof J S Shirke, to join the group. The other engineers to join were, Mr Amitabh Banerjee and Mr R S Singh. Others members to join the group were Mr R K Patwardhan, Mr K S Modh, Mr V Babaram and Mr N S Savalgi. Mr A P Gohil used to visit ISSP for the instrument calibration, if I remember right. It became a huge crowd at second floor of new building. Room no 256 became hub for SAT/P2 activities. All of us worked very hard for about two years starting from the second half of 1972 to the first quarter of 1974 . I could just take one set of earned leave for visit to home town during the summer of 1973. The pre engineering model of the experimental instrument was fabricated soon after. The IONO experiment was accommodated in three packages, RPA unit, UV photometer unit and the Electronics package.

The satellite project was assigned to a newly formed unit named Indo Soviet Satellite Project or ISSP. Later on the name was changed to Indian Scientific satellite project retaining the acronym ISSP. Prof U R Rao was made project director of the ISSP and Dr Kasturi Rangan as deputy director. The ISSP was housed in industrial sheds at Peenya Industrial Estate, and A 1-6 ,Peenya Industrial Estate became a new important address. Prof U R Rao moved his group, more or less lock stock and barrel from PRL to ISSP. A small unit was retained at PRL to look after some X ray experiments. Satellite Systems division or SSD, which was supposed to look after satellite mainframe systems was seeded at Space Science and Technology Centre (SSTC, the old name for VSSC). The same was also moved from Trivandrum to Peenya. Thus ISSP became a satellite project hub in totality.

The pre engineering model of the three packages of the IONO experiment of PRL, got ready by March 1974. All the PRL packages were to be tested at the satellite centre to conform to the stringent interface requirements required by the satellite mainframe system. The project decided that the next level models, engineering model as well flight models needed to be fabricated at ISSP to ensure uniformity in quality control, as well as better coordination with the mainframe design team. The activities related to X ray payload had already shifted to ISSP Bangalore, and our team was also asked to move to ISSP Bangalore on transfer. The decision created some discontent, apprehensions in some of the team members. Myself having the main responsibility of over all payload, had already decided to move at the earliest. Other members of our group moved in due course to be stationed at ISSP. As per directive of Prof U R Rao, our team was to move to ISSP by March April 1974. The railway strike poured cold water on our travel plans. Quite a few members of ISSP faced hardship on trains, which were halted midway. I had plans to move my wife, toddler son and infant daughter to my home town, faraway in Ayodhya. Railway strike compelled us to change our plans. Tickets had to cancelled and their stay extended at Ahmedabad, much to the chagrin of our landlady, as we had planned to vacate the house and move to Bangalore. My father in law came to Ahmedabad after two weeks, to take my family by whichever mode it was possible.

Air Ticket was arranged for me to take the instrument with me to carry out compatibility tests at Bangalore, and I moved to ISSP in April 1974. The permission to air travel was hard to get in those days, and I had privilege, to go to Bangalore several times by air to attend to duties related to the Indian satellite, later on named as Aryabhata. Our team was accommodated in the ISSP guest house, located at upper palace orchards, with instructions that this was only temporary arrangement ,and we should look for suitable accommodation for ourselves. ISSP bus used to start from guest house at 0850 to reach ISP at 0930 , the office start time. Peenya was faraway place from Bangalore city, and Rajajinagar was the closest place to stay. Most of the new arrivers to ISSP looked for rented accommodation in Rajajinagar area. I got a small accommodation of one small bedroom set on the first floor of a building off the main road from city leading to Yeshwantpur railway overbridge. The ISSP buses had a halt at the petrol bunk, which became convenient for travel everyday. After arranging for accommodation I brought my family to Bangalore to stay with me. The stay was not so pleasant, as my young children had some health issues, off and on, and our evenings after return from ISSP, were spent in the queue of patients at the clinic of Dr Somasekhara Rao Kadle. I had dental problem too and thanks to Dr Nagarkatti of Malleswaram, who nicely treated my problem. ISSP dispensary manned by Dr Jantakal was on the west of cord road, and opened during day hours. Transport was also a big issue.

The work on the satellite was going on in full swing. The testing facilities had to be shared among different groups and long duration environmental checks were often scheduled for night. We had to come to ISSP by bus available at 1930 or 2200 hrs at the petrol bunk. During tenure of the tests one had to wait four hours or more to take readings and we dozed off on makeshift benches to get in between naps. The return trip bus started at 0600 hrs from Peenya. The schedules were rather very tough and taxing. The integration group headed by Mr V R Katti, had to deal with every one, Once it so happened that Mr V R Katti fainted during during one of the long term tests and medical help had to be called. The canteen facility at ISSP used to work more or less round the clock, which gave a big boost to our spirits. Breakfast, Lunch, snacks, tea and dinner all used to be arranged very well. The food used to be tasty and gave a joy to all of us.

By December 1974 most of the instruments of satellite were more or less complete, up and running. At last satellite got completed and was ready to be shipped to USSR for launch. Some of the team members accompanied the payload to the USSR launch station to carry out last minute testing of the health of onboard systems. After return from successful launch of the Aryabhata satellite on April 19 1975 we faced a sort of vacuum. Some of the members of PRL team opted to stay at ISSP and they were granted permission. Myself and my colleagues Mr R S Singh, Mr K S Modh , Mr R K Patwardhan and Mr A Banerjee, returned back to PRL. I vacated my house at Rajajinagar, and said bye to Bangalore in mid May 1975. Later Mr Patwardhan, who had moved to a private firm at Rajkot, decided to go back to ISSP. He applied for a post at ISSP and was called for interview. But fate had something else for him, he had appendix problem the night previous to the interview date and had to be operated at in the hospital. In the 50th year of the launch of the Aryabhatta, the first satellite from India for space science, I was reminded of the situations and the works that we had carried out in those times. I am truly grateful to the great opportunity that I had got to be directly involved in this landmark project of India.

In Memoriam of Dr K. Kasturirangan (1940-2025)

Dr. K. Kasturirangan left for the heavenly abode on April 25th 2025. Dr. Krishnaswamy Kasturirangan was a Distinguished Alumnus of PRL and an accomplished space scientist.

Dr. Kasturirangan did his schooling at Sree Rama Varma High School and graduated in science with honours from Ramnarain Ruia College, Mumbai, and obtained his Master of Science degree in physics from the University of Mumbai. Dr. Kasturirangan was encouraged to pursue research at PRL by Dr. Vikram Sarabhai in the then newly emerging area of X-ray astronomy. He received his Doctorate Degree in experimental high-energy astronomy in 1971, working at the Physical Research Laboratory, Ahmedabad. Dr. Kasturirangan's interests include research in high-energy X-ray and gamma-ray astronomy as well as optical astronomy. He has made extensive and significant contributions to studies of Cosmic x-ray sources, celestial gamma-ray, and cosmic x-rays effect in the lower atmosphere. He authored/co-authored more than 240 publications in the areas of astronomy, space science and applications.

Dr. Kasturirangan's entry into ISRO was in its formative years. In 1994, Dr. Kasturirangan was appointed the Chairman of ISRO and Secretary of the Department of Space. For the next nine years, until 2003, he led India's space odyssey with unmatched dedication and vision.

His early assignments were critical—he was the Project Director of India's first two experimental Earth observation satellites, Bhaskara-I and II, which laid the groundwork for India's future in space-based Earth monitoring. Under his leadership, as Chairman, ISRO, the space programme has witnessed several major milestones, including the successful launching and operationalisation of the India's prestigious launch vehicle, the Polar Satellite Launch Vehicle (PSLV) and more recently, the first successful flight testing of the all-important Geosynchronous Satellite Launch Vehicle (GSLV).

Dr. Kasturirangan served as a Member/Fellow of several academies, which include the International Academy of Astronautics (also served as its Vice President), the International Astronomical Union, The World Academy of Sciences the Indian Academy of Sciences (also as its President during 2001-2003), Indian National Academy of Engineering (also its President during 2005-2006), and the Indian National Science Academy, the National Academy of Sciences of India. He was also General President of the Indian Science Congress for the years 2002-2003. He was the Honorary Fellow of the Cardiff University, UK and Academician of the Pontifical Academy of Sciences, Vatican City.

He was the Chancellor of the Central University of Rajasthan and NIIT University. He was the one-time chancellor of Jawaharlal Nehru University and the Chairman of the Karnataka Knowledge Commission. He was a one-time member of the Rajya Sabha (2003–2009) and a former member of the erstwhile Planning Commission of India. He was also the director of the National Institute of Advanced Studies, Bangalore, from April 2004 to 2009. Dr K. Kasturirangan was the Chairman, National Education Policy 2020. He had been conferred with the highest civilian honours, Padma Shri, Padma Bhushan and Padma Vibhushan by the President of India and the Award of 'Officer of the Legion d'honneur' by the President of the French Republic, France.

With the demise of Dr. Kasturirangan, the PRL has lost a distinguished alumnus and an Honorary Fellow. Dr Kasturirangan was a fatherly figure for PRL who always encouraged, guided, and appreciated the scientific research activities being pursued at PRL and applauded its achievements. He had visited PRL for the last time during 30-31 January 2023 to participate in the PRL Alumni Meet and to deliver the 76th PRL ka Amrut Vyakhyaan. He visited various labs of PRL during those two days, and it is gratifying to know that he was immensely pleased with the path that PRL was treading and the giant strides it is making in all the research fields being pursued in PRL. With the passing away of Dr. K. Kasturirangan, PRL has lost a friend, guide, well-wisher, and one of the illustrious alumni. He will always be remembered for his vision, inspiration, and encouragement for PRL, which will continue to motivate in pursuing quality science in niche areas.

Dr. K. Kasturirangan visited to PRL for the last time during 30-31 January 2023

In Memoriam of Prof. P. Venkatakrishnan (1953 - 2025)

It was shocking to learn of the demise of Prof. P. Venkatakrishnan, who passed away suddenly in Bangalore on April 12th. Recognised globally for his seminal contributions to solar physics, particularly on solar magnetic fields, his demise has left a void in the field that will be very difficult to fill. Before his retirement, he was Senior Professor and Head of the Udaipur Solar Observatory (USO) of the Physical Research Laboratory (PRL) from 1999 to 2015. Prof. Venkatakrishnan was born in Thiruvananthapuram in 1953. He finished his schooling at Kendriya Vidyalaya in Thiruvananthapuram in 1969. He was a bright and meritorious student. He attained his BSc degree in 1972 and Master's in Physics in 1974 from University College, Thiruvananthapuram, achieving the 8th rank in B.Sc. and securing the first position in M.Sc.

He completed his PhD at the Indian Institute of Astrophysics (IIA), Bangalore in 1984, under the guidance of Prof. M H Gokhale and Prof. Chandrasekhara, on the "Study of Convection and Magnetic Fields in the Sun." Prof. Venkatakrishnan was an outstanding academician. He mentored 13 PhD students in solar physics, covering a wide range of topics from theoretical problems to experimental studies, demonstrating his commitment to allowing his students the academic freedom to explore their research. The high quality of the research his PhD students produced has resulted in them all securing positions at prestigious national and international institutions. He published more than 100 research articles in international journals. He was invited to join several organising committees of the International Astronomical Union. He also served as a member of the editorial board of the journal "Solar Physics."

His dream project to build a high-resolution solar telescope for magnetic field measurements prompted him to transition from IIA, Bangalore, to PRL's USO, Udaipur. Shortly after joining USO, he organised an international conference celebrating the silver jubilee of the foundation of USO in September 2001. At USO, he spearheaded several instrumentation initiatives, including Adaptive Optics for the solar telescope and the installation of the advanced 50 cm Multi-Application Solar Telescope (MAST) on the island in the Fatehsagar lake in Udaipur. For this achievement, he was also honoured with the ISRO Team award for the MAST project.

During his tenure as the Head, USO, he initiated several international collaborations like Indo-French, Indo-Japan, and participated in the ongoing Indo-US GONG program. He was regarded as a leading scientist and expert in the country, having contributed to the Panels of the ADCOS (Advisory Committee on Space) roadmap document for space sciences in India. He served on the review committees for various instruments in the ADITYA-L1 mission, which was successfully launched in September 2023 and is operational at the L1 point.

After retiring from PRL, he dedicated himself to writing books on the history and science of the sun. The three books he authored are: "Our Daytime Star: A Brief History of the Sun, "The Amazing Story of Kuton the Photon", and "Off to an Eclipse".

Under his guidance, the solar physics group at PRL's USO expanded and thrived, as several young scientists were appointed to lead ambitious projects in solar physics. The members of USO consistently found him approachable and willing to engage in discussions. He was an attentive listener who did not impose his views, which made him popular. He will be remembered fondly by all. His wife, Usha Ji, provided him with unwavering support and fostered a welcoming atmosphere for everyone in the USO family. He was also always keen to help young students by providing guidance and recommendations to shape their careers. Prof. Venkatakrishnan has left a scientific legacy that will keep inspiring future generations in India.

ChaSTE onboard Chandrayaan-3 measured Higher Surface Temperatures at Shiv-Shakti point: New Insight about Harboring Water-ice on the Moon

*(**Durga Prasad, K** , Kumar Chandan,et. al.)*

The Chandrayaan-3 mission, which has successfully accomplished soft-landing near the Moon's southern polar region on 23 August 2023, marked a significant milestone in lunar exploration. A cornerstone of this mission was Chandra's Surface Thermophysical Experiment (Chaste), an instrument designed to investigate the thermal properties of the lunar regolith that was onboard the Vikram lander. For the first time, ChaSTE provided in-situ measurements of temperature and thermal conductivity in the Moon's high-latitude region, addressing critical gaps in our understanding of lunar thermophysics.

The ChaSTE payload was developed collaboratively by Physical Research Laboratory (PRL), Ahmedabad and Space Physics Laboratory (SPL), VSSC, Trivandrum with help of various entities of Vikram Sarabhai Space Centre (VSSC) and Space Applications Centre (SAC), Ahmedabad. ChaSTE has the following two objectives. Passive Experiment: Measure vertical temperature gradients within the top 10 cm of regolith. Active Experiment: Determine thermal conductivity by heating the soil and analysing heat dissipation.

Chaste experiment consisted of a ~40 cm probe made of low-thermal-conductivity composite (0.16 W/m·K) to minimise heat distortion, and it had ten platinum RTD sensors (Pt-1000) along its body at 6-18 mm intervals to measure temperature at various depths. A motor-based mechanism allowed controlled penetration into the regolith. A Kapton strip ribbon heater was bonded around the sensor RTD9 to measure the thermal conductivity of the lunar regolith. The microcontroller-based electronics system had two cards: the front-end electronics card (FE) and the processing electronics card (PE). The PE controlled the instrument's deployment and penetration with BLDC motors, transferring data to the lander, operating the probe heater for thermal conductivity measurements, and generating telemetry for deployment and penetration operations. The FE was responsible for exciting all 10 RTD sensors with a constant current source, acquiring analogue voltages from the sensors and converting the acquired analogue signals to digital signals by an Analogue to Digital Converter (ADC). It was also responsible for monitoring the heater and motor currents. The FE card consisted of ten independent signal conditioning channels, one for each RTD. An advanced current loop conditioning scheme was used in ChaSTE FE for high accuracy temperature measurements.

ChaSTE's passive experiment revealed unexpected thermal behaviour at the landing site ("Shiv Shakti Point," 69.37°S, 32.32°E). The probe's presence altered local temperatures by 5–10 K due to its higher thermal inertia. 3D thermophysical model corrected this bias, revealing "true" regolith temperatures. The probe recorded a peak surface temperature of 355 K (82°C) at local noon, significantly hotter than the 330 K predicted by NASA's Diviner instrument. This discrepancy was attributed to ChaSTE's deployment on a sunward-facing slope (6°), which amplified solar heating. Nearby flat terrain, measured indirectly via a lander-mounted sensor, aligned with Diviner's predictions (~332 K). Temperature differences of 85 K were observed between the surface (355 K) at 10 cm depth (270 K) at midday, highlighting the regolith's role as a thermal insulator. Night time temperatures plummeted to 105 K (-168°C), consistent with radiative cooling in the vacuum. ChaSTE demonstrated that meter-scale slopes drastically alter thermal conditions. While sunward slopes amplify heating, poleward slopes >14° maintain subsurface temperatures below 120 K, creating microenvironments where water-ice could migrate and stabilise. This challenges the assumption that only permanently shadowed polar craters harbour ice, expanding potential exploration targets to high-latitude slopes. (https://doi.org/10.1038/s43247-025-02114-6)

- ChaSTE's active heating experiments provided the first in-situ thermal conductivity measurements in the Moon's southern highlands. The regolith's thermal conductivity at 80 mm depth was 0.0115–0.0124 W/m·K, aligning with Apollo-era equatorial measurements but lower than remote-sensing estimates (~0.1 W/m·K). This confirms the regolith's insulating properties, critical for modelling heat flow and volatile retention. Motor current data during probe insertion revealed a regolith density of 1940 kg/m^3, denser than Apollo samples (~1300–1900 kg/m^3). This compaction likely resulted from lander exhaust disturbing the surface layer, a factor future missions must account for. ChaSTE's foil heater and transient analysis technique overcame challenges faced by prior missions. Ground tests with lunar simulants (polyurethane foam) established calibration curves, enabling accurate inversion of flight data. Numerical models (COMSOL Multiphysics) validated these results, confirming ChaSTE's reliability. (https://doi.org/10.1038/s41598-025-91866-4)

ChaSTE's data suggest that high-latitude poleward slopes (not just polar craters) could trap water-ice at shallow depths (<1 m). These regions, technically less challenging to access, are prime targets for future rovers and drills. The regolith's low thermal conductivity (0.01 W/m·K) offers natural insulation for habitats but poses challenges for heat dissipation in electronics. ChaSTE's measurements will inform the design of lunar bases and energy systems. By quantifying how local topography affects temperatures, ChaSTE's findings enhance the accuracy of orbital data (e.g., Diviner, LRO), enabling better predictions of volatile distribution.

The ChaSTE experiment on Chandrayaan-3 has redefined our understanding of the Moon's thermal environment. Its in-situ measurements revealed the profound influence of small-scale topography on temperatures, identified new regions for water-ice exploration, and provided critical data for engineering lunar infrastructure.

All ChaSTE data are publicly available via ISRO's PRADAN portal (https://pradan.issdc.gov.in/ch3)

The results were published in the following peer-reviewed journals

1. Durga Prasad, K , Kumar Chandan, G, A. et al. Higher surface temperatures near south polar region of the Moon measured by ChaSTE experiment on-board Chandrayaan-3. Commun Earth Environ 6, 153 (2025). https://doi.org/10.1038/s43247-025-02114-6

2. Mathew, N., Durga Prasad, K., Mohammad, F. et al. Thermal conductivity of high latitude lunar regolith measured by Chandra's Surface Thermophysical Experiment (ChaSTE) onboard Chandrayaan 3 lander. Sci Rep 15, 7535 (2025). https://doi.org/10.1038/s41598-025-91866-4

3. Mathew, N., Durga Prasad, K et al., Chandra's Surface Thermophysical Experiment (ChaSTE) onboard Chandrayaan3 Lander, Advances in Space Research, Date of Publication: 22/01/2025

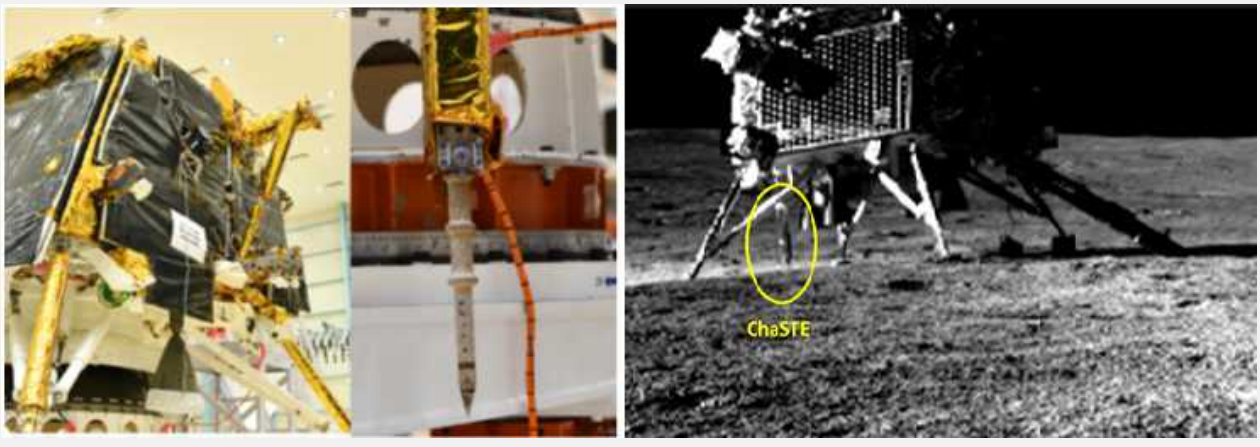


Fig: ChaSTE payload is undergoing integrated test with lander. The probe after coming out from the cylindrical tube, is also shown (https://doi.org/10.1016/j.asr.2025.01.022)

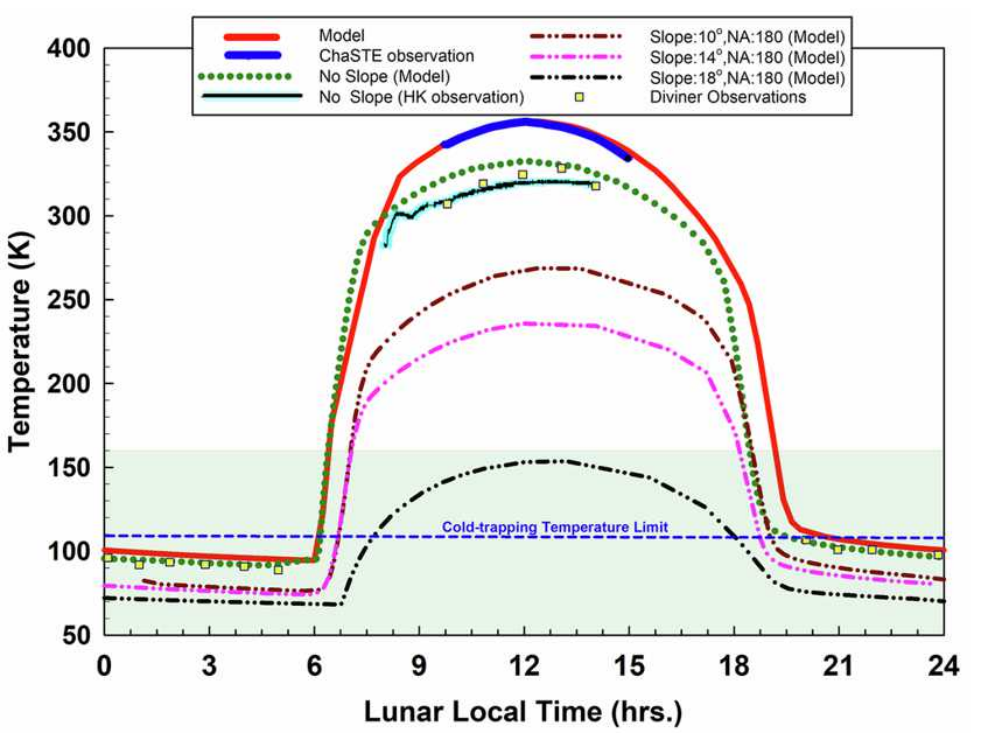


Fig: Solid blue and red curves show in situ surface temperature measurements and modelled diurnal temperatures. Surface temperature at a 0° slope location at a distance of nearly 1 m from the Chaste position is shown in the black curve (cyan band represents error bar), and the corresponding diurnal temperatures from the model are depicted in the green dotted curve. NA in the legend indicates North Aspect angle. Diviner observations during day and night are shown as yellow squares. Model-derived diurnal temperatures for locations having poleward slopes of 10°, 14° and 18° are shown using dashed-double-dot curves. The green band represents the optimum temperature conditions for water-ice migration and cold trapping

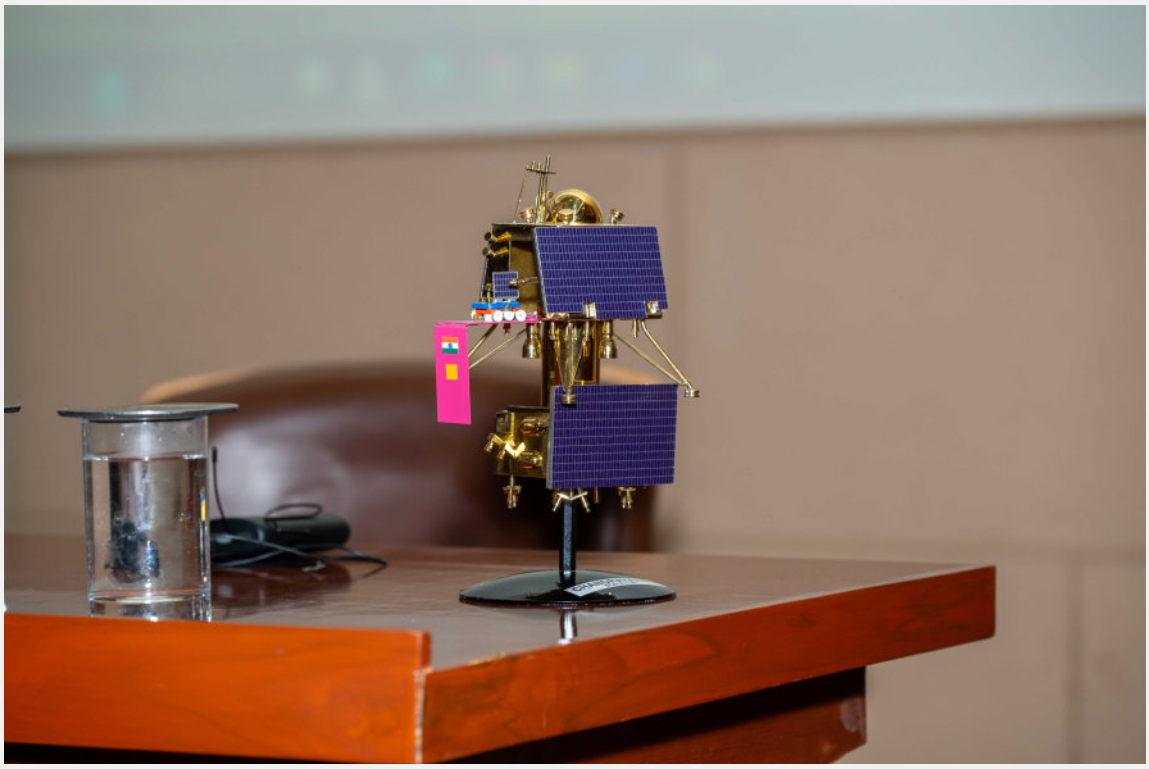
Celebration of Science from ChaSTE Experiment onboard Chandrayaan-3 Lander

The scientific results from ChaSTE, an instrument jointly developed by the Physical Research Laboratory (PRL) and the Space Physics Laboratory (SPL) of Vikram Sarabhai Space Centre (VSSC), onboard the Chandrayaan-3 mission, were recently published in Nature Communication Earth and Environment journal. To celebrate this significant scientific milestone, an event was organized at PRL in the K. R. Ramanathan Auditorium on 9th April 2025, from 2:30 to 4:00 PM.

In addition to the entire PRL community, the event also welcomed superannuated PRL colleagues and contributors from the Space Applications Centre (SAC), Ahmedabad, who played an important role in the development of the instrument. The gathering served as an occasion to reflect the journey from the experiment's inception to the realization of its scientific outcomes.

The programme commenced with a welcome address by Prof. Anil Bhardwaj, Director, PRL. Members of the ChaSTE team from PRL shared brief, informal accounts highlighting various exciting aspects of the instrument's development. Dr. Durga Prasad, Principal Investigator (PRL) of ChaSTE, recounted his experiences from conceptualization to realization of the instrument, along with engaging anecdotes from the process. Mr. Chandan Kumar, Deputy Project Manager – FE Electronics, offered insights into the technical challenges that the team could successfully navigated during development.

It was indeed encouraging to witness the auditorium filled to capacity with an enthusiastic and appreciative audience. Mr. Sanjeev Kumar Mishra, Deputy Project Manager – Science Characterisation, presented the vote of thanks. ChaSTE team members from PRL and SAC were felicitated for this achievement by Prof.Anil Bhardwaj, Director-PRL, who was accompanied by Prof. D. Pallam Raju, Dean and Prof. Varun Sheel, Head-PSDN. The event concluded with a high tea, marking a fitting end to the celebration.



Celebration of Science from ChaSTE Experiment onboard Chandrayaan-3 Lander

7th PRL-IAPT Dr. Vikram Sarabhai Lecture (April 9, 2025)

PRL-IAPT Dr. Vikram Sarabhai Lecture, organised regularly every year, is one of the flagship activities of PRL. On the afternoon of Wednesday, April 9, the 7th lecture of the series was organised at the K. R. Ramanathan Auditorium, Physical Research Laboratory Ahmedabad. The speaker for the 7th lecture was Prof. Bijaya Sahoo, Sr. Professor and Head, AMOPH division, PRL. Prof. Sahoo has been listed as one of the Top 2% of Scientists in the world in the respective research fields since 2020 and is a recipient of NASI Fellowship, Buti Foundation Award (2018), and the S.N.Ghosh Young Scientist Award from the Indian Society of Atomic & Molecular Physics (2010) together with other laurels from abroad. Prior to joining PRL, Prof. Sahoo worked at leading research organisations in Germany and The Netherlands.

Atomic physics is one of the primogenital and the longest scientific endeavours in the history of mankind, and it spans from ancient philosophical ideas to modern fundamental research today. The notion of the atom evolved gradually from indivisible particles to explain the concept of quantum mechanics and subatomic structures. The 7th annual lecture was an ongoing celebration of the worldwide IYQ2025, as the inner secrets of the atom were revealed about a hundred years ago through quantum mechanics and quantum principles.

The programme began with a welcome address by Prof. Anil Bhardwaj, Director, PRL, who briefed the audience about the annual PRL-IAPT Dr. Vikram Sarabhai Lecture series, which has been jointly organised since 2019. Dr. Chetan Limbachiya, Head, Department of Applied Physics, MS University, Vadodara, introduced the speaker who delivered the lecture on "A brief expedition into an Atomic Universe".

Prof. Bijaya Sahoo very lucidly outlined how Atomic Physics goes beyond the usual Physics of atoms! The speaker discussed numerous atomic processes to show pathways for exploring natural treasures of various facets of fundamental Physics. He started with the familiar periodic table and the electronic configurations in atoms as taught in school-level science, giving an overview of matter from macroscopic entities down to quarks. He then dwelt upon the multi-electron atoms, outlined how atomic structure grows into theoretical complexities, and offered computational challenges. An important consideration here is the dimensional and the energy hierarchy involved. Quantum mechanics plays a crucial role everywhere. He explained electromagnetic, weak and strong interactions within an atom and touched upon the Physics 'beyond standard model' such as Lorentz symmetry violation, neutrino interactions, dark matter candidate mediating interactions, CP/T violation, etc. He touched upon topics such as new vector bosons and nuclear structure from isotope studies and atomic parity violation. In that way, Prof. Sahoo vividly portrayed atomic systems as natural laboratories to study fundamental physics.

What are the applications of fundamental knowledge like this? One would ask. Prof. Sahoo turned to this important question and outlined how atomic knowledge is useful in emerging science and technologies. The atomic clock plays important roles in very many ways today. Mentioning the success of our Chandrayaan -3 mission, he explained how the mission payloads have succeeded in detecting various chemical elements on the lunar surface. Advanced atomic physics is also essential in the Aditya L1 data analysis. These days, a fundamental role is also played in identifying various interstellar objects through atomic spectra. Atomic knowledge works for us through lasers of different types.

The speaker highlighted the role of many-body theories in the test for quantum mechanics on one hand and that of atomic physics in exploring nuclear knowledge through the studies of isotopic shifts, etc. Current studies involve the synergy between high-precision measurements and three theoretical areas --particle, nuclear and atomic physics. Atoms provide natural laboratories for studying fundamental physics, he said, and emphasised, in conclusion, on developing accurate relativistic many-body methods.

Thanking the speaker, Prof. P. C. Vinod Kumar, President IAPT RC-07, conducted the Q-A session and mentioned about the relevant quantum technologies. He gave an outline of the national and RC-level activities of IAPT. Dr Bhushit Vaishnav of PRL was the programme anchor. The crowd applauded when Prof. K. N. Joshipura mentioned that our Indian students encouraged by IAPT always win medals in various science Olympiads year after year. He also recalled the previous speakers of the lecture series from 2019 onwards and presented a memento to Prof. Bijaya Sahoo. RC-07 treasurer Dr. Punit Suthar proposed a vote of thanks. The audience, comprising students, PRL scientists, IAPT members, and those viewing the YouTube live, enjoyed the entire programme.

Prof. Sahoo as the speaker of 7th PRL - IAPT, he has been listed as one of the Top 2% of Scientists in the world in the respective research fields since 2020.

Celebration of Ambedkar Jayanti

The 135th Birth Anniversary of Bharat Ratna Dr. B R Ambedkar was celebrated at the PRL Reserved Class Employees' Association Office, at PRL Main Campus on 14.04.2025 (Monday).
The program began with a lamp lighting ceremony. Prof. D. Pallam Raju, Dean of PRL, Dr. Harish Gadhvi, Liaison Officer for OBC employees at PRL, Dr. T. A. Rajesh, Liaison Officer for SC, ST, and PwBD employees at PRL, along with other PRL staff members, paid floral tribute to Dr. Babasaheb Ambedkar, the eminent architect of the Indian Constitution.

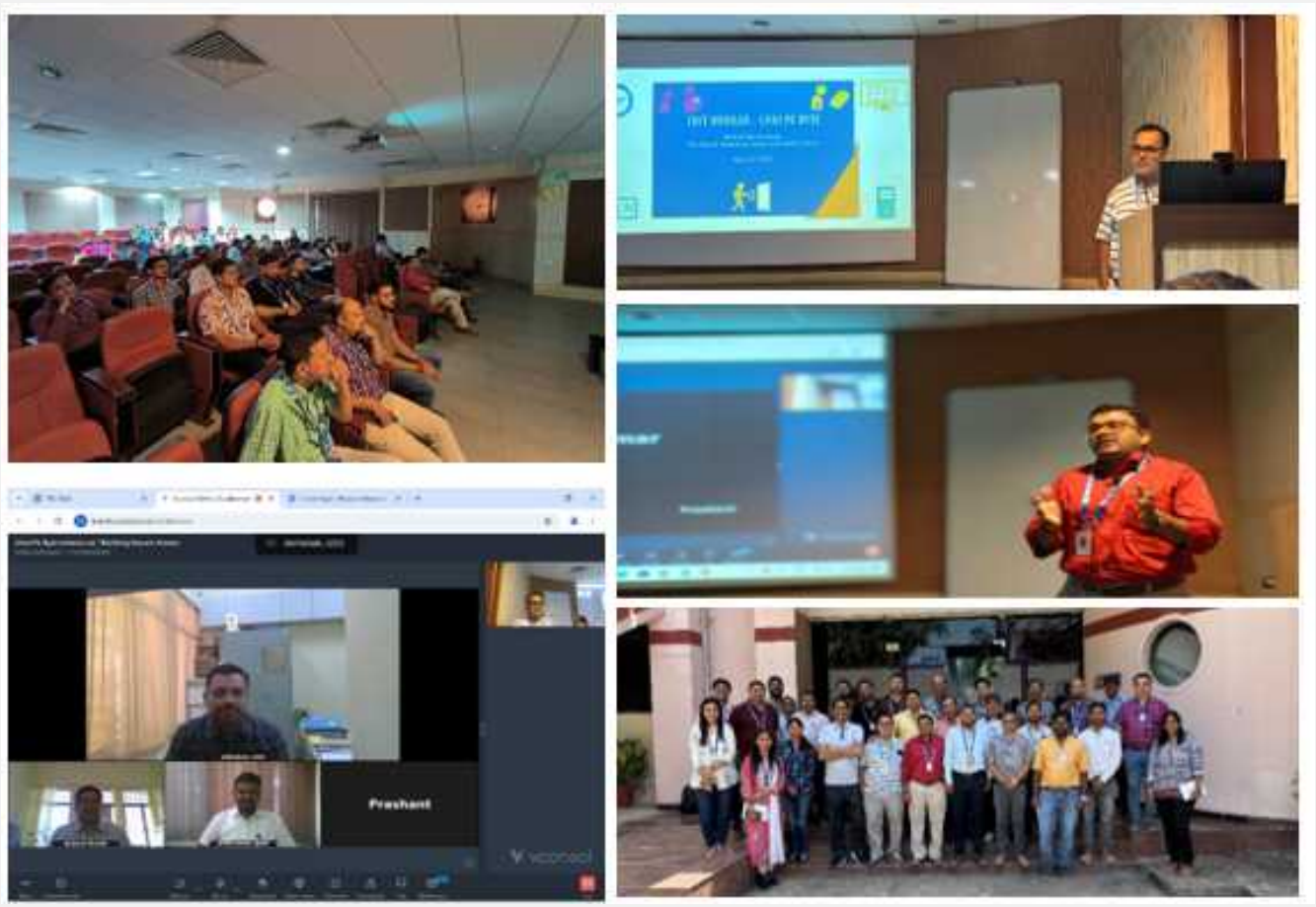
During the event, Prof. D. Pallam Raju delivered a tribute to Dr. Ambedkar, highlighting his contributions towards the betterment of India. Dr. Harish Gadhvi and Dr. T. A. Rajesh also shared their reflections on Dr. Ambedkar's vision of equality in honor of his birth anniversary. The program was coordinated by the PRL Reserved Class Employees' Association.

Celebration of Ambedkar Jayanti

2nd CNIT Division Nukkad - "Chai Pe Byte" of the year 2025

The 2nd CNIT Division Nukkad – “Chai Pe Byte” of the year 2025 on “Building Secure Access: The Role of Technology, Setup and Identity Cards” was held on April 22, 2025 in offline mode during 10:00hrs to 11:00hrs. Total 37 participants attended the session. In the session, 90% discussion was in Hindi and 10% discussion was in the 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. Atul Manke warmly welcomed all the participants in the 2nd session of CNIT Division Nukkad – Chai Pe Byte on “Building Secure Access: The Role of Technology, Setup and Identity Cards” and briefed the objective of the session. The main objective of the session were:
1. Provide a comprehensive overview of the setup and functionality of the Biometric Access Control System (BACS).
2. Highlight the uniqueness of Identity Cards in ensuring secure access and enhancing safety measures.
3. Explore the software applications associated with BACS.
4. Upgradation of the existing BACS infrastructure to improve efficiency and reliability.
Mr. Rahul Sharma presented an overview of the BACS architecture including its brief history. He highlighted Architecture, Visitor Management and Identity Cards uniformity across all DOS/ISRO centers/units for secure access. He also briefed limitations of setup and common issues reported by users along with how they were resolved to minimize the issues.
The discussion on “Building Secure Access” provided valuable insights into the Biometric Access Control System (BACS) and its role in ensuring safety and security. The talk covered key aspects of BACS infrastructure, identity card significance, associated software applications, and the necessary upgrades to enhance reliability.
Key Takeaways:
1. Comprehensive Overview of BACS: Mr. Rahul provided an in-depth explanation of the BACS architecture, tracing its evolution and functionality. He emphasized the importance of biometric technology in streamlining access control.
2. Identity Cards for Secure Access: The uniqueness of identity cards in maintaining uniformity across all DOS/ISRO centers/units was highlighted. Their role in visitor management and improving security measures was discussed in detail.
3. Software Applications in BACS: The integration of various software tools was explored, showcasing their contributions to enhancing Authentication & Authorization, Identity Card Management, Tracking access logs, and managing visitor entries.
4. Addressing Setup Limitations & User Concerns: Common challenges faced by user like IN/OUT data loss and access delays were discussed. Mr. Rahul also outlined successful strategies for resolving these issues to minimize disruptions.
As discussed in the OLIC meeting to aware the PRL users about document sharing features of Desktop based Online Meeting software, Mr. Tejas Sarvaiya demonstrated document sharing feature of Desktop based online meeting software like Vconsol, ISRO Jitsi and Google Meet. This will help users to efficiently share the document during online meeting.
CNIT team sincerely thank Director, PRL, for his constant guidance and motivation to initiate such activities in different IT verticals. We thank Registrar, PRL, and Dean, PRL for their support. We thank Prof. Bijaya Sahoo, Prof. Varun Sheel, Prof. Namit Mahajan, Dr. Shanmugam for their guidance and support in all the IT related activities and projects. The CNIT team would like to extend their heartfelt gratitude to all the Divisions' Heads, Deputy Heads, and Section Heads for nominating their web content manager for this session. From the bottom our hearts, we thank all the participants who enthusiastically participated, provided their valuable feedback and encouraged us to conduct similar events in future. CNIT team thank Mr. Pradeep Chauhan for providing Online VConsol Meeting link for USO and Mount Abu participants. We also thank all the PRL fraternity for their cooperation and help.



“Chai Pe Byte” initiative is to facilitate knowledge sharing and experience exchange, identify and address IT related concerns of users, and explore potential solutions

103rd PRL ka Amrut Vyakhyaan

The 103rd PRL Ka Amrut Vyakhyaan was delivered by Lt. Gen. Raj Shukla (Retd.) on April 23, 2025. In this engaging Vyakhyan, Lt. Gen. Shukla shared his experiences and wisdom on our national security and its relevance to global geopolitics, with his talk titled ''India's National Security Challenges/ Futures – The Intersect Of Geopolitics and Technology".

Lt. Gen. Shukla started the Vyakhyyaan, stressing that today India stands at a pivotal point in its development, where economic growth and cultural engagement must be complemented by robust national security. He then emphasised that it requires building a modern strategic military enterprise founded on technological innovation, active engagement with the scientific community, and the establishment of a strong military-industrial base to enhance our global strategic standing. Referencing the timeless wisdom of Chanakya, he emphasized the relevance of preparedness in today's complex geopolitical landscape and security challenges. He underscored the urgency of equipping our forces with advanced defence systems to protect national interests and support the vision of a Viksit Bharat. He highlighted the need for rapid advancement in civil manufacturing sectors of our country to build an indigenous advanced military-industrial complex. He emphasized the need of adopting cutting-edge technologies, such as artificial intelligence, quantum computing, robotics, and precision-guided systems, to address modern threats effectively and timely. Though defence investments are costly, he argued they are essential for maintaining peace by ensuring strategic deterrence. Furthermore, he highlighted that the Government of India has earmarked 2025 as the year of defence reforms, aimed at transforming the armed forces into a technologically advanced, multi-domain combat-ready force. He also discussed the various initiatives and actions to be taken to have a technologically advanced defence ecosystem in the years to come. During the talk, drawing on numerous global examples, he illustrated the consequences of unpreparedness that various countries have faced during various conflicts or geopolitical issues. Towards the end of the Vyakhyyaan, he stressed upon the collaborative and timely efforts that we must take on various fronts to strengthen our defence system and increase our deterrence in the light of evolving security challenges in our vicinity.

Overall, Lt. Gen. Shukla's Vyakhyaan was very illuminating on our standing on global geopolitical and security context, and the role that future technologies could play in strengthening our deference capabilities.

You Tube Link: https://www.youtube.com/live/zQNouK3AKxY

23rd PRL Amrut Rajbhasha Vyakhyaan

पीआरएल अमृत राजभाषा व्याख्यान (पर्व)" का 23वां व्याख्यान 30 अप्रैल, 2025 को आयोजित किया गया। इस अवसर के प्रमुख वक्ता श्री आशीष मालवीया, उप महाप्रबंधक और क्षेत्रीय प्रमुख, यूनियन बैंक ऑफ इंडिया, गोवा थे।

The 23rd lecture of "PRL Amrut Rajbhasha Vyakhyaan (PARV)" was held on April 30, 2025. The eminent speaker for the occasion was Shri. Ashish Malviya, Deputy General Manager and Regional Head, Union Bank of India, Goa.

श्री आशीष मालवीया अप्रैल 2024 से यूनियन बैंक ऑफ इंडिया गोवा क्षेत्र के उप महाप्रबंधक और क्षेत्रीय प्रमुख के रूप में कार्यरत हैं, जो 13,500 करोड़ रुपये के कुल कारोबार के साथ 69 शाखाओं के संरक्षक हैं। वे गोवा से पहले मुंबई केंद्रीय कार्यालय में पूंजी नियोजन, उन्नयन एवं रणनीति विभाग प्रमुख के रूप में काम कर रहे थे। श्री आशीष 25 से अधिक वर्षों के समृद्ध अनुभव के साथ , जून 1999 से बैंक के साथ हैं|

Shri Ashish Malviya is serving as Deputy General Manager & Regional Head, Union Bank of India Goa Region from April 2024, custodian of 69 branches with a total business of Rs 13,500 crore. Earlier, he was working as Head, Capital Planning, Upgradation & Strategy Department at Mumbai Central Office. Shri Ashish is associated with the Bank since June 1999 and with ironic experience of over 25 years.

The vyakhyaan was titled बैंकिंग उद्योग में डिजिटलीकरण की परिवर्तनकारी यात्रा

श्री मालवीया ने स्वतंत्रता-पूर्व युग से लेकर वर्तमान डिजिटल युग तक भारतीय बैंकिंग क्षेत्र के परिवर्तन पर चर्चा की। इसकी शुरुआत 1969 और 1980 में प्रमुख बैंकों के विकास और राष्ट्रीयकरण के चरणों को रेखांकित करके की गई। फिर कथा 1991 के बाद के उदारीकरण काल में बदल जाती है, जिसने आधुनिकीकरण और निजी, विदेशी और फिनटेक-संचालित बैंकिंग मॉडल के उद्भव को उत्प्रेरित किया। प्रमुख मील के पत्थरों में बैंकिंग सेवाओं का डिजिटलीकरण, कोर बैंकिंग सिस्टम का उदय, मोबाइल और इंटरनेट बैंकिंग और यूपीआई का क्रांतिकारी प्रभाव शामिल हैं।

Shri. Malviya discussed the transformation of the Indian banking sector from the pre-independence era to the current digital age. It began by outlining the phases of development and nationalization of major banks in 1969 and 1980. The narrative then shifts to the post-1991 liberalization period, which catalyzed modernization and the emergence of private, foreign and fintech-driven banking models. Key milestones include the digitization of banking services, the rise of core banking systems, mobile and internet banking, and the revolutionary impact of UPI.

उन्होंने वर्चुअल कार्ड, बायोमेट्रिक भुगतान, एम्बेडेड वित्त, सीमा-पार UPI प्रेषण, नियो बैंक और अकाउंट एग्रीगेटर ढांचे जैसे हाल के रुझानों के बारे में विस्तार से बताया। उन्होंने ONDC और सेंट्रल बैंक डिजिटल करेंसी (CBDC) के संभावित रोलआउट जैसी सरकार की डिजिटल पहलों पर भी प्रकाश डाला। कुल मिलाकर, व्याख्यान में समावेशिता, दक्षता, नवाचार और निर्बाध ग्राहक अनुभव की दिशा में क्षेत्र की प्रगति को रेखांकित किया गया।

He further elaborated about recent trends such as virtual cards, biometric payments, embedded finance, cross-border UPI remittances, neo banks and account aggregator frameworks in more detail. It also highlighted the government's digital initiatives such as ONDC and the potential rollout of Central Bank Digital Currency (CBDC). Overall, the lecture has underlined the sector's progress towards inclusivity, efficiency, innovation and seamless customer experiences. After the vyakhyaan, there was an interactive Q&A session that gave the attendees fresh perspectives and extra details on the topic.

Speaker Shri. Ashish Malviya as the eminent speaker of 23rd PRL Amrut Rajbhasha Vyakhyaan

Youtube: https://www.youtube.com/watch?v=wMyOLcRLZSE&list=PL12xjTGd3IdgQXLe9_O8ygpF92DY2hj6P&index=23

PRL Monthly Publications Digest (May 2025)

Astronomy & Astrophysics Division [02]

1. Manoj Mandal, S. Pal, G. K. Jaisawal, Anne Lohfink, Sachindra Naik, J. Chauhan, 2025, Probing thermonuclear bursts and X-ray reflection features in Aql X-1 during 2024 outburst, Journal of High Energy Astrophysics, 47, 100387, Date of Publication: 24/04/2025, Impact Factor: 10.2

2. Sudeshna Patra, Neal J. Evans, Kee-Tae Kim, Mark Heyer, Andrea Giannetti, Davide Elia, Jessy Jose, Jens Kauffmann, Manash R. Samal, Agata Karska, 2025, Variation of Dense Gas Mass–Luminosity Conversion Factor with Metallicity in the Milky Way, The Astrophysical Journal, Date of Publication: 15/04/2025, Impact Factor: 4.8

Geosciences Division [03]

1. Ranjan K. Mohanty, Rahul K. Agrawal, A. Shivam, Amzad H. Laskar, 2025, Radiocarbon in soil organic carbon and soil pore space CO2 in sub-humid to semi-arid regions of western India: implications to tropical soil carbon dynamics, Catena, Date of Publication: 27/04/2025, Impact Factor: 5.4

2. Nazirahmed S., P. Rahi, H. Saxena, A. Singh, and R. Panchal, 2025, High prokaryotic diversity in the oxygen minimum zone of the Bay of Bengal: implications for nutrient cycling, Aquatic Microbial Ecology, Date of Publication: 17/04/2025, Impact Factor: 1.6

3. Shukla, A. K., Tripathi, S. N., Talukdar, S., Murari, V., Gaddamidi, S., Manousakas, M.-I., Lalchandani, V., Dixit, K., Ruge, V. M., Khare, P., Kumar, M., Singh, V., Rastogi, N., Tiwari, S., Srivastava, A. K., Ganguly, D., Daellenbach, K. R., and Prévôt, A. S. H., 2025, Measurement report: Sources and meteorology influencing highly time-resolved PM2.5 trace elements at three urban sites in the extremely polluted Indo-Gangetic Plain in India, Atmospheric Chemistry and Physics, Date of Publication: 01/04/2025, Impact Factor: 6.7

Space & Atmospheric Sciences Division [02]

1. Shantikumar S. Ningombam, Swagata Mukhopadhyay, B.L. Madhavan, A.K. Srivastava, Som K. Sharma, Amarendra Singh, Sonam Jorphel, Dorje Angchuk, Tashi Thsering Mahay, 2025, Characterization of aerosol optical and radiative properties at Leh, located over the climate sensitive Hindu Kush Himalayan region using sky radiometer observation, Atmospheric Environment, Date of Publication: 20/04/2025, Impact Factor: 4.2

2. Rathore, J., D., Ganguly, V., Singh, M., Gupta, V. J., Vazhathara, A., Biswal, R. K., Kunchala, P. K., Patra, L. K., Sahu, S., Gani, & S., Dey, 2025, Characteristics of Haze Pollution Events During Biomass Burning Period at an Upwind Site of Delhi, Journal of Geophysical Research: Atmospheres, Date of Publication: 08/04/2025, Impact Factor: 3.8

Theoretical Physics Division [01]

1. Gurucharan Mohanta, 2025, Radiative mass mechanism: addressing the flavour hierarchy and strong CP puzzle, Journal of High Energy Physics, Date of Publication: 22/04/2025, Impact Factor: 5.0

Atomic, Molecular and Optical Physics [03]

1. Arijit Roy Surendra V. Singh R. Ramachandran J. K. Meka M. Ambresh T. Vijay P. Janardhan V. Jayaram V. Venkatraman A. Das H. Hill Anil Bhardwaj N. J. Mason B. Sivaraman, 2025, Instantaneous formation of interstellar minerals and mineral quantum dots, RSC Advances , Date of Publication: 17/04/2025, Impact Factor: 3.9

2. Vaibhav Katyal, A. Chakraborty, B. K. Sahoo, Ben Ohayon, Chien-Yeah Seng, Mikhail Gorchtein, and John Behr, 2025, Testing for isospin symmetry breaking by combining isotope shift measurements with precise calculations in potassium, Phys. Rev. A 111, 042813 (2025), Date of Publication: 11/04/2025, Impact Factor: 3.0

3. A. Chakraborty and B. K. Sahoo, 2025, Ab initio calculations of electric dipole polarizabilities in the Li, Na, and K atoms, Phys. Rev. A 111, 042807 (2025), Date of Publication: 07/04/2025, Impact Factor: 3.0

Visitors

1. Dr. Sadashiv Sahoo, a research scholar within the Iron-Calorimeter (ICAL) collaboration at India based Neutrino Observatory (INO) is in PRL from 25.03.2025 to 25.05.2025 as a Student Visitor to work with Prof. Srubabati Goswmai, Senior Professor for a project on atmospheric neutrinos

2. Mr. Sadashiv, a Research Scholar from Patna University, Patna visited Udaipur Solar Observatory (USOOB), Udaipur from 12.04.2025 to 23.04.205 for collaborative work on Data driven simulation with Dr. Ramitendranath Bhattacharya, Professor of USOOB/PRL, Udaipur.

3. Mr. Khoa Dang Tiet from Ametel Inc. France has visited Physical Research Laboratory, Ahmedabad on 21.04.2025 in connection for discussions on scientific equipment and performance of HR-NanoSIMS.

4. Mr. P. Rakesh Kumar Dora, a Senior Research Fellow from Institute of Mathematical Sciences, Chennai visited Physical Research Laboratory, Ahmedabad from 21.04.2025 to 24.04.2025 to deliver a seminar and interact with staff members.

5. Lt. Gen. Raj Shukla (Retd.), PVSM, YSM, SM, Member of the Union Public Service Commission visited PRL on 23.04.2025 to deliver 103rd PRL Ka Amrut Vyakhyaan titled “India’s National Security Challenges/Futures-The Intersect of Geopolitics and Technology”.

6. Mr. Piduru Kiran from Markes International Ltd., Central Park, Bridgend, UK has visited Physical Research Laboratory, Ahmedabad on 24.04.2025 in connection with discussions on scientific equipment and performance analysis of TD and air server.

7. During April 2025, the following have visited Infrared Observatory, PRL, Mount Abu:-

- One DIG of CRPF, Mount Abu.
- One Airforce Commandant
- Two (2) DOS/ISRO staff members
- Fifteen (15) Defense personnel,
- Forty two (42) General Public

Awards & Honours

1. Mr. Anirban Ghosh, Sr. Scientific Asst.-A, Atomic, Molecular and Optical Physics Division, PRL has Won The Best Poster Award in the Indian Laser Association at the 33rd National Laser Symposium (NLS-33), jointly organized by the Board of Research in Nuclear Sciences (BRNS), RRCAT Indore, and Medi-Caps University from March 6-9, 2025.

2. Prof. D. Pallam Raju, Senior Professor, Space and Atmospheric Sciences Division and Dean, PRL, has been nominated as a Member, Academic Board for Physics, in M K Bhavnagar University, Bhavnagar.

Hearty welcome to our new members

NAME: DR. JACKY KUMAR

DESIGNATION: ASSISTANT PROFESSOR

DATE OF JOINING: 01.04.2025

DIVISION/AREA: THEORETICAL PHYSICS DIVISION

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DESIGNATION: PDF

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