Newsletter of the Physical Research Laboratory

THE SPECTRUM

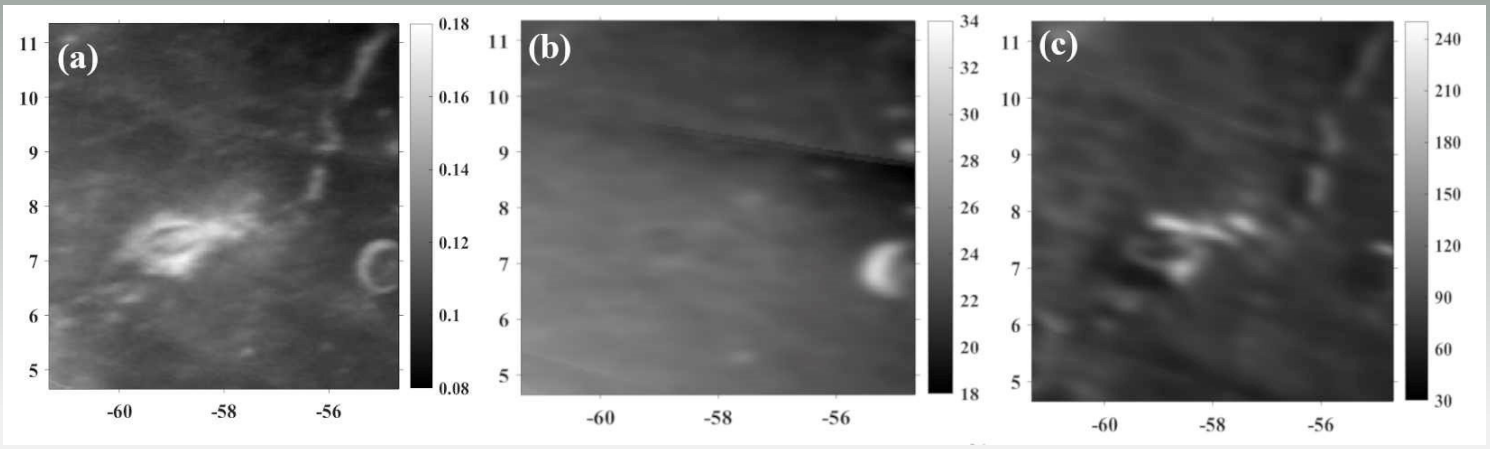


Image of the Month

Albedo, surface roughness and mean grain size maps of Reiner Gamma derived using imaging polarimetric observations from PRL's Mount Abu Observatory

July 2023 Issue

Table of Contents

Quasi-two-day wave amplification through interhemispheric coupling during the 2010 austral summer

***(D. Singh**, G. Mitra, A. Guharay, D. Pallamraju and S. Gurubaran)*

The Author

Dupinder Singh

Quasi-two-day wave (QTDW) is an important dynamical entity in earth's middle and upper atmosphere. It constitutes strong oscillation of atmospheric parameters at nearly two days. Theoretical and observational studies suggest that the QTDW is a normal mode of atmosphere which is amplified when energy from certain atmospheric instabilities maps onto it. Recently, there is a growing interest in the QTDW events for their role in the interhemispheric coupling, i.e., when processes occurring in one hemisphere affects the conditions in the other hemisphere.

We studied a QTDW event that took place in January-February 2010. Analysis of MERRA-2 reanalysis data reveals QTDW perturbations which are mostly located in the southern hemisphere and their latitude-altitude-zonal structure similar to the theoretically predicted normal mode. Diagnostic analysis suggests that the QTDW amplification near southern hemisphere is linked to planetary wave breaking (PWB) in the northern hemisphere. PWB created favourable conditions for the inertial instability (II).

The signatures of II are evident in temperature and wind anomalies around the equator. Subsequent to the appearance of II signatures, the summer easterly jet is found to be barotropically unstable resulting in amplification of the QTDW. The latitude-time evolution of the QTDW agrees with the timeline (and location) of PWB, II and barotropic instability.

Source/Reference of the Work: https://doi.org/10.1016/j.asr.2023.06.044

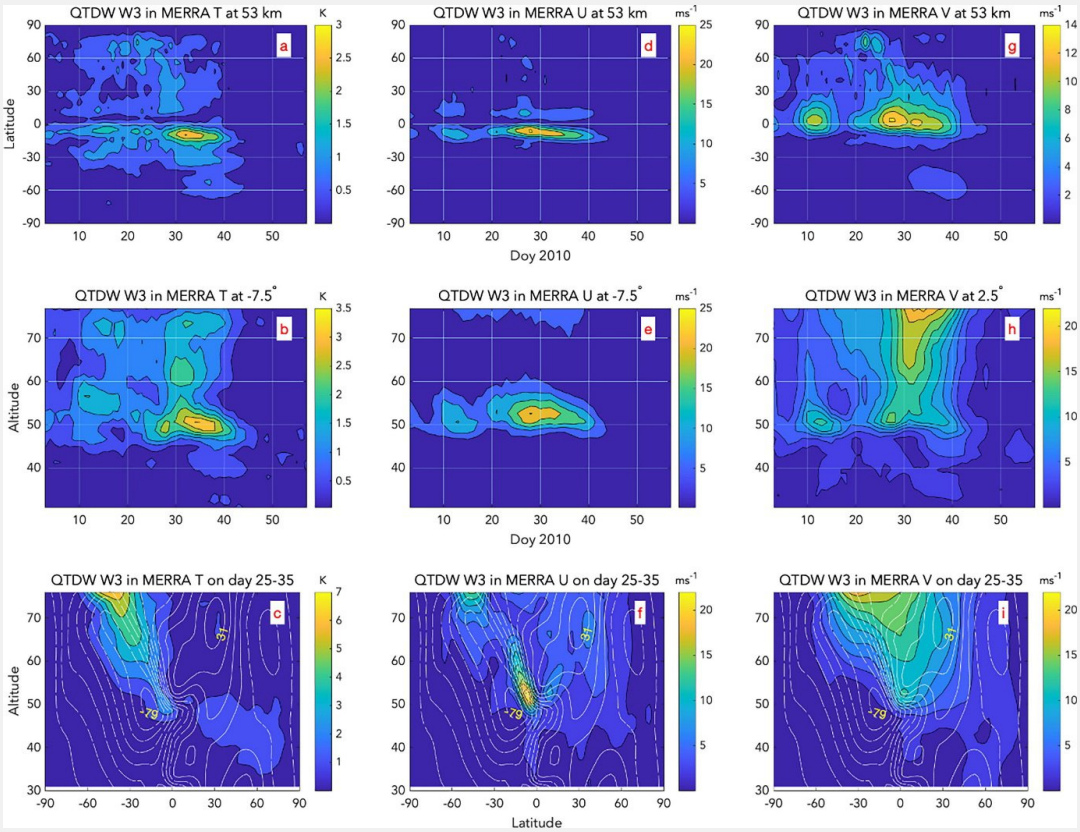
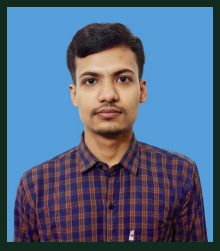


Figure Caption: Amplitude of QTDW westward wavenumber 3 in MERRA-2 temperature (a,b,c), Zonal wind (d,e,f) and Meridional Wind (g,h,i). White lines show the zonal mean zonal winds on Day 30 of 2010 (c,f,i). Solid (dashed) white lines correspond to eastward (westward) winds. Contour spacing is 10 ms-1. Magnitude of zonal wind near the core of jet is marked on the central contours. QTDW amplitudes in (c,f,i) are averaged over Day 25-35.

AFGL 5180 and AFGL 6366S: sites of hub-filament systems at the opposite edges of a filamentary cloud

***(A.K. Maity**, L.K.Dewangan, N.K Bhadari, D.K. Ojha, Z. Chen and R. Pandey)*

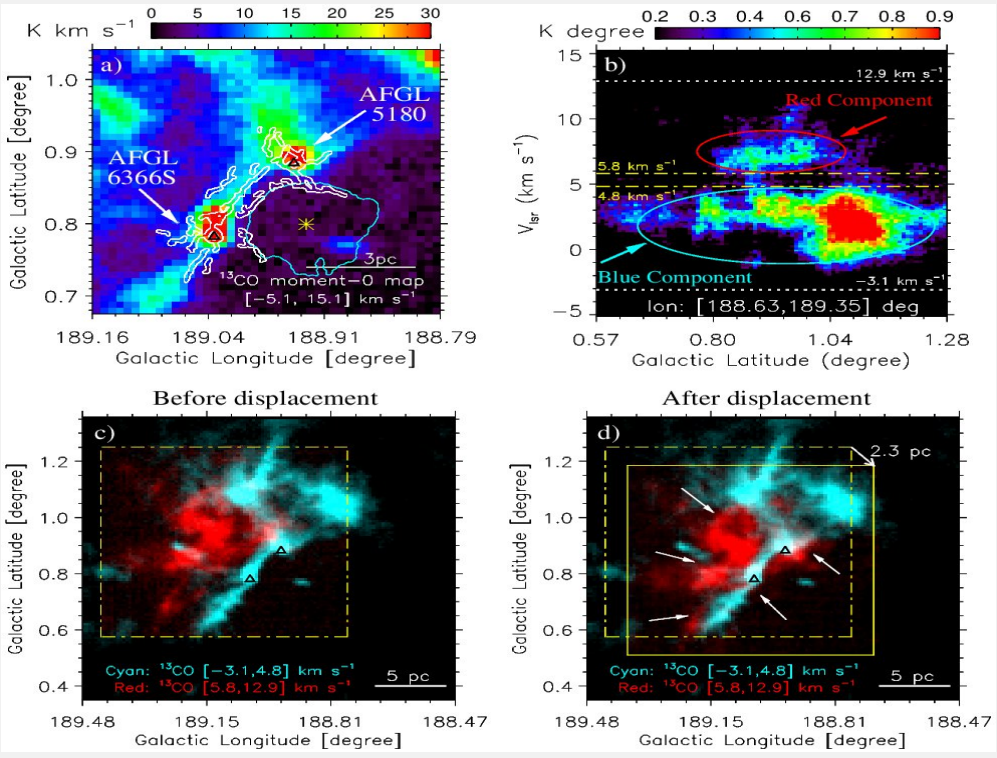
The Author



Arup Kumar Maity

The formation of massive stars (M > 8 Msun), which profoundly impact the Galaxy due to their immense radiative and mechanical feedback, is an intriguing puzzle in astrophysics. It is thought that massive stars and clusters of young stellar objects (YSOs) commonly form within parsec-scale massive clumps/clouds such as hub-filament systems that are known as a junction of three or more dust and molecular filaments. The incoming material from very large-scales of 1-10 pc may be funnelled along molecular filaments into the central hubs in hub-filament systems. Recent theoretical works suggest that hub-filament systems can be developed through cloud-cloud collision, but observational evidence is required to validate this idea.

Nearby (~1.5 kpc) massive star-forming sites AFGL 5180 and AFGL 6366S are studied using multi-wavelength data sets, and these sites are located at opposite edges of a filamentary molecular cloud as traced using the 13CO(J=1-0) line data (see Figure 1a). Each site hosts the Class II 6.7 GHz methanol maser emission, which has been known as the signatures of the early stages of massive star formation. Using the Herschel 160 μm dust continuum image, a hub-filament system is investigated toward both the sites. The 13CO(J=1-0) line data reveal the presence of two clouds with velocity ranges of approximately [-3.1, 4.8] and [5.8, 12.9] km/s. Notably, these clouds are interconnected by an intermediate velocity bridge feature in the range of [4.8, 5.8] km/s, as illustrated in Figure 1b. Furthermore, the “key/intensity-enhancement” and “keyhole/intensity-depression” features of the two clouds are identified, showing the presence of a complementary distribution. This correspondence is further enhanced, when considering a spatial shift of approximately 2.3 pc in the red cloud component, as demonstrated in Figures 1c and 1d, respectively.



The observed bridge feature and the complementary distribution together show the onset of the cloud-cloud collision process in the selected target sites. The relative velocity between the cloud components and the spatial shift observed in their complementary distribution reveals a collision time scale of about 1 million years ago. Based on the observed outcomes, it is reasonable to propose that a collision between the molecular clouds seeded the formation of hub-filament systems and the massive stars toward both the target sites.

Source/Reference of the Work: https://doi.org/10.1093/mnras/stad1644

Figure: a) 13CO(1 – 0) integrated intensity map overlaid with the filament skeletons (in white). The asterisk indicates the position of an O-type star, CGO 115. b) Galactic latitude – velocity diagram. c) A two-color composite image showing the spatial distribution of the blue-shifted cloud (in cyan) and red-shifted cloud (in red). The dotted-dashed box (in yellow) highlights an area encompassing the distribution of molecular gas associated with the red-shifted component. d) Same as the panel “c,” but the red-shifted component is spatially shifted by about 2.3 pc to the solid box. Arrows indicate the complementary distribution of the cloud components.

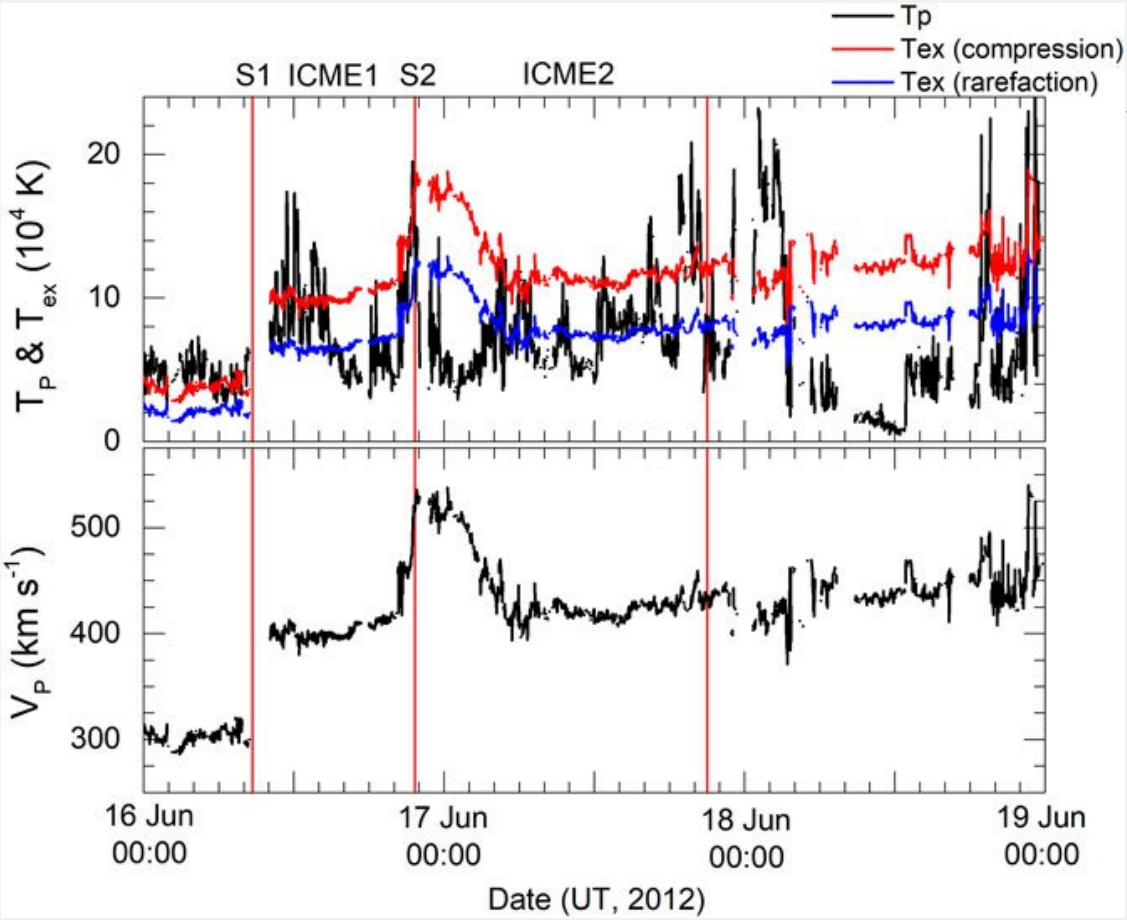
Investigating the Variations in Composition and Heating in Interacting CMEs

(***Nandita Srivastava***, *Zavkiddin Mirtoshev and Wageesh Mishra)*

The Author

Nandita Srivastava

Interaction of coronal mass ejections (CMEs) in the heliosphere is expected to occur generally during maximum phase of solar activity. When the CMEs interact, they either merge to form a single interplanetary CME (ICME) or arrive as distinct entities or ICMEs at 1 AU. We analysed two events of the CME–CME interaction observed on 13-14 June and 9-10 November, 2012, of which the former led to a merged structure after the interaction, while the latter event arrived at L1 point as two distinct structures. Based on the composition signatures measured in-situ, of these interaction events, we found that the interaction process leads to distinct composition signatures in the form of ion charge state enhancements which are suggestive of different complex structures formed in the process. In particular, the ion composition profiles reveal several peaks corresponding to the plasma temperatures of the individual solar sources/flares suggesting the inhomogenous nature of plasma of the participating CMEs. Another important observation is the presence of strong compression signatures due to interaction that leads to heating of the plasma. We compared the solar wind proton velocity data with the expected temperature data to understand the ICME–ICME interaction processes, involving compression and rarefaction. The June event showed strong compression signatures in the leading and trailing edge of the preceding CME and rarefaction in the following CME. On the other hand, the November event showed rarefaction in the preceding CME and compression in the interaction region and the following CME. The novel approach undertaken in this study highlights the importance of comparing solar wind proton velocity data with the expected temperature data to understand the CME-CME interaction processes, involving compression and rarefaction. Our study also emphasizes the importance of examining the compositional signatures, which helps in identification of distinct structures of CMEs participating in interaction.



Source/Reference of the Work: https://doi.org/10.3389/fspas.2023.1154612

Figure Caption: Variation of the proton velocity, proton temperature, and overplotted expected temperature of compression and rarefaction for interacting CMEs of the 13–14 June 2012 event

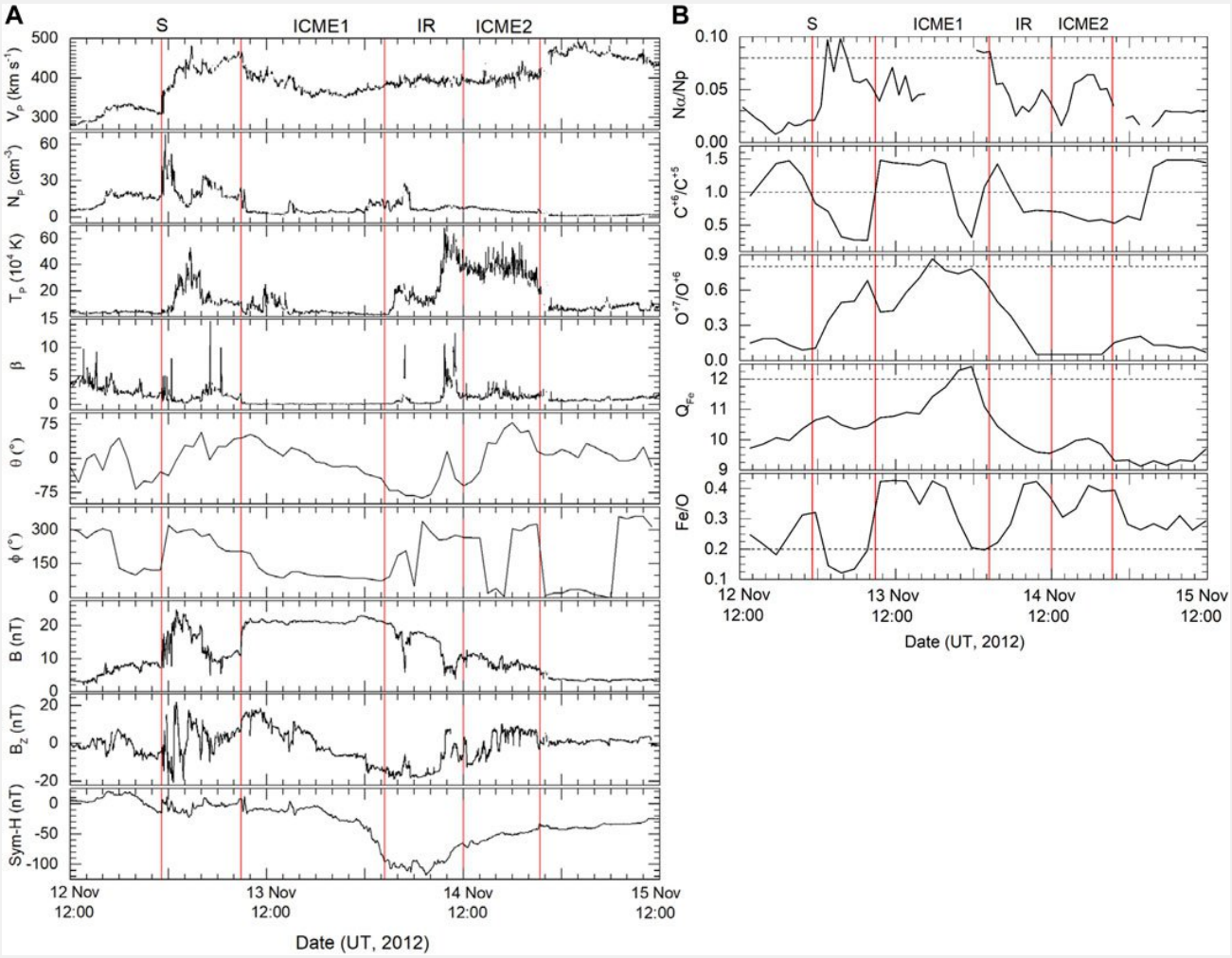


Figure Caption:

(A) Plasma and magnetic parameters observed in situ by the ACE spacecraft for the interacting CMEs of 9–10 November 2012. The vertical lines marked in red, from left to right, denote the arrival of the shock, ICME1 leading and trailing boundaries, ICME2 leading and trailing boundaries. Between the third and fourth vertical lines is marked the interaction region (IR) in between the two ICMEs.

(B) Composition parameters marking the arrival of ICMEs associated with the interacting CMEs of November 2012. All the composition parameters show enhanced values as compared to the solar wind.

Unique regolith characteristics of the lunar swirl Reiner Gamma as revealed by imaging polarimetry at large phase angles

(***M. Bhatt***, *C. Wöhler, J. Rogall, K. Aravind, S. Ganesh, and A. Bhardwaj)*

The Author

Megha Bhatt

Lunar swirls are high-albedo irregular markings that are only found on the Moon and the formation of these features is still unknown. The Reiner Gamma swirl is one of the best-known swirl features. It is located in the western Oceanus Procellarum, nearside of the Moon. This unique swirl has a fully evolved structure of high-albedo curve-shaped line markings that can be examined using telescopic observations. The spectral properties of Reiner Gamma indicate a change in the physical regolith characteristics, which can be examined quantitatively using the polarimetric properties of the regolith obtained across a range of phase angles.

In this work, we provide detailed physical characteristics of the regolith at the Reiner Gamma swirl. For the first time, we used imaging polarimetric observations of Reiner Gamma obtained from the Mount Abu IR Observatory between January and March, 2021 to understand the surface roughness, opposition effect strength, and grain size distribution at a spatial resolution of 1 km. We also computed median regolith grain size maps of Reiner Gamma using the derived photometric roughness, albedo, and degree of polarization.

The Hapke modeling of the Reiner Gamma swirl suggested significant changes in the opposition effect strength at the central oval, but only marginal differences in surface roughness from its surroundings. Within the swirl, the median grain size varies significantly in comparison to the background mare grain size of ~45 μm. Our results confirm the occurrence of surface alteration processes that might have disrupted the regolith microstructure in the Reiner Gamma swirl. These findings are consistent with an external mechanism of swirl formation, by considering interaction between the regolith and cometary gas. Subsequent to its formation, the swirl structure was preserved due to shielding by crustal magnetic field.

Source/Reference of the Work: https://doi.org/10.1051/0004-6361/202245356

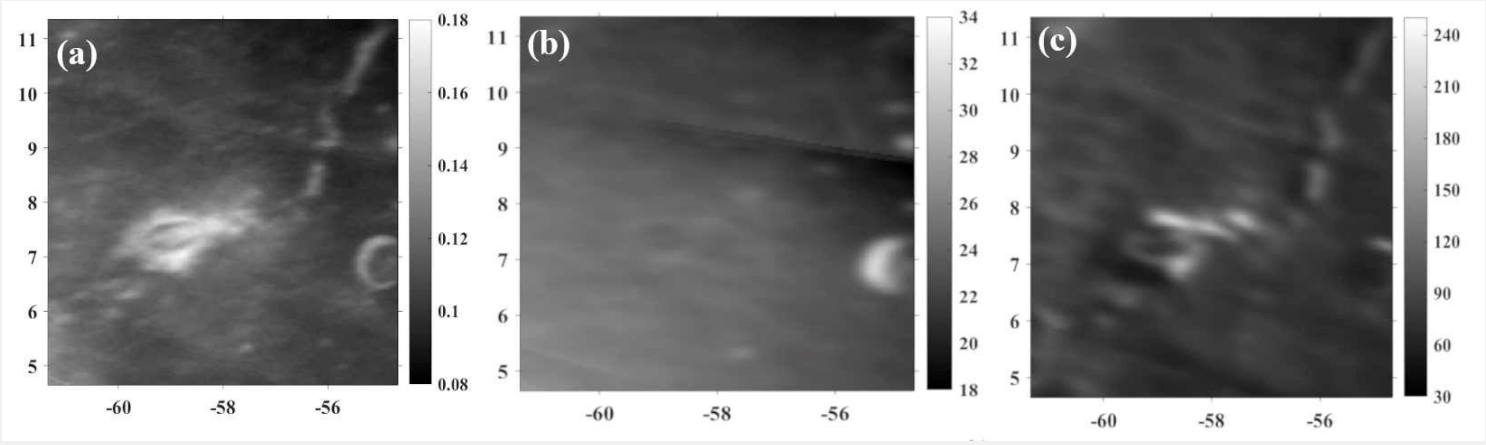


Figure Caption: Albedo, surface roughness and mean grain size maps of Reiner Gamma derived using imaging polarimetric observations from PRL's Mount Abu Observatory

Evaluation of the performance of F-layer peak height models used in IRI-2016

(***K. Venkatesh***, *D. Pallamraju, Kelvy P Dalsania, D. Chakrabarty and T.K. Pant)*

The Author

K. Venkatesh

The International Reference Ionosphere (IRI) is an empirical model, which simulates different ionospheric parameters, namely, the electron density profiles, density and heights of different ionospheric layers, ion and electron temperatures, composition etc. The latest version of IRI model (IRI-2016) employs three different methods namely 'BSE-1979', 'AMTB-2013' and 'SHU-2015' for ionospheric F-layer peak height (hmF2) estimation. The performance of these three height methods in IRI-2016 is evaluated over the Indian equatorial and low latitude sectors. The impact of deviations in the modelled hmF2 on the estimation of electron density profiles and the Total Electron Content (TEC) is examined using the three different hmF2 methods in IRI-2016. Digisonde observations over Trivandrum (8.5 °N, 76.9 °E) and Ahmedabad (23.0 °N, 72.5 °E) along with GPS observations over Colombo (6.8 °N, 79.8 °E) and Ahmedabad during a high solar activity year 2014 are used in this study. A comparison of electron density profiles between digisonde and IRI-2016 at both the equatorial station, Trivandrum, and the low latitude station, Ahmedabad, revealed significant deviations with higher deviations in the post sunset hours at the equator. The three height methods have shown significant differences in their predictions of hmF2 at both locations. At the equator, the SHU-2015 method shows better estimates closer to the measurement values, than the other two methods except at Pre-Reversal Enhancement (PRE) time, during which, the AMTB-2013 method shows better performance. At the low latitude station, the newly added methods (SHU-2015 and AMTB-2013) do not indicate any improvements in estimating the hmF2. The availability of three different height methods in IRI-2016 is exploited to understand the modifications if any, in the ionospheric height structure and TEC for different hmF2 methods. It is observed that the electron density distribution as seen in hmF2 variations are not effectively reproduced in constructing the density profiles in the existing model outputs.

This study highlights the need for modifications in the empirical formulations for equatorial and low latitudes, since it is observed that the electron density distribution as seen in hmF2 variations are not effectively reproduced in constructing the density profiles in the existing model outputs. This will enable a better representation of the electron density distribution and/or the TEC over the equatorial and low latitudes

Source/Reference of the Work: https://doi.org/10.1016/j.asr.2023.06.047

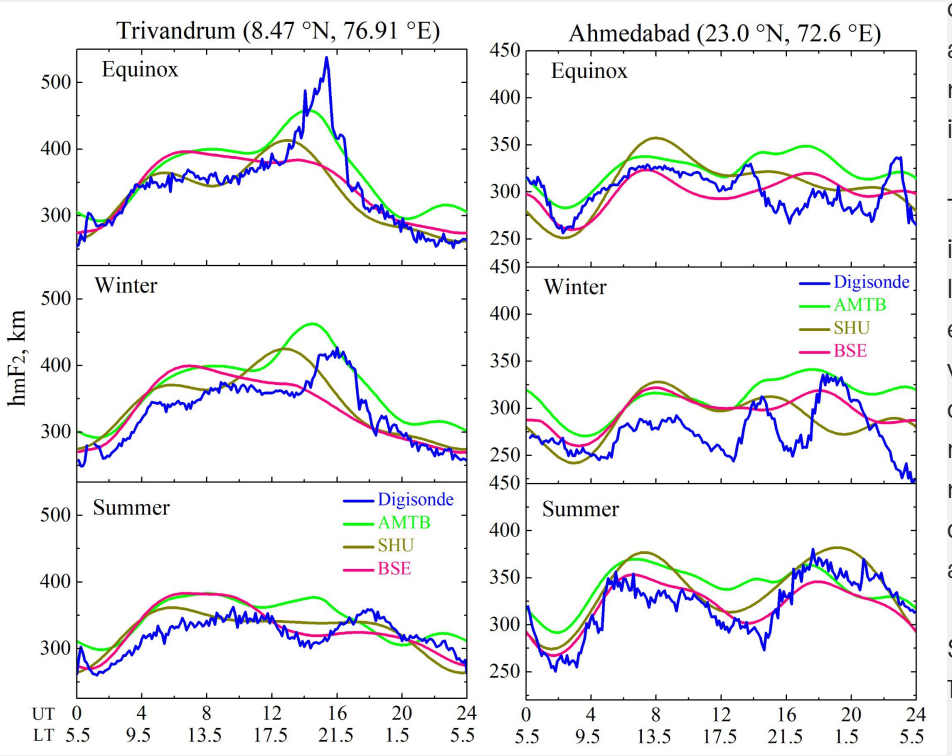


Figure Caption: Mean diurnal variations of the hmF2 from digisonde and three methods (AMTB, SHU and BSE) of IRI-2016 during equinox, winter and summer months over Trivandrum and Ahmedabad

Inauguration of PARAM VIKRAM-1000 1 PF High Performance Computing (HPC) Facility by Secretary DOS/ Chairman ISRO on Thursday, 22nd June, 2023

The new recently setup and commissioned 1PF HPC facility at the Physical Research Laboratory (PRL), Department of Space, Government of India, Ahmedabad, has been inaugurated on Thursday, 22 June, 2023 by Shri S. Somanath, Secretary DOS/ Chairman ISRO, together with Shri A.S. Kiran Kumar, Chairman, PRL Council of Management (former Chairman ISRO) and Member, Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC). The inaugural function was held in Main (Navrangpura) Campus of PRL during 9:00 AM to 12:00PM. The function was graced by Members of PRL Council of Management and former Scientists and Engineers of PRL associated with HPC facility.

Shri. S. Somanath, Secretary DOS/Chairman, ISRO, addressed the gathering and appreciated the sincere and dedicated efforts, and commitment of PRL team in setting up this facility within a short span of about a year. He also announced the name of this HPC facility – "PARAM VIKRAM-1000".

Shri. A.S. Kiran Kumar, Chairman, PRL Council of Management, emphasized the use of HPC facility for more challenging scientific research problems.

The PARAM VIKRAM -1000 HPC facility has 108 computing nodes, dispenses 7296 CPU cores, 2,76,480 GPU Cores, 74 TB of RAM and 1 PB of high-performance parallel Lustre file system. The new HPC compute nodes are Made in India and a majority of the software used is open source. It provides theoretical peak performance (R_{peak}) 1395.63 TeraFlop/s (TF) and Maximal LINPACK performance (R_{max}) 956.34 TF . The website of Param Vikram-1000 HPC is – https://www.prl.res.in/prl-eng/paramvikram1000

This momentous occasion marked a significant step in PRL's commitment to pursuing cutting-edge fundamental research in Space and Atmospheric Physics, Theoretical Physics, Atomic, molecular & optical physics, Solar physics, Astrophysics, and Earth and Planetary Sciences, through advanced computational capabilities. With the inauguration of this HPC Facility, PRL aims to accelerate through the fields of artificial intelligence, machine learning, computational modelling, and many more.

There were also important presentations made by the scientific & technical fraternity of PRL on the scientific highlights obtained using the HPC facility while addressing several important and fundamental scientific research problems in diverse disciplines

List of Scientific & Technical presentations made by PRL fraternity

Sr. No.	Name	Division	Title of the Talk
1.	Dr. Ramitendranath Bhattacharyya	USO	Simulating source region magnetic field lines of solar coronal transients
2.	Dr. Arvind Singh Rajpurohit	A&A	Atmosphere of Very Low Mass Stars (M dwarfs) and Exoplanets
3.	Dr. Narendra Ojha & Dr. Harish Gadhavi	SPASC	Modeling of Atmospheric Trace Gases and Aerosols over Indian Subcontinent
4.	Dr. Partha Konar	THEPH	HPC: Journey From 100 TF to 1000 TF
5.	Dr. Varun Sheel	PSDN	Modeling Climate of Mars and Venus
6.	Dr. Aveek Sarkar	A&A	An overview: Scientific pursuits
7.	Dr. A Raja Bayanna	USO	Solar Physics MAST observations
8.	Mr. Mithun Neelkandan PS	A &A	High Performance Computing for X-ray Investigations of Astrophysical Sources
9.	Dr. Bijaya Kumar Sahoo	AMOPH	High Precision Atomic Clocks

Glimpses from the Event

Celebration of International Day of Yoga-2023

As a part of Azadi Ka Amrit Mahotsav, the 9th International Day of Yoga (IDY-2023) was celebrated on 21 June 2023 (Wednesday) at PRL Library Lawn.

The programme initiated by Shri. Pradeep Kumar Sharma, Convener, C-AKAM by giving a brief introduction of the Yoga instructors Ms. Priti Iyengar, Registered Yoga Teacher and Mr. V Ranganathan, Yoga Practitioners for 35 years. Prof. Anil Bhardwaj, Director, PRL welcomed the Yoga instructors by presenting them a Tulsi plant pots. Prof. Lokesh Kumar Sahu, Chair, C-AKAM joined the felicitation.

Mr. V Ranganathan started a session by explaining the benefits of warm up exercises prior to Yoga to make the body flexible for Yoga. Ms. Priti Iyengar performed the practical demonstration of warm-up exercises. Mr. V Ranganathan explained about the types of yoga positions i.e. standing poses, sitting poses and lying poses. Thereafter, Ms. Priti Iyengar gave step-wise practical demonstration of various Asanas like Tadasana, Pavan-muktasan, Padmasana, Vajrasana etc. All the members practiced & performed sitting, standing and lying poses asanas, importance of these were explained simultaneously. Ms. Priti Iyengar encouraged everyone to practice regular yoga to remain fit and improve concentration.

Post Yoga session, Yoga competition under AKAM was organized, in which participants had to select a chit from the box and perform the asana mentioned in the chit. Total 30 number of participants have participated in the said Competition.

Result of Yoga Competition conducted by C-AKAM on IDY (21-June-2023)

परिणाम Results	प्रतिभागियों के नाम Name of Participants
प्रथम First	श्री ए शिवम Mr. A Shivam
	श्री अंकित कुमार Mr. Ankit Kumar
द्वितीय Second	सुश्री मेघना सोनी Ms. Meghna Soni
	श्रीमती हर्षा परमार Mrs. Harsha Parmar
तृतीय Third	श्री शांतनु कुमार पांडा Mr. Santunu Kumar Panda
	श्रीमती संगीता वर्मा Mrs. Sangeeta Verma
प्रोत्साहन Consolation	श्रीमती चंद्रम्मा ए. Mrs. Chandramma A.
	श्री क्षितिज उपाध्याय Mr. Kshitiz Upadhyay

Glimpses from the Event

9th International Yoga Day Celebration at Udaipur Solar Observatory / PRL, Udaipur

On the occasion of 9th International Yoga Day on 21st June, 2023 a Yoga Practice/Demonstration session was organized at Udaipur Solar Observatory/Physical Research Laboratory, Udaipur. Under the goal of Yoga from Arctic to Antartica of the Ministry of AYUSH, Government of India, with the aim of organizing yoga demonstrations in a vast geographical array, USO/PRL, Udaipur has organized International Yoga Day on its island observatory premises located in the middle of Fatehsagar Lake. This was the first time that yoga practice was organized in the middle of Fatehsagar Lake of Udaipur.

On this occasion, the importance of yoga was told by eminent yoga instructor Dr. Shubha Surana and her team and its live practice was also done. In this event, members of Udaipur Solar Observatory/Physical Research Laboratory, Udaipur and their family members participated and practiced yoga. Dr. Surana presented some simple yoga exercises like Tadasana, Vajrasana, Chakrasana etc. and the role of Pranayama along with some demonstrations of her colleague and informed about the importance and benefits of yoga in daily life. She also made various asanas practiced live by the participants. Dr. Surana also apprised the participants about the benefits of yoga in various diseases.

A yoga competition was also organized at the end of the programme and the winners of this competition would be awarded in the upcoming Independence day celebration.

Glimpses from the Event

A special lecture on "स्वास्थ्य–सूत्र – "मेरा स्वास्थ्य–मेरी जिम्मेदारी"

To create domestic and global demand and to provide nutritional food to the people, Government of India had proposed to the United Nations for declaring 2023 as International Year of Millets (IYM-2023). The proposal of India was supported by 72 countries and United Nations General Assembly (UNGA) declared 2023 as International Year of Millets on 5th March, 2021. This led to the Hon'ble Union Finance Minister making a Budget announcement on 1st February 2022: "2023 has been announced as the International Year of Millets.

In this context, as a part of Azadi ka Amrit Mahotsav and yearlong Swachhta Pakhwada activity, a special lecture on the theme International Year of Millets (IYM-23) on Millets, Ayurveda, Swachhta and Healthy lifestyle was organized on Monday, 19 June 2023 in K. R. Ramanathan Auditorium.

Vd. Dr. Jaiprakash Ram, MD., Ph.D, Regional Ayurveda Research Institute (RARI), Ministry of Ayush, Ahmedabad was invited to deliver a special lecture on the theme International Year of Millets (IYM 23) – on Millets, Ayurveda, Swachhta, and healthy lifestyle. The subject of the lecture was "स्वास्थ्य–सूत्र – मेरा स्वास्थ्य–मेरी जिम्मेदारी".

Vd. Dr. Jaiprakash Ram initiated his talk by a Sanskrit shloka from Charak Sanhita related to Health. Further, he explained about the basic food habits and routine lifestyle. He highlighted the significance of the celebration of IYM-2023. Vd. Dr. Jaiprakash Ram informed about the various health benefits of millets and their suitability for cultivation under tough conditions marked by climate change. He discussed the importance and benefits of millets, its types, and distribution.

He elaborated upon three categories of regulatory principles of the body, mind, and behavior in Ayurveda, called Vata, Pitta, and Kapha dosha. Ayurveda is boon to human being wherein hidden root cause of any disease can also be detected and cured with the help of Ayurveda. He also explained about the daily lifestyle of human being and how it affects the routine body cycle. Further, he informed about the disadvantages of having opposite-foods and also about the necessity of water requirement for our body.

The lecture was attended by Director, PRL, Dean PRL, Registrar, PRL, PRL staff members, research scholars, PDFs and trainees. PRL members from Udaipur Solar Observatory and Mt. Abu joined online through WebEx link. After the lecture Question & Answer session was arranged.

Glimpses from the Event

Two Days Training Programme for Users on High Performance Computing System (HPC)

[A] Date: 07/June/2023 – HPC Users' Training

Computer Networking and Information Technology (CNIT) Division arranged a training session for High Performance Computing (HPC) users on 07-June-2023. The main objective of the programme was to familiarize the existing and prospective users with the new ~1 (PetaFlops) PF HPC system of PRL. The training programme covered new HPC architecture, available tools and software, Job scheduling and Resource Management – Slurm, Job Management on the new HPC system. The training program employed a combination of talks, live demonstrations and interactive discussions to ensure active learning and engagement. The training was attended by around 75 participants from different divisions/sections of PRL. The training was very well appreciated by the participants.

[B] Date: 08/June/2023 – HPC System Administration and Monitoring Training

Computer Networking and Information Technology (CNIT) Division arranged a training session for CNIT and CMG members for newly setup High Performance Computing (HPC) system on 07-June-2023 8 June 2023. The main objective of the programme was to familiarize CNIT management team members with the new ~1 (PetaFlops) PF HPC system. The training programme covered new HPC architecture, System Administration and Management of HPC infrastructure like Uninterrupted Power Supply (UPS), Diesel Generator and Cooling systems. The training programme covered about day-to-day system administration tasks and other important management aspects of HPC. The training was attended by 15 members of CNIT division and CMG. The CMG team members discussed various operational aspects of Power connectivity, UPS, DG and Cooling system. The CNIT team members discussed day-to-day system administration tasks and HPC monitoring.
CNIT team and HPC Committee thank Director, PRL, Registrar, PRL, Dean, PRL, Chair, Computer Committee and all the participants.

Glimpses from the Event

World Environment Day - LiFE Campaign - Pledge

As per the Government of India, Department of Space directive, all the employees of Central Government/ Departments/ State Governments/ Training Institutes were advised to take pledge on Mission LiFE on World Environment Day i.e. 5th June, 2023. PRL members celebrated World Environment Day on Monday, 5th June, 2023 at 1100 hrs by taking pledge on Mission LiFE at their respective work place.

Alongwith this, DoPT had enabled a provision on e-HRMS (https://e-hrms.gov.in) to facilitate Central/ State Government employees to take LiFE pledge online and download their certificates.
To earmark the occasion, tree plantation was done by the Director, PRL, Dean PRL, Registrar, PRL and other PRL members.

Glimpses from the Event

School Bag and Pencil box distribution for Girl child of contractual workers

In order to promote the thought of “Beti Padhao”, an encouraging initiative was suggested by the Director, PRL to distribute the bags to contractual workers, having second child as Girl child.

The above event was organized on Thursday, 1st June, 2023 at PRL Reserved Class Employees’ Association office. Head, P&GA and Head, Accounts & IFA were present on this occasion. They had distributed the bags to the contractual workers, having second child as Girl child. Head, Accounts & IFA addressed the crowd and encouraged them to motivate their girl child for education for better future.

Glimpses from the Event

BLOOD DONATION CAMP HELD ON 15.06.2023 AT PRL DISPENSARY

The Blood Donation Camp held at PRL Dispensary on 15th June 2023, in observance of "World Blood Donor Day," was a resounding success. The event was organized by the Committee for Azadi Ka Amrit Mahotsav, in association with the Dr. Jivraj Mehta Smarak Health Foundation. The Blood Donation Camp witnessed an overwhelming response, with a total of 50 participants, including Director, Registrar, Faculty members, Staff members, and a significant number of students came forward to donate blood.

The selfless act of voluntary blood donation exemplifies compassion, empathy, and a genuine concern for the well-being of others.PRL is immensely proud of each of the donors who made invaluable contribution to this noble cause and extends its heartfelt gratitude to all the donors for their unwavering support and enthusiasm. It is through such acts of kindness and solidarity that we can create a healthier and more caring society.

PRL also express sincere appreciation to the organizers, team PRL Dispensary, and medical professionals of Dr. Jivraj Mehta Smarak Health Foundation who worked tirelessly to ensure the smooth functioning of the Blood Donation Camp.

Let us continue to uphold the spirit of altruism and promote the importance of voluntary blood donation.

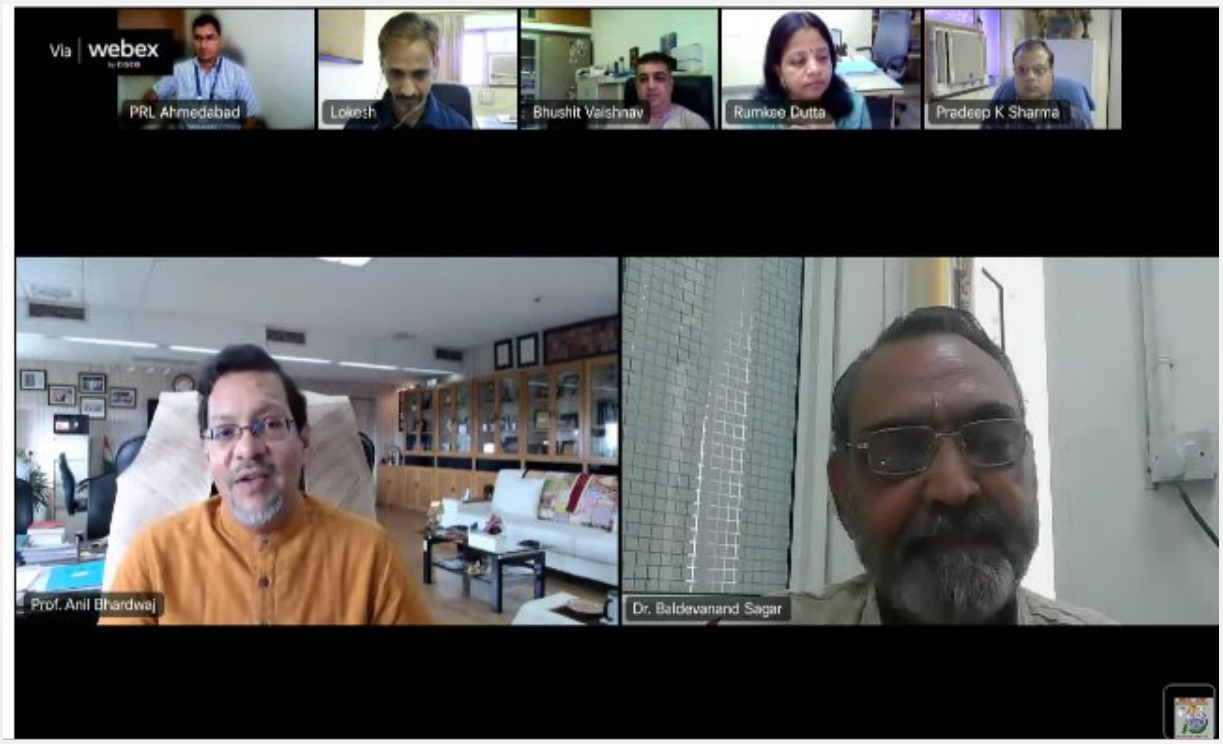
Glimpses from the Event

PRL Amrut Rajbhasha Vyakhyaan (PARV)

In continuation of celebrations of glorious 75 years of India's independence along with Platinum Jubilee celebrations of PRL's foundation, various programs are being conducted. As a part of these, PRL has started monthly lectures in Hindi, the Official Language. This lecture series is named "PRL Amrut Rajbhasha Vyakhyan" (PARV). 1st PARV Vyakhyan was inaugurated by the Director, PRL on 21st June 2023.

The first lecture in the PARV series was delivered by Dr. Baldevanand Sagar, who is National President of World Sanskrit Media Council, Translating & Broadcasting Prime Minister's "Mann Ki Baat" into Sanskrit, "Manogatam", on All India Radio, Ministry of Information and Broadcasting, Government of India. The lecture was delivered in Hindi on the topic ""India's Past, Present and Future". In his lecture he highlighted the essence of Indian culture which lies in its profound legacy of spiritual and scientific values, meticulously preserved and passed down through the ages. These invaluable insights are found in the written literature of the Vedas and the Upanishads. Drawing from this rich heritage, India envisions a future where it assumes the role of a global leader, a Vishva Guru, guiding the world towards enlightenment and progress.

The audience were spellbound by the content of his talk, his mellifluous oration, which was followed up by a lively question-and-answer session.



Available online at: https://www.youtube.com/watch?v=5jnwlBmZGlk

PRL Ka Amrut Vyakhyaan- 81

COL. CHRISTOPHER REGO (RETD.), Founder and CEO, Sunbird Trust visited PRL to deliver the 81st PRL ka Amrut Vyakhyaan on 14 June 2023. The title of his vyakhyaan was "**PEACE THROUGH EDUCATION IN NORTH EAST INDIA** ".

Through the vyakhyaan he shared information that many parts of India's North East have been plagued with insurgency and ethnic conflict for decades. This has cost the country heavily in terms of lives, livelihoods and development of this region. Importantly, given the threat posed by our aggressive northern neigbhour, this instability is severely impacting the security of this strategic limb. With the obvious linkage of lack of education and empowerment to radicalization of youth and perpetuation of ethnic divisions, this talk of Peace through Education in North East India by Col Christopher Rego was about a sustainable solution to insurgency and conflict through his innovative approach executed through his organisation Sunbird Trust. Charity begins from home and so as the Sunbird Trust was nucleated from the efforts of Col. Rego and his wife. The Vyakhyaan was followed by interactions of Col. Rego with the audience where he answered to all the questions asked to him.

A gathering of close to 200 people attended the vyakhyaan. In addition, more than 300 viewers watched the vyakhyaan on PRL's YouTube Channel.

PRL thanks Col. Christopher Rego for sparing his valuable time and having interactions with several groups. It was a memorable, motivational, and inspiring experience.

Available online at: https://www.youtube.com/watch?v=1TD-ig-G-i0

PRL Monthly Publications Digest (June 2023)

Astronomy & Astrophysics Division [3]

1. Maity, A. K., Dewangan, Lokesh Kumar, Bhadari, N. K., Ojha, D. K., Chen, Z., and Pandey Rakesh, 2023, AFGL 5180 and AFGL 6366S: sites of hub–filament systems at the opposite edges of a filamentary cloud, Monthly Notices of the Royal Astronomical Society (MNRAS), 523, 5388, DOI:10.1093/mnras/stad1644, Date of Publication: 29/06/2023

2. Vaishnav V. Rao, Preeti Kharb, K. Rubinur, S. Silpa, N. Roy, B. Sebastian, Veeresh Singh, J. Baghel, S. Manna, C. H. Ishwara-Chandra, 2023, AGN Feedback Through Multiple Jet Cycles in the Seyfert Galaxy NGC 2639 , Monthly Notices of the Royal Astronomical Society, stad1901, Date of Publication: 23/06/2023

3. Prachi Prajapati, Anwesh Mishra, Ananya Rawat, Shashikiran Ganesh, Vishal Joshi, Navpreet Kaur, Neeraj Kumari, Sachindra Naik and Sunil Chandra, 2023, Near infrared background with 1.2-m telescope at Mount Abu, Journal of Astrophysics and Astronomy, Date of Publication: 07/06/2023

Atomic Molecular and Optical Physics Division [2]

1. Subith Kumar, Anirban Ghosh, Chahat Kaushik, Arash Shiri, Greg Gbur, Sudhir Sharma, and G. K. Samanta ORCID logo, 2023, Simple experimental realization of optical Hilbert Hotel using scalar and vector fractional vortex beams (Editor's pick and Scilight featured), APL Photonics, Date of Publication: 16/06/2023

2. Arijit Roy, V. S. Surendra, R. Ramachandran, J. K. Meka, S. Gupta, P. Janardhan, B. N. Rajasekhar, H. Hill, Anil Bhardwaj, N. J. Mason & B. Sivaraman , 2023, Interstellar Carbonaceous Dust and Its Formation Pathways: From an Experimental Astrochemistry Perspective (Review Article), Journal of the Indian Institute of Science , A Multidisciplinary Reviews Journal, Date of Publication: 12/06/2023

Geosciences Division [3]

1. Dey, S., Ghosh, P., Rawat, P., Choudhary, N., Rai, A., Meena, R., Mandal, T.K., Mao, J., Jia, S., Rastogi, N., Sharma, S.K., and Sarkar, S., 2023, Optical source apportionment of aqueous brown carbon (BrC) on a daytime and nighttime basis in the eastern Indo-Gangetic Plain (IGP) and insights from 13C and 15N isotopic signatures, Science of The Total Environment, Date of Publication: 22/06/2023

2. Sudhira R. Bhadra, Rajeev Saraswat, Sanjeev Kumar, Sangeeta Verma, Dinesh K. Naik, 2023, Mid-Pleistocene Transition altered upper water column structure in the Bay of Bengal, Global and Planetary Change, Date of Publication: 12/06/2023

3. Parastoo Ghaznavi, Yogita Kadlag, David Haberthür, Ruslan Hlushchuk, Ingo Leya, 2023, Is µCT irradiation nondestructive? A noble gas study on matrix samples from the CV3 chondrite Allende, Meteoritics & Planetary Science, Date of Publication: 03/06/2023

Planetary Sciences Division [4]

1. Rishitosh Kumar Sinha, Dwijesh Ray, Tjalling De Haas, Susan J. Conway, and Axel Noblet, 2023, Morphologic and Morphometric Differences between Gullies Formed in Different Substrates on Mars: New Insights into the Gully Formation Processes, Earth Surface Dynamics, Date of Publication: 20/06/2023

2. Rajiv R. Bharti, Isaac B. Smith, Shital H. Shukla , 2023, Subsurface study of the Tharsis graben system using SHARAD data, Icarus, Date of Publication: 15/06/2023

3. Ramakant R. Mahajan, 2023, Investigating noble gases and nitrogen in Zag (H3-6) and ALH 77216 (L3.7–3.9): The ordinary chondrites with solar type neon and argon, Polar Science, Date of Publication: 15/06/2023

4. M. Bhatt, C. Wöhler, J. Rogall, K. Aravind, S. Ganesh and A. Bhardwaj, 2023, Unique regolith characteristics of the lunar swirl Reiner Gamma as revealed by imaging polarimetry at large phase angles, Astronomy & Astrophysics, Date of Publication: 06/06/2023

Space & Atmospheric Sciences Division [3]

1. K. Venkatesh, D. Pallamraju, Kelvy P Dalsania, D. Chakrabary, T.K. Pant, 2023, Evaluation of the performance of F-layer peak height models used in IRI-2016 over the Indian equatorial and low latitudes, Advances in Space Research, Date of Publication: 30/06/2023

2. D. Singh, G. Mitra, A. Guharay, D. Pallamraju and S. Gurubaran, 2023, Quasi-two-day wave amplification through interhemispheric coupling during the 2010 austral summer, Advances in Space Research, Date of Publication: 29/06/2023

3. Dipjyoti Patgiri, Rahul Rathi, Virendra Yadav, Sumanta Sarkhel, Dibyendu Chakrabarty, Subarna Mondal, M.V. Sunil Krishna, Arun K. Upadhayaya, Chiranjeevi G. Vivek, Suresh Kannaujiya, Surendra Sunda, 2023, A case study on multiple self-interactions of MSTID bands: New insights, Advances in Space Research, Date of Publication: 01/06/2023

Theoretical Physics Division [2]

1. Prasanta K Das, Partha Konar, Saumyen Kundu, Sudipta Show, 2023, Jet substructure probe to unfold singlet-doublet dark matter in the presence of non-standard cosmology, Journal of High Energy Physics (JHEP) 06 (2023) 198, Date of Publication: 29/06/2023

2. Namit Mahajan, 2023, ρ exchange contribution to neutrinoless double beta decay, Eur. Phys. J. C (2023) 83:530, Date of Publication: 24/06/2023

Udaipur Solar Observatory [1]

1. Sanjay Kumar, Avijeet Prasad, Sushree S Nayak, Satyam Agarwal and R Bhattacharyya, 2023, Magnetohydrodynamics simulation of magnetic flux rope formation in a quadrupolar magnetic field configuration, Plasma Physics and Controlled Fusion, Date of Publication: 22/06/2023

HEARTY WELCOME TO NEW MEMBERS

NAME: Dr. SAPTARSHI DEY

DESIGNATION: PROJECT SCIENTIST-III (DST-SERB-YOCP)

DATE OF JOINING: 06.06.2023

DIVISION/AREA: ATOMIC, MOLECULAR AND OPTICAL PHYSICS DIVISION

NAME: Mr. AYAN KUMAR NAI

DESIGNATION: JUNIOR RESEARCH FELLOW-I (HUB)

DATE OF JOINING: 16.06.2023

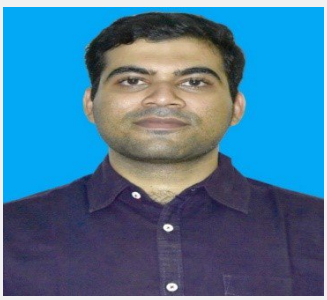
DIVISION/AREA: ATOMIC, MOLECULAR AND OPTICAL PHYSICS DIVISION

NAME: Mr. MILAN JANA

DESIGNATION: PROJECT ASSOCIATE-I – DST-TDP

DATE OF JOINING: 16.06.2023

DIVISION/AREA: ATOMIC, MOLECULAR AND OPTICAL PHYSICS DIVISION



NAME: Mr. SANJAN ROYCHOWDHURY

DESIGNATION: PROJECT ASSOCIATE-I – DST-TDP

DATE OF JOINING: 30.06.2023

DIVISION/AREA: ATOMIC, MOLECULAR AND OPTICAL PHYSICS DIVISION

VISITORS

1. Mr. Asish Tanay Behera, from IISER Pune, visited Geosciences Division PRL during 01.06.2023 to 31.07.2023.
2. Ms. Aharna Sarkar, from IISER Pune, visited Geosciences Division PRL during 07.06.2023 to 06.08.2023.
3. Ms. Dhruvi Patel, from Gujarat University, visited Theoretical Physics Division PRL during 08.06.2023 to 07.08.2023.
4. Mr. Prabhat Solanki, IISc Bangalore visited Theoretical Physics Division PRL during 06.06.2023 – 20.06.2023.
5. Prof. T. R. Govindarajan, Krea University, A.P visited Theoretical Physics Division PRL on 08.06.2023.
6. Dr. Arnab Chaudhuri, PDF, IIT Gandhinagar visited Theoretical Physics Division PRL on 13.06.2023.
7. Dr. Jalaja Pandya, Visiting faculty, Pandit Deendayal Energy University visited Theoretical Physics Division PRL on 15.06.2023.
8. Dr. Jean Paul Vernier, Senior Scientist, National Institute of Aeronautics, NASA Langley Research Centre, USA visited Space & Atmospheric Sciences Division PRL during 13-14 June 2023.

SUPERANNUATION

Name of the employee	Shri G.S. Rajpurohit
Designation at the time of superannuation	Senior Technical Assistant-D
Area/Division	IRO, A&A Division, Mount Abu.
Date of Birth	01.07.1963
Date of Joining PRL	28.01.1988
Date of Superannuation	30.06.2023

Good Luck for your future endeavours

Cyber Security Awareness – Dumpster Diving

Jigar Raval, Parthiv Parmar, Adit Mehta, Suraj Rathod, Utsavi Sadhu, Ravi J., CNIT, Division

What is Dumpster Diving?

It is a type of the social engineering attack. It refers to the practice of searching through the trash or recycling bins of an organization or individual with the goal of obtaining sensitive or valuable information which can be misused by fraudsters for cyber-attacks like phishing, spear phishing, identity theft etc.

What Data Dumpster Driver Can Obtain and Misuse

Best Practices to Avoid Dumpster Diving

- Never leave or keep unattended your confidential or important document like Network Diagram, Meeting Notes, Minutes, ATM/Credit Card Slips etc...
- Always use shredders for disposal of the sensitive papers/documents.
- Before disposal of the Hard Disk / External USB drives, format it properly OR completely damage it.
- Always securely destroy online delivery boxes that contains important information like address, name, contact details, item name etc.
- Use Trusted Recycling Companies

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