IISER KOLKATA Newsletter

April, 2025 www.iiserkol.ac.in

Indian Institute of Science Education and Research Kolkata (IISERK) is an Institute of National Importance established as an autonomous institute for higher education by the then Ministry of Human Resource Development (now Ministry of Education), Government of India, to promote high-quality education and research in basic sciences.

IISER KOLKATA & BRIC- NIBMG SIGNED MOU FOR COLLABORATIVE RESEARCH

The aim is to promote cooperation and collaboration in research studies. This agreement will enable researchers, faculty and students from the organizations to undertake joint projects, collaborative research and the use of facilities.

100 - DAY COUNTDOWN TO INTERNATIONAL DAY OF YOGA (IDY) 2025

As part of the celebrations marking the 100-day countdown to the International Day of Yoga (IDY) 2025, IISER Kolkata organized a series of events promoting the practice and understanding of yoga and meditation.

1. Seminar and Experiential Session: "Magic and Myth of Meditation & Cognition"

A special seminar titled "Magic and Myth of Meditation & Cognition" was held on April 8, 2025, from 6:00 PM to 7:00 PM at the M N Saha Auditorium, IISER Kolkata. The event featured distinguished speakers Dr. Subinoy Das and Dr. Banani Chakraborty, who delivered an insightful talk exploring the science and philosophy behind meditation. This was followed by a guided experiential session aimed at enhancing participants' understanding of meditation practices and their cognitive benefits. The session witnessed enthusiastic participation from members of the IISER Kolkata community.

2. Regular Yoga Sessions

In addition to the seminar, regular yoga classes are being conducted in the evenings at the SAC building, providing participants with ongoing opportunities to engage in the physical and mental disciplines of yoga. These sessions form a crucial part of the institute's broader efforts to promote health, wellness, and mindfulness within the campus community.

STUDY TOUR: BARASAT GOVERMENT COLLEGE & MIDNAPUR COLLEGE

On 9th April 2025, 20 students and 3 faculty members from Barasat Government College, and on 25th April 2025, 87 students and 7 teachers from Midnapur College visited IISER Kolkata's Department of Biological Sciences as part of their Institutional Study Tour. The visit provided them with an opportunity to explore advanced research in biological sciences and interact with faculty and researchers. During the visit, students were introduced to ongoing research projects and had the opportunity to observe cutting-edge laboratory techniques and scientific instruments.

Faculty members and research scholars were engaged with the students, discussing key topics in modern biology, research methodologies, and career prospects in life sciences. A special interactive session with Prof. Anindita Bhadra allowed students to ask questions and gain insights into higher education and research opportunities at IISER Kolkata. The visit was an enriching experience, fostering scientific curiosity and strengthening academic collaboration between IISER-K and these colleges.

नराकास कोलकाता कार्यालय 2 के अर्धवार्षिक बैठक में आईआईएसईआर कोलकाता का सम्मान एवं सुश्री आनी सुनीता केरकेट्टा, कनिष्ठ सहायक, निबंध प्रतियोगिता में तृतीय पुरस्कार से सम्मानित|

नराकास कोलकाता कार्यालय 2 का अर्धवार्षिक बैठक 03 अप्रैल 2025 को, सीएसआईआर-केंद्रीय काँच एवं सिरामिक अनुसंधान संस्थान में आयोजित किया गया था । उक्त बैठक में आईआईएसईआर कोलकाता को काव्य-पाठ प्रतियोगिता के सफल आयोजन हेतु सम्मानित किया गया एवं नराकास द्वारा आयोजित निबंध प्रतियोगिता में सुश्री आनी सुनीता केरकेट्टा, कनिष्ठ सहायक, को तृतीय पुरस्कार से सम्मानित किया गया।

EK Pehal Team

As part of our decade-long journey empowering underprivileged children through education and cultural enrichment, Ek Pehal organized a vibrant four-day workshop from April 2nd to 5th, 2025, culminating in a grand cultural event on April 6th at R.N. Tagore Auditorium. Over 50 children participated, showcasing their talents through captivating performances in dance, drama, songs, yoga, and an art exhibition. The event, supported by more than 30 dedicated student volunteers, celebrated the profound impact Ek Pehal has had on the lives of these children over the past ten years. The workshops, held at the SAC, included engaging activities like painting, clay modeling, and collage-making, fostering creativity and collaboration between the children and the IISER K community.

A few students and a faculty member from IISER Kolkata participated in the Career Fair organized by the Badkulla United Academy (school affiliated to WBBSE) on 24 April 2025.

The primary objective was to raise awareness among prospective students about the opportunities for admission to an Institute of National Importance such as IISER Kolkata. Volunteers actively engaged with students and their parents, providing insights into the institute's academic programs, research opportunities, and vibrant campus life of IISER Kolkata

FACULTY ACHIEVEMENTS

Prof. Priyadarsi De has been appointed as co-editor-in-chief of the JMS-PAC.

Prof. Nirmalya Ghosh of Department of Physical Sciences and CESSI delivered Plenary Lecture in the recently concluded Indo-French International Conference on Specialty Fibers, Sensing and Quantum Photonics (ICFSQP), held at Mahindra University, Hyderabad during April 11-13, 2025.

STUDENT'S ACHIEVEMENTS

Mr. Suman Noskar (21IP007), a 2nd year PhD student under the supervision of Prof. Alakesh Bisai from the Department of Chemical Sciences, has received ACS Journal of Organic Chemistry Best Poster Award at the "Inter IISER-NISER Chemistry Meet-2025 (IINCM-25)" held at IISER Pune during 20th Mar - 22nd Mar, 2025.

Mr. Arpan Mukherjee (Roll No. 22MS151), Mr. Sampoorn Pandey (Roll No. 22MS168), Mr. Rupayan Halder (Roll No. 22MS129) and Mr. Pritam Sadhu (22MS140), had participated in the prelims of Mimamsa 2025 conducted in January 2025 with 1800 teams, from where they had qualified to the finals of Mimamsa 2025 conducted by IISER Pune.

The finals of Mimamsa 2025 concluded with intense rounds of Deep Thought, Brief Thought and Rapid Fire between the 4 finalist teams including IISc Bangalore, IIT Bombay, IISER Kolkata and IIT Delhi with IISc Bangalore becoming the winners again, IIT Bombay being the first runners up and IISER KOLKATA being the 2nd runners up to maintain a podium finish.

Arpan Mukherjee

Sampoorn Pandey

Rupayan Halder

Pritam Sadhu

Ms. Ammu J.K. (Roll No. 20 RS147), PhD student of Dr. Kathakali Bhattacharyya from the Department of Earth Sciences has received the Best poster award at the "National Seminar on Dynamic Processes of the Earth from Deep Interior to Surface "organized by UGC- Centre for Advanced Studies, Department of Geology, Presidency University, Kolkata", held on March 21 & 22, 2025. The poster was titled "Understanding the Relative Controls on Fracturing, their Attributes, and Kinematics within Frontal Thrust Sheets of Fold-thrust Belts: Insights from Ramgarh thrust, Darjeeling-Himalaya".

Mr. Nikesh Dewangan (20RS021), a Ph.D. scholar from Dr. Pradip Kumar Tarafdar (Memface Lab), Department of Chemical Sciences, has been honored with the Best Poster Presentation Award at the Inter IISER-NISER Chemistry Meet (IINCM 2025), recently held at IISER Pune. His poster was titled "Design of Flavonoid-Based Lipid Domains as Fusion Inhibitors to Efficiently Block Coronavirus and Other Enveloped Virus Infections."

Ms. Biyas Chowdhury (Roll No. 20MS167) from the Department of Physical Sciences, working with Dr. Sudip K Garain for her MS thesis, got selected for an ISRO sponsored National Workshop on Hands-on Data Analysis of XSPECT on-board XPoSat - that was launched in January, 2024 and is ready to observe cosmic X-ray sources. Ms Chowdhury is one of the 40 research scholars/students selected for this workshop and will be funded entirely by ISRO

Mr. Anubhab Das (Roll No.22MS136), Mr. Sthaman Sinha (Roll No. 22MS106), Mr. Adil Krishna P (Roll No.22MS102), Mr. Asish Kumar Patra (Roll No. 22MS212), Mr. Harsh Kanu (Roll No. 22MS139), Mr. Atri Majumder (Roll No. 44MS144) – members of the musical band of 22MS called Nakshatra Krittika, secured the 2nd position in the Battle of Bands at the Fest organized by MAKAUT, and 3rd position in the fest organized by Kalyani Govt Engineering College.


Anubhab Das


Sthaman Sinha


Adil Krishna P

Asish Kumar Patra


Harsh Kanu


Atri Majumder

Ms. Grishma Kasle (Roll No. 20RS083), a Ph.D. scholar from Prof. Jayasri Das Sarma's lab at the Department of Biological Sciences, has been honored with the WILEY-Best Oral Presentation Award at Anusandhan 2025 held recently at Bose Institute Kolkata.

Ms. Anushka Mondal (Roll No. 23RS028), a Ph.D. scholar from Prof. Jayasri Das Sarma's lab at the Department of Biological Sciences, has been honored with the WILEY-Best Poster Presentation Award at Anusandhan 2025 held recently at Bose Institute Kolkata.

Ms. Alolika Chakraborty (Roll No.21IP009) an IPhD student of Dr. Kajaljyoti Borah, from the Department of Earth Sciences, has been selected for the IASPEI Early Career Scientists School (ECSS) and a travel grant for attending the IAGA/IASPEI Joint Scientific Meeting 2025 in Lisbon, Portugal. The grant covers a registration fee waiver plus Euro 1000 for participating in the Meeting.

Mr. Swarnendu Saha (Roll No. 20MS152) has received the Student Travel Support Grant of 100000 Japanese Yen grant from JpGU to present his work at JpGU 2025, the Japanese Geosciences Union, which shall be organised at Chiba, Greater Tokyo, Japan from May 25 to May 30, 2025. He did this work under the supervision of Dr. Arnab Mukherjee of NCPOR, Goa.

Mr. Samantak Kundu (Roll No. 22RS113) from the Department of Earth Sciences, currently working under the supervision of Dr. Sanjay Kumar Mandal has recently been awarded the DAAD Bi-national PhD Scholarship, through which he will be conducting a part of his doctoral research in Germany. The duration of funding is 1 year with 1300 euros per month scholarship, 460 euros research allowance and 1425 euros travel allowance and the location of the host institute is Potsdam. His host institute in Germany will be the GFZ Helmholtz Centre for Geosciences, where he will work under the joint supervision of Prof. Dr. Sascha Brune and Prof. Dr. Dirk Scherler, alongside his supervisor at IISER Kolkata.

Ms. Neela Koner, (Roll No. 22MS043) a 3rd BS-MS student of Department of Chemical Sciences has got the opportunity to attend RESOLV (Cluster of Excellence) Seminar Series (4 days seminar series) in Ruhr-Bochum, Germany. She will receive a travel allowance and free accommodation and food arrangement from RESOLV Authority to support my journey. She is currently working under Dr. Dibyendu Das in the Department of Chemical Sciences.

ALUMNI ACCOLADES

We are delighted to share that IISER Kolkata Alumni, Dr. Arpan Das, who did his PhD under the supervision of Prof. Swadhin Mandal, has recently been offered an Assistant Professor position at IIT Bhubaneswar. Dr. Arpan Das completed his PhD in the year 2022, specialising in synthetic main group chemistry and catalysis. Following his doctoral studies, he joined Ruhr University Bochum in Germany as an Alexander Von Humboldt Postdoctoral Fellow, where he is currently engaged in research on carbanion chemistry. Many congratulations to Dr. Das and Prof. Mandal.

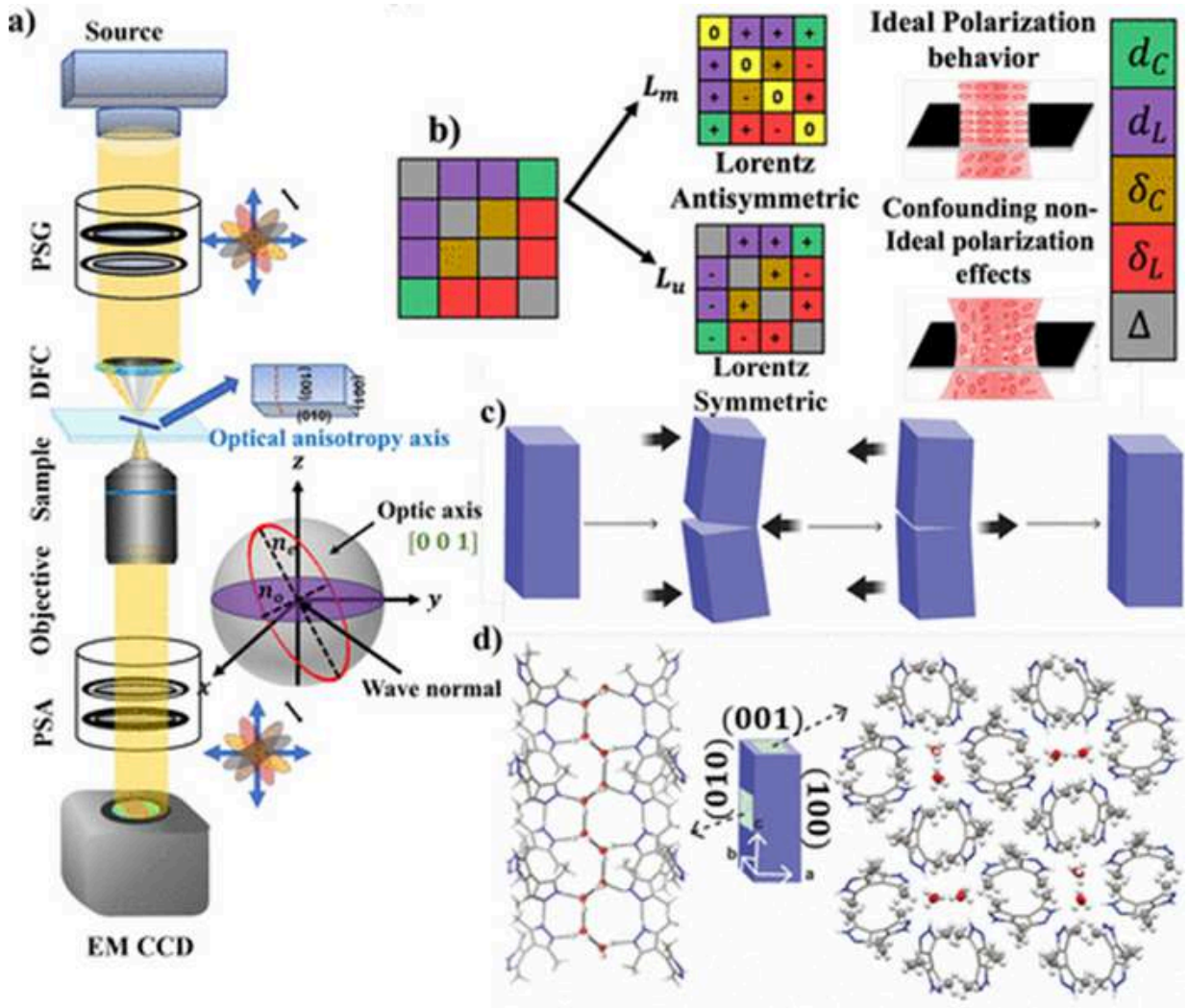
Dr Bikash Shaw, a research group alumnus under the supervision of Prof. Swadhin Mandal has been recently offered a position at IIT BHU, Varanasi as an Assistant Professor. Dr. Bikash joined Prof. Mandal's group as an NPDF postdoctoral fellow and spent nearly two years working with him when he coauthored five publications in highly reputed international journals. His productive stay at IISER Kolkata was later rewarded with very prestigious international fellowships such as the Newton Fellowship and the Alexander von Humboldt Fellowship.

Probing Self-Healing Behavior of Piezoelectric Crystals using Polarized Light

Collaborative research with Prof. Malla Reddy (Department of Chemical Sciences, IISER Kolkata and IIT Hyderabad) on "Self-Healing Behavior of Piezoelectric Crystals Studied Using Polarized Light" is published in **ACS Photonics (N. Kumar and JK Nayak et al, ACS Photonics, DOI: 10.1021/acsphotonics.4c02243).** Note that previous work on this was published in **Science, 2021, 373, 6552, 321-327.**

Brief description: We have used a custom designed state-of-the-art polarization microscopic system to probe and quantify the structural order of the piezoelectric organic crystals with nanometer scale spatial resolution. This unique experimental system in combination with a suitable polarization analysis model enabled quantitative assessment and understanding of the self-healing behavior of the crystals by sensing changes in structural anisotropy in the nanometer length scale.

The studies not only probe and quantify the crystal's various optical properties but also offer new insights into its self-healing mechanism. It is observed that the mechanical stress-induced changes of the microscopic polarization properties of the crystal are manifested as the reduction of anisotropic parameters, e.g., diattenuation and retardance, in the imperfectly healed and fractured crystal. This reduction in amplitude and phase anisotropy parameters is interpreted as the manifestation of the photoelastic effect, where some remnant strain within the broken crystal leads to the alteration of the dielectric tensor of the anisotropic crystal. These alterations, in turn, explain changes in the macroscopic piezoelectric polarization through the orientation of the permanent dipoles and the generation of stress-induced surface charges, which leads to the autonomous self-healing of the crystal. Beyond its remarkable self-healing properties, the crystal also exhibits rich optical properties, e.g., strong polarization anisotropy effects, nonlinear properties, etc.

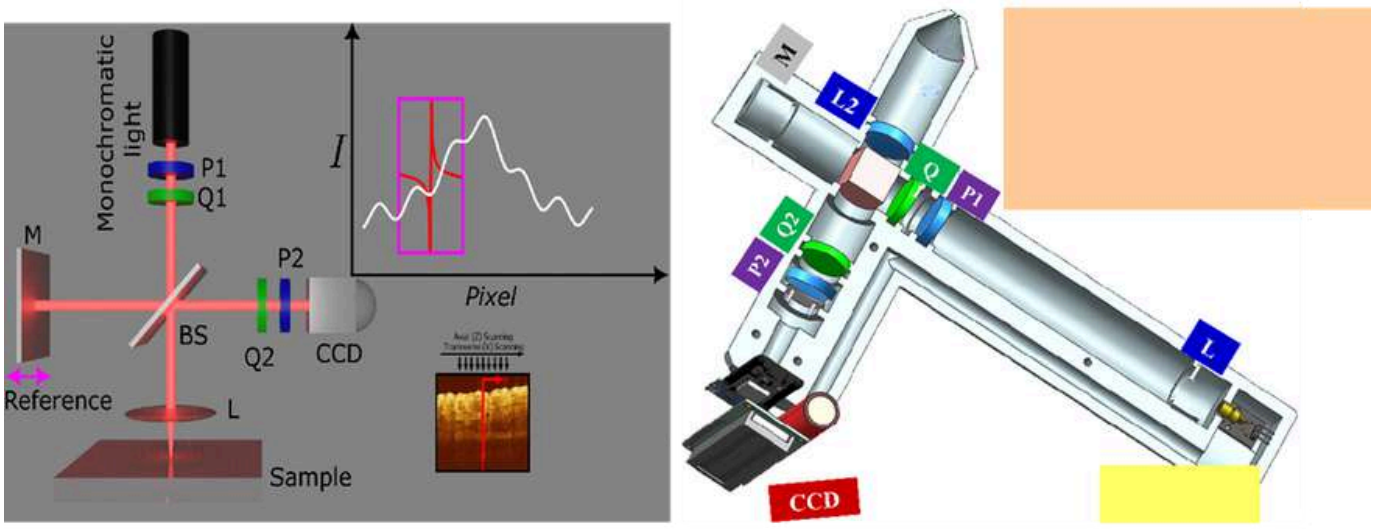


Schematic illustration of the polarized light measurements and its inverse analysis on the self-healing bipyrazole molecular crystals. (a) Dark-field imaging polarization microscopy system. (b) Mueller matrix inverse analysis using the differential matrix formalism, which decomposes the experimentally observed Mueller matrices into Lorentz symmetric (L_m) and Lorentz antisymmetric (L_u) components of the Mueller matrix logarithm, and the individual polarization anisotropy parameters are quantified subsequently. The crystal is oriented in such a way that polarized light propagates perpendicular to the optic axis or the c-axis (001 face of the crystal). A cartoon illustration of the index ellipsoid of this uniaxial crystal is also shown, where the optic axis that is normal to the (001) face of the crystal is shown. (c) Schematic representation of a crystal exhibiting self-healing. (d) Arrangement of the molecules in the bipyrazole molecular crystal illustrates the origin of the uniaxial optical anisotropy of the crystal. Crystal packing diagrams: Propagation of 1D hydrogen bonded zigzag water chain (connecting neighboring bipyrazole molecules) along crystal needle direction; packing view perpendicular to (001) face (top face) showing discrete hydrogen bonded and dispersive interaction zones (right side). Adopted from **Science, 2021, 373, 6552, 321-327 and ACS Photonics, DOI: 10.1021/acsphotonics.4c02243**

RESEARCH HIGHLIGHTS: CENTRE OF EXCELLENCE IN SPACE SCIENCES INDIA(CESSI)

Patent

A METHOD & APPARATUS OF MEASURING INTERFEROMETRIC WEAK VALUE AMPLIFICATION OF SMALL OPTICAL ROTATION, Indian Patent No. 560551, patent application no 202331058260, date of grant 18/2/2025.



Design of the hand-held imaging Weak Value Polarimeter device **(in the backscattering configuration) using path interference approach. (a)** The experimental configuration for weak value polarimetric imaging L: Monochromatic light source, (P1,P2): polarizers, (Q1,Q2): quarter waveplate, (BS): 50:50 beam splitter, (M): reference mirror. **(b)** A mechanical design of the weak value polarimeter device (T-format probe).

Brief description: Weak measurement and Weak value amplification (WVA) are quantum mechanical concepts. However, these can be realized in classical optics setting because of their interferometric origin. Using the interferometric philosophy of WVA, we have developed a weak value polarimeter device that can significantly enhance the sensitivity of polarimetric detection of optical rotation and other polarization signal. This polarized light-based weak measurement devices is the first of its kind having no precedence in the biomedical domain and may revolutionize optical techniques for polarization imaging and biomedical applications. **This is a joint research venture of the groups of Nirmalya Ghosh and Dibyendu Nandi. Former CESS PhD student Athira B S is the primary inventor. The other inventors are: Ankit K Singh, Niladri Modak, Mintu Karmakar, Ritwik Dhara, Dibyendu Nandi, Nirmalya Ghosh.**

CESSI Publication List for the month of April 2025

- **[1 April 2025]** "Gyroscopic Precession in Reissner–Nordström Spacetime", Paulami Majumder and K. Rajesh Nayak, General Relativity and Gravitation, Volume 57, Number 63.

- **[4 April 2025]** "X-class Flare on 2023 December 31 Observed by the Solar Ultraviolet Imaging Telescope on Board Aditya-L1", Soumya Roy, Durgesh Tripathi, Vishal Upendran et al. (including Dibyendu Nandy, Dipankar Banerjee), The Astrophysical Journal Letters, Volume 983, Number 1.

- **[23 April 2025]** "On the Origin of Long-term Modulation in the Sun's Magnetic Activity Cycle", Chitradeep Saha, Suprabha Mukhopadhyay, and Dibyendu Nandy, The Astrophysical Journal Letters, Volume 984, Number 1.

Seminars, Lectures and Colloquia

[DPS Colloquium] Prof. Kedar Khare (IIT Delhi) -- A computational camera that can "see" beyond the physical sensor boundary, Date: Wednesday, Apr 02, 2025.

[DBS Seminar] Professor Anindita Bhadra (Department of Biological Sciences, IISER Kolkata) -- Why do we study dogs? Date: Wednesday, Apr 02, 2025.

[CESSI Seminar] Tathagata Saha (Leibniz-Institut für Astrophysik Potsdam) -- Multiwavelength study of the accretion substructures in extreme variability changing look AGNs, Date: Tuesday, Apr 08, 2025.

[DPS Seminar] Prof. Nayana Shah (Washington University, St. Louis) -- Reimagining two-channel Kondo physics: fermions to bosons and back in a consistent way Date: Wednesday, Apr 09, 2025.

[Special Seminar] Prof. Tomoo Katsura (University of Bayreuth) -- Grain growth kinetics of bridgmanite coexisting with ferropericlase as a function of pressure: the origin of LLSVPs and mid-mantle slab stagnation
Date: Wednesday, Apr 09, 2025.

[DBS Seminar] Dr. Lucky Sarkar (Postdoctoral Researcher Dr. Michaela Gack's Laboratory Cleveland Clinic Florida Research and Innovation Center) -- MDA5 ISGylation is crucial for immune signaling to control viral replication and pathogenesis, Date: Wednesday, Apr 09, 2025.

[DPS Seminar] Prof. Prasenjit Sen (Harish-Chandra Research Institute) -- Machine Learning aided efficient screening and inverse design of materials using generative models, Date: Wednesday, Apr 16, 2025

[Institute Colloquium] Prof. A. K. Tyagi (Homi Bhabha National Institute) -- Rational design of functional materials: A chemist's approach
Date: Monday, Apr 21, 2025.

[DMS Seminar] Utsav Choudhury -- Intersection theories and K theories of Moduli spaces and Grothendieck Riemann Roch theorem, Date: Thursday, Apr 24, 2025.

[CESSI Seminar] Deep Chatterjee (MIT Kavli Institute) -- Online Analyses and Real-time Discovery Alerts from LIGO-Virgo-KAGRA in O4 and Beyond, Date: Tuesday, Apr 29, 2025.

[CESSI Colloquium] Andrew Miller (Utrecht University, Netherlands) -- Looking for imprints of dark matter in gravitational waves
Date: Wednesday, Apr 30, 2025.

[DPS Seminar] Prof. Dibakar Ghosh (Indian Statistical Institute, Kolkata) -- Coexisting dynamics of swarming and synchrony
Date: Wednesday, Apr 30, 2025.

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