
VBO Dust Workshop III

Dust across Cosmic Scales:
From Grain to Galaxies

11 – 14 August 2026 | Hybrid Mode

Vainu Bappu Observatory (VBO)
Indian Institute of Astrophysics

<https://events.iiap.res.in/event/437/>

Programme Schedule

Morning Session: 09:30–11:30, 12:00–13:00 | Afternoon Session: 14:30–16:30, Evening: 17:00–18:00

ERT Expert Review Talk (40 min) **O** Overview talk (20 min) **C** Contributed talk (15 min)

Day 1 — Dust in Different Astrophysical Environments

Time	Type	Speaker	Title
09:30 – 10:20	ERT	Sun Kwok	Complex Organics in Space: a changing view of the cosmos
<i>Session 1: Dust in Different Astrophysical Environments – Overview</i>			
10:20 – 10:40	O	Prithish Halder	Probing Solar-System Dust through Photo-Polarimetric Observations and Light Scattering Models
10:40 – 11:00	O	Umanath Kamath	Dust formation in nova ejecta
11:00 – 11:40	–	<i>Break</i>	
11:40 – 11:55	C	Muskan Kumari Shaw	The Origin of Cosmic Dust in the Early Universe
11:55 – 12:10	C	Debdatta Banerjee	Potential Role of Cosmic Nanosilicate Dust in Hosting Iron (Fe): Insights from Quantum Chemical Simulations
12:10 – 12:25	C	Antariksha Mitra	Physical Evolution of Cosmic Grains: A Numerical Framework for Dust Evolution in the Interstellar Medium
12:25 – 12:40	C	Divyadharsini R	Unveiling the Supernovae Origin from Presolar Grain Data: Connecting Stardust to Stellar Explosions
12:40 – 14:30	–	<i>Lunch Break</i>	
14:30 – 18:00	–	<i>Tutorial 1: Light Scattering Tools – Applications to Astrophysical Dust Environments</i>	
18:30 – 19:30	–	<i>Documentary Screening</i>	

Day 2 — ISM Dust and Magnetic Fields

Time	Type	Speaker	Title
09:30 – 10:20	ERT	Brandon Hensley	The Nature of Interstellar Dust
<i>Session II: ISM Dust and Magnetic Field</i>			
10:20 – 10:40	O	Archana Soam	Magnetic Fields and Dust Grain Alignment in Different Environments of Galactic Star Formation
10:40 – 10:55	C	Sandhyarani Panigrahy	Evidence for Gravity-Driven and Magnetically Regularized Gas Flows Feeding the Massive Protostellar Cluster in Cepheus A
10:55 – 11:30	–	<i>Break</i>	
11:30 – 11:45	C	Saikhom Pravash Singh	Grain Alignment Mechanisms in the Massive Quiescent Filament G16.96+0.27 Using Dust Polarization Observations from JCMT/POL-2
11:45 – 12:00	C	Puja Porel	Unbound Tails and Compressed Heads: A JCMT Study of the SFO38 Cloud
12:00 – 12:15	C	Omkar Jadhav	Investigation of Hourglass-Shaped Magnetic Fields in the G35.20–0.74 Star-Forming Complex
12:15 – 12:30	C	Rohit Chaudhary	Understanding the Importance of Magnetic Fields in the “Collect and Collapse” Model of Star Formation: A Case Study towards S104 using JCMT SCUBA2/POL2
12:30 – 12:45	C	Upasana Rakesh Kumar Gupta	Role of Magnetic Field in Early-Stage Star Formation in PGCCs

Time	Type	Speaker	Title
12:45 – 13:00	C	Sayan Panda	Magnetic Field Morphology and Strength of the High-Latitude Molecular Cloud MBM 12
14:30 – 18:00	–	<i>Tutorial 2: Grain Alignment Workshop</i>	
18:30 – 19:20	ERT	Ranjan Gupta	Observations of Astrophysical Dust in Various Environments and its Modeling

Day 3 — Circumstellar Dust

Time	Type	Speaker	Title
09:30 – 10:20	ERT	Thiem Hoang	Physics of Grain Alignment and Dust Polarization: From Steady-State Environments to a Dynamic Universe
<i>Session III: Circumstellar Dust</i>			
10:20 – 10:40	O	Firoza K. Sutaria	Exploring the Signatures of Dust Grains in the Optical Spectra of Interacting Supernovae
10:40 – 11:00	O	C. Muthumariappan	Grains in Ionized Gas: Their Implications on Thermal Structure
11:00 – 11:30	–	<i>Break</i>	
11:30 – 11:50	O	Manoj Puravankara	Dust and Ice in Protostellar Envelopes with JWST
11:50 – 12:10	O	Shridharan Baskaran	Following the Carbon Trail: PAHs and Fullerenes with Spitzer and JWST
12:10 – 12:25	C	Prasoon Ashok Singh	Fullerene Detection in the Circumstellar Shell of the Candidate Luminous Blue Variable WRAY 16-232
12:25 – 12:40	C	Soumen Das	Dust Emission in the Vicinity of Black Holes: Thermal Signatures from Accretion Disk Environments
12:40 – 12:55	C	Aman Kumar	The Dusty Side of Supernovae
14:30 – 18:00	–	<i>Tutorial 3: CLOUDY Workshop</i>	
18:30 – 19:30	–	<i>Group Discussion</i>	

Day 4 — Circumstellar Dust Processes

Time	Type	Speaker	Title
09:30 – 10:20	ERT	D. K. Ojha	Seeing Through Cosmic Dust: Infrared Perspectives on Star Formation
<i>Session IV: Circumstellar Dust Processes</i>			
10:20 – 10:35	C	Anwesh Kumar Mishra	Investigating Non-Uniform Mass-Loss Rates among Type-II Cepheids in OGLE and Gaia
10:35 – 10:50	C	Saptarshi Ghosh Dastider	Ice Surface as Sulphur Reservoirs: A First-Principles Study of Adsorption, Spectroscopy and Molecular Survival in TMC-1
10:50 – 11:30	–	<i>Break</i>	
11:30 – 11:45	C	Shivani Gupta	ATOMS-QUARKS Survey: Inflow and Infall in Massive Protocluster G318.049+00.086 – Evidence of Competitive Accretion
11:45 – 12:00	C	Sujit Das	Dusty Red Supergiant Wind Controlled by Radiation and Gas–Dust Drag

Time	Type	Speaker	Title
12:00 – 12:15	C	Deshika R	Comparative Structural Analysis of High-Mass and Low-Mass Star-Forming Regions: A Dust Temperature Study of the Orion and Taurus Molecular Clouds
12:15 – 12:30	C	Arushi Kumar	Dust Scattering of X-ray Photons from GRBs
12:30 – 12:45	C	Keerthana U	Influence of Dust Grain Properties on the Scattered Intensity in an Impact-Induced Ejecta Curtain: A Numerical Simulation Study
14:30 – 18:00	–	<i>Tutorial 4: Grain Growth by Coalescence and Adsorption</i>	
18:30 – 19:15	ERT	B. G. Andersson	Probing the ISM with Polarimetry

Expert Review Talks – Speakers & Abstracts

1. Prof. Sun Kwok

University of British Columbia, Vancouver, Canada

Complex Organics in Space: a changing view of the cosmos

Planetary explorations have revealed that complex organics are widely present in the Solar System. Infrared spectroscopic observations have discovered that complex organics are synthesized in large quantities in planetary nebulae and distributed throughout the Galaxy. Signatures of organics are found in distant galaxies, as early as 1.5 billion years after the Big Bang. A number of unsolved spectral phenomena – diffuse interstellar bands, extended red emission, the 220 nm feature, and unidentified infrared emission bands – are likely to originate from organics. This talk discusses the possible chemical structures of the carriers of these phenomena, and how these organics are synthesized abiotically in the Universe.

2. Dr. B.-G. Andersson

SOFIA Science Center / Universities Space Research Association (USRA), NASA Ames Research Center, USA

Probing the ISM with Polarimetry

With the continuing development and testing of the Radiative Alignment Torque (RAT) paradigm for grain alignment, we have gained a powerful tool to probe the interstellar medium (ISM) and its environment, including the nature of the dust grains. Polarimetry is a powerful tool for probing the interstellar magnetic field; expanding this tool from the optical to mm-waves, with deeper, higher-resolution data, and combining with accurate distance tracers such as from Gaia, has enhanced such studies tremendously. Polarimetry now also allows us to probe grain characteristics – size distribution, shape and mineralogy – as well as the interaction of dust with gas dynamics and radiation-field characteristics.

3. Prof. Thiem Hoang

Korea Astronomy and Space Science Institute (KASI) and University of Science and Technology (UST), South Korea

Physics of Grain Alignment and Dust Polarization: From Steady-State Environments to a Dynamic Universe

Dust interacts with stellar radiation and magnetic fields to produce extinction, thermal emission, and polarization, making it a powerful probe of astrophysical environments – from the diffuse ISM and star-forming regions to the surroundings of cosmic transients. This talk reviews recent advances in radiative-torque (RAT) dust physics, including grain alignment and rotational disruption in quasi-static environments, and introduces TransRAT – a new theoretical framework for self-consistently modelling time-dependent grain alignment and rotational disruption in the evolving radiation fields of cosmic transients, illustrated with a Type IIP supernova illuminating a nearby molecular cloud.

4. Dr. Brandon Hensley

Jet Propulsion Laboratory, California Institute of Technology

The Nature of Interstellar Dust

This lecture summarizes our current understanding of the physical properties of interstellar dust: the observations that inform us, the theoretical models that have been developed, and the laboratory experiments to which both theory and data are compared. Particular attention is given to dust polarization as a diagnostic of dust properties and a tracer of interstellar magnetic fields.

5. Prof. Ranjan Gupta

Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India

Observations of Astrophysical Dust in Various Environments and its Modeling

Interstellar dust plays a central role in the extinction of starlight. Conventional models assume Mie theory of light scattering, with solid spheres and other shapes of silicate and graphite particles. An extension of this, Effective Medium Theory (EMT), explains some observed interstellar properties. Recent space probes confirm that dust grains are highly porous and fluffy aggregates rather than regular, homogeneous shapes; since no exact theory exists for the scattering properties of such irregular particles, the discrete-dipole approximation (DDA) method and its results will be discussed.

6. Prof. D. K. Ojha

Tata Institute of Fundamental Research (TIFR), Mumbai, India

Seeing Through Cosmic Dust: Infrared Perspectives on Star Formation

Dust is both an obstacle and a powerful diagnostic in understanding star formation. While it obscures the earliest stages of stellar evolution at optical wavelengths, it also reveals the hidden Universe through infrared emission and extinction. This review presents an observational perspective on how infrared and multi-wavelength studies have transformed our understanding of Galactic star-forming regions, embedded stellar clusters, young stellar objects, circumstellar disks, and episodic accretion.