32MYM

32ND MID YEAR MEETING OF THE INDIAN ACADEMY OF SCIENCES

A CISCO WEBEX EVENT | 4, 11, 18, 25 JUNE & 2 JULY

4 JUNE 2021
16:00 –18:30 h

MATHEMATICS
EARTH & PLANETARY SCIENCES
PHYSICS

Abstract e-Book

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32ND MID YEAR MEETING OF THE INDIAN ACADEMY OF SCIENCES

VIRTUAL / CISCO WEBEX EVENT
4, 11, 18 & 25 JUNE | 16:00–18:30 h
2 JULY | 14:00–19.30 h

EVENT SCHEDULE

MATHEMATICS/ EARTH & PLANETARY SCIENCES/ PHYSICS

Inaugural Lectures
by Fellows/Associates

4 JUNE 2021 (FRIDAY)

16:00–16:20	Conservation Laws with a Flux Function Discontinuous in the Space Variable	**G D Veerappa Gowda** *TIFR-CAM,Bengaluru*
16:25–16:45	Unique Continuation for Sublinear Parabolic Equations	**Agnid Banerjee** *TIFR-CAM, Bengaluru*
16:50–17;10	Partial Differential Equations on Long Cylinders	**Prosenjit Roy** *IIT, Kanpur*
17:15–17:35	Variability of the Sun and its Impact	**Dipankar Banerjee** *ARIES, Nainital*
17:40–18:00	Isostasy and Strength of Continental Lithosphere – Insights from Studies over Indian Plate	**Virendra M Tiwari** *NGRI, Hyderabad*
18:05–18:25	Quantum Photonics with Plasmonic Cavity Coupled Quantum Dots: Emergence of Long zange Polariton Transport and Spin-Momentum Locking	**Jaydeep K Basu** *IISc, Bengaluru*

Link for Webex attendees: *bit.ly/MYM2021_Day1*
YouTube Live Stream: *youtu.be/3SZIdSk32yU*

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Inaugural Lectures by Fellows/ Associates

G D VEERAPPA GOWDA

TIFR Centre for Applicable Mathematics, Bengaluru

FELLOW

2019

Mathematics

4 June 2021
16:00 –16:20 h

Conservation Laws with A Flux Function Discontinuous in the Space Variable

The speaker will discuss conservation laws with a flux function F(x, u) discontinuous in the space variable x arises in several models in physics and engineering and in particular, in modeling of two phase flow in a heterogeneous porous medium, in the modeling of the ideal Clarifier-Thickner unit and traffic flows. In this talk the existence, interface entropy condition, uniqueness and the explicit formula for the solution when F(x, u) is convex in u will be discussed. Approximation of the solution by Godunov type numerical schemes and their convergence analysis with applications to oil reservoir simulations will be presented.

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Inaugural Lectures by Fellows/ Associates

AGNID BANERJEE
TIFR-CAM, Bengaluru

ASSOCIATE
2018
Mathematics

4 June 2021
16:25 -16:45 h

Unique Continuation for Sublinear Parabolic Equations

The speaker will talk about some recent results on strong unique continuation and backward uniqueness results for sublinear parabolic equations. This is based on some recent joint work with Ramesh Manna and Vedansh Arya.

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Inaugural Lectures by Fellows/ Associates

PROSENJIT ROY
IIT, Kanpur

ASSOCIATE
2020
Mathematics

4 June 2021
16:50 –17:10 h

Partial Differential Equations on Long Cylinders

In this talk, the speaker will discuss some properties of the solutions of some partial differential equations that are set on cylindrical domains. In particular, he will analyze asymptotic behaviour of the solutions of such problems when the length of the cylinder tends to infinity

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Inaugural Lectures by Fellows/ Associates

DIPANKAR BANERJEE
ARIES, Nainital

FELLOW
2020
Physics

4 June 2021
17:15–17:35 h

Variability of the Sun and its Impact

Solar variability refers to the changes in the solar activity in different time scales. In this presentation the speaker will give examples of variabilities with short time scale of hours to years time scale. How multi-wavelength long term solar observations from ground and space based platform is changing our understanding of this nearest star will be the focus of discussion. ADITYA-L1 is the first Indian mission that is dedicated to study solar atmosphere with unprecedented spatial and temporal resolution. The speaker will briefly introduce the mission objectives in this context as well.

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Inaugural Lectures by Fellows/ Associates

V M TIWARI
NGRI, Hyderabad

FELLOW
2020
Earth & Planetary Sciences

4 June 2021
17:40–18:00 h

Isostasy and Strength of Continental Lithosphere – Insights from Studies over Indian Plate

In recent discussions, it has been suggested that the crust alone contributes to the long-term strength of the continental lithosphere – referred as 'Crème Brûlée Model', contrary to the widely accepted 'Jelly Sandwich Model'. Integrated strength or Effective Elastic Thickness (EET) of the lithosphere is often determined through isostatic analyses, employing gravity anomalies. However, estimates of EET are sometime biased to the utilized methodologies. To address these two issues – estimation of EET and model of strength of continental lithosphere, we have methodically recorded and analysed gravity and topographic data using physics based model in conjunction with other geophysical observations over different geological terrains of Indian Tectonic Plate. We argue with our studies that both the mentioned models compete to each other, depending upon the underlying lithospheric properties. This has added a novel perception on the global debate over the model of continental lithospheric strength and isostatic compensation mechanism.

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Inaugural Lectures by Fellows/ Associates

JAYDEEP K BASU
IISc, Bengaluru

FELLOW
2020
Physics

4 June 2021
18:05–18:25 h

Quantum Photonics with Plasmonic Cavity Coupled Quantum Dots: Emergence of Long Range Polariton Transport & Spin-Momentum Locking

The speaker will discuss his recent results on coupling of colloidal quantum dots (QD), from single to compact assemblies, to plasmonic nanocavity arrays and metamaterials. With single isolated QDs his group was able to distinguish quantum coupling to localised surface plasmon and surface lattice resonances modes in plasmonic nanocavity arrays. He will discuss ultra-long-range optical energy propagation in these hybrid quantum photonic devices. He will also talk about the observation of photonic spin-momentum locking in the form of directional and chiral emission from achiral QDs evanescently coupled to achiral hyperbolic metamaterials. Efficient coupling between QDs and the metamaterial leads to emergence of these photonic topological modes that can be theoretically explained in terms of rigorous modelling based on photon Green's function where pseudo spin of light arises from coupling of QDs to evanescent modes of HMM.