

## Thursday 5 March

10:00

### AOWM EC meeting: EC meeintg

Session

11:30

13:10

### The Sandpile Model and Its Extensions: Dynamical Structures

**Contribution** | **Speaker:** Thi Ha Duong Phan (Vietnam Academy of Science and Technology)

#### Description

The Sandpile Model (SPM) was introduced in 1987 by the physicists Bak, Tang, and Wiesenfeld to study self-organized criticality in dynamical systems. Since then, the model and its extensions have become central topics in contemporary research, particularly in mathematics, computer science, and physics.

This talk presents the SPM and its extensions, focusing on the structure of their state spaces, as well as stability properties and convergence times - fundamental aspects of dynamical systems that provide deeper insight into their behavior.

13:50

14:10

### Minimal submanifolds in higher codimension

**Contribution** | **Speaker:** Yng-Ing Lee (National Taiwan University)

#### Description

The study of minimal submanifolds has a long history. They arise naturally and have a lot of applications. There are sharp differences between properties of minimal hypersurfaces and minimal submanifolds in high codimension. For instance, in higher codimension the uniqueness and stability for solutions of Dirichlet problem of minimal surface equation no longer hold, and the solvability and smoothness of solutions are not guaranteed either. We are particularly interested in a special class of minimal submanifolds in higher codimension, called minimal Lagrangian submanifolds. Such examples in  $\mathbb{R}^{2n}$  or in a Calabi-Yau manifold are called special Lagrangians. They are always volume minimizing and play an important role in Mirror Symmetry in String theory. We allow singularities in the study.

In the first part of this talk, I will first give an introduction and overview on the subject, including possible methods to study their existence and related results. In the second part, I will focus on the continuity method and my recent project.

14:50

15:00

### Tea Time & IPMU tour

Break

16:00

16:00

**Poster session****Session** | **Convener:** 18 presentators**Description**

- 1) Saraswati Acharya: Differential equations and their application to human body heat transfer using the finite element method.
- 2) Editha Jose: Mathematics of Reaction Networks and its Applications
- 3) Akanksha Gupta: Pellian Polynomials over Integers
- 4) Yasuko Hasegawa: Applications of Number Theory in Various Fields
- 5) Suhita Hazra: Structure of Sets With Prescribed Complexity
- 6) Papiya Sur: Common divisors of totients of polynomials
- 7) Deep Thakur: Some new results on Hurwitz zeta functions
- 8) Luyu Zheng: Quiver braid group action for a 3-fold crepant resolution
- 9) Nao Moriyama: Remarks on the minimal model theory for log surfaces in the analytic setting
- 10) Naoka Karube: The moduli space of dormant opers on elliptic curves
- 11) Yukino Yagi: Reconstruction of oriented matroids from Varchenko-Gel'fand algebras
- 12) Fumika Mizoguchi: Nilpotent and solvable Lie algebras obtained by quivers
- 13) Gaurav Kumar: Some results on the Lerch Zeta function
- 14) Hikari Hanaki: The Littlewood-Richardson rule for Schur multiple zeta functions
- 15) Fumi Ogihara: On the estimation of the sum of a representation function related to square-full numbers in short intervals
- 16) Jyothsna Sivaraman: Counting ideals and its applications
- 17) Dhananjaya Sahu: On higher order real zeros of Dedekind zeta functions

17:00

17:30

**Conference Dinner****Break**

19:30

## Friday 6 March

10:00

### Group Discussion

Session

11:30

13:00

### Partitions, Eisenstein Series, and Their Applications

**Contribution** | **Speaker:** Soon-Yi Kang (Kangwon National University)

#### Description

This talk explores structural connections between integer partitions and Eisenstein series, with an emphasis on the arithmetic implications of modularity and quasi-modularity. As a primary example, we study generating functions arising from MacMahon-type partition variants and show that they admit quasi-modular descriptions. This framework provides effective control over their coefficients and leads to arithmetic applications, including a new expression for prime detection.

13:40

14:00

### Mathematics for Advancing Cardiovascular Medicine — From Hemodynamic Analysis to Clinical Application —

**Contribution** | **Speaker:** Yoshie Sugiyama (The University of Osaka)

#### Description

In this talk, I discuss how mathematical structures contribute to advances in cardiovascular medicine, based on ongoing interdisciplinary collaborations with cardiovascular surgeons and cardiologists.

Starting from three-dimensional anatomical structures reconstructed from medical imaging, we perform hemodynamic analyses grounded in fluid equations and continuum mechanics. These analyses aim to provide quantitative indicators that support surgical design and clinical decision-making. As a representative example, I will introduce efforts to improve the Fontan procedure through mathematical evaluation of blood flow dynamics and energy-related measures.

Reliable hemodynamic modeling requires more than numerical computation. Its validity depends fundamentally on the mathematical formulation of governing equations, well-posedness considerations, and in particular the appropriate treatment of boundary conditions. Boundary conditions are not merely technical specifications; they determine stability, physical consistency, and interpretability of the results. I will highlight how these theoretical aspects shape clinically meaningful analysis.

Finally, I will briefly discuss how mechanically derived quantities can be connected to predictive frameworks, including AI-based approaches, while preserving mathematical coherence and interpretability.

Through these examples, I aim to demonstrate that mathematics serves not only as a computational tool but as a conceptual and structural foundation for translating medical information into reliable clinical insight.

14:40

15:00

### Tea Time

Break

15:40

15:40

### Mentoring Program

**Contribution** | **Speakers:** Sanoli Gun (IMSc, Chennai), Yukari Ito (Kavli IPMU, U Tokyo)

#### Description

We will explain how to organize mentoring program.

Sanoli Gun will explain about it in Indian Women in Mathematics.

Yukari Ito will explain about Heidelberg Laureate Forum and the mentoring program.

16:20