



香港數學學會

The Hong Kong Mathematical Society

(Founded in 1979)

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The Hong Kong Mathematical Society
c/o Department of Applied Mathematics
The Hong Kong Polytechnic University
Hung Hom, Hong Kong

THE HONG KONG MATHEMATICAL SOCIETY ANNUAL GENERAL MEETING 2023

27 May 2023 (Saturday)
9:00am – 4pm
The University of Hong Kong

Schedule of Events

Time: 9am-11:50am

Venue: Lecture Theatre A, Chow Yei Ching Building, HKU

9:00am – 10:00am	HKMS Distinguished Lecture by Prof. Jong-Shi Pang (University of Southern California) Chair: Prof. Defeng Sun
10:00am -- 10:30am	Tea/Coffee break with refreshment
10:30am -- 10:50am	Award Presentation Ceremony
10:50am -- 11:00am	Financial report
11:00am -- 11:50am	Plenary talk by Dr. Chun Yin Hui (HKU) Chair: Prof. Patrick Tuen Wai Ng

Time: 12:00noon-14:00

Venue: Senior Common Room, 14/F, K.K. Leung Building, HKU

12:00noon --14:00 Lunch

Time: 14:00-16:00

Venue: Lecture Theatre C, Chow Yei Ching Building, HKU

14:00 -- 14:50	Plenary talk by Dr. Tianling Jin (HKUST) Chair: Prof. Tieyong Zeng
14:50 -- 15:40	Plenary talk by Dr. Can Yang (HKUST) Chair: Prof. Kun Xu

Title and Abstract

Distinguished lecture

Time: 9:00am-10:00am

Title: A bird's-eye view of modern "non"-optimization

Speaker: Prof. Jong-Shi Pang (University of Southern California)

Abstract: The past few decades have witnessed an explosion of interest in the use of mathematical optimization methods for problems in machine learning, statistical prediction, and data science. Throughout this period, convex programming has been the main computational tool for solving the optimization problems in these domains. This talk makes the case that this "approach of convenience" is vastly inadequate in rigorously addressing advanced problems where non-traditional functional features, most notably, nonconvexity and nondifferentiability, are pervasive and optimality of solutions is an un-attainable ideal. For these problems, the ability to recognize and rigorously treat the mathematical complexity of the shell of big data ought to be prioritized without compromising computations. Often ignored, the latter "non"-aspects of optimization should be the direction of future research, which necessitates a redirected formulation of the mathematical models of the underlying problems for their faithful abstractions and the realization that computational methods can at best obtain approximate stationary solutions of the resulting optimization problems. This re-imagined paradigm defines the new era of mathematical optimization. Our bird's-eye presentation will cover several basic topics key to the study of optimization problems with coupled nonconvexity and nondifferentiability illustrated by applications.

Plenary Talks:

Time: 11:00am – 11:50am

Speaker: Dr. Chun Yin Hui (HKU)

Title: Monodromy of subrepresentations and irreducibility of low degree automorphic Galois representations

Abstract: Given a compatible system $\{\rho_\lambda : \text{Gal}_K \rightarrow \text{GL}_n(E_\lambda)\}_\lambda$ of semisimple λ -adic representations of a number field K satisfying mild local conditions, we prove that for almost all λ any type A irreducible subrepresentation of $\rho_\lambda \otimes \overline{\mathbb{Q}}_\ell$ is residually irreducible. We apply this result and some potential automorphy theorem to prove that $\rho_\lambda \otimes \overline{\mathbb{Q}}_\ell$ is residually irreducible for almost all λ if the compatible system is attached to a regular algebraic, polarized, cuspidal automorphic representation of $\text{GL}_n(\mathbb{A}_\mathbb{Q})$ and $n \leq 6$.

Time: 14:00 – 14:50

Speaker: Dr. Tianling Jin (HKUST)

Title: Optimal regularity and fine asymptotics for the porous medium equation in bounded domains

Abstract: We prove global Holder gradient estimates for bounded positive weak solutions of porous medium equations and fast diffusion equations in smooth bounded domains with the homogeneous Dirichlet boundary condition. This allows us to establish their optimal global regularity and finer asymptotics. This talk is based on the joint works with Xavier Ros-Oton and Jingang Xiong.

Time: 14:50 – 15:40

Speaker: Dr. Can Yang (HKUST)

Title: AI for science: examples from integration of single-cell and spatial transcriptomics data

Abstract: Artificial intelligence (AI) is transforming the way science is conducted and discoveries are made. In this talk, we present examples from integration of single-cell and spatial transcriptomics (ST) data to show the role of AI methods. Current ST technologies based on either next generation sequencing (seq-based approaches) or fluorescence in situ hybridization (image-based approaches), while providing hugely informative insights, remain unable to provide spatial characterization at transcriptome-wide single-cell resolution, limiting their usage in resolving detailed tissue structure and detecting cellular communications. To overcome these limitations, we developed SpatialScope, a unified approach to integrating scRNA-seq reference data and ST data that leverages deep generative models. With innovation in model and algorithm designs, SpatialScope not only enhances seq-based ST data to achieve single-cell resolution, but also accurately infers transcriptome-wide expression levels for image-based ST data. Additionally, we also show that our developed AI method, STitch3D, can help for 3D reconstruction of cellular structures from the tissue level to the whole organism level. While AI approaches greatly offer the computational efficiency, statistical principles and insights play an important role for the successful development of these methods. These are the joint work with my PhD students Xiaomeng Wan, Jiashun Xiao, Gefei Wang and Jia Zhao, as well as collaborators Angela Wu, Zhixiang Lin, Ryohichi Sugimura, Yan Yan and Yang Wang.

[Guide to conference venue and lunch restaurant \(see next pages\)](#)

How to go to Lecture Theatre CBA, Chow Yei Ching Building

1. Take exit A2 of HKU MTR station.



2. Turn right



3. Walk along the U-street



5. You will arrive at Chow Yei Ching Building.



How to go to Senior Common Room, 14/F, K.K. Leung Building

1. Turn left



2. Turn left. Take the elevator or escalator to G/F.



3. Walk straight then turn right.



4. You will arrive at K.K. Leung Building. Take the elevator to 14/F.

