

The Mathematics of Data
Workshop on Optimization and Discrete Structures
(2 to 12 Jan 2024)



Venue

IMS Auditorium
Institute for Mathematical Sciences
3 Prince George's Park
Singapore 118402

ORGANIZING COMMITTEE

Co-Chairs

Afonso S. Bandeira
ETH Zurich

Subhroshekhar Ghosh
National University of Singapore

Philippe Rigollet
Massachusetts Institute of Technology

Members

Hong T.M. Chu
National University of Singapore

Tuesday 2 Jan 2024	Time	Title Speaker
	1415–1430	Registration
	1430–1525	Multi-Armed Bandits with Abstention <i>Vincent Y. F. Tan</i> <i>National University of Singapore, Singapore</i>
	1525–1530	Short Break
	1530–1625	<u>Mini Course</u> Optimal transport and high-dimensional probability: Introduction to optimal transport <i>Yair Shenfeld</i> <i>Brown University, USA</i>

Wednesday 3 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	Hitting the High-D(imensional) Notes: SGD learning dynamics <i>Courtney Paquette</i> <i>McGill University, Canada</i>
	1055–1100	Short Break
	1100–1155	High-dimensional limits of streaming and multi-pass SGD on least squares <i>Elliot Paquette</i> <i>McGill University, Canada</i>
	1155–1430	Lunch Break
	1430–1525	<u>Mini Course 1</u> How to check when a system of real quadratic equations has a solution <i>Mark Rudelson</i> <i>University of Michigan, USA</i>
	1525–1530	Short Break
1530–1625	<u>Mini Course</u> Optimal transport and high-dimensional probability: Proof of duality and Brenier's theorem via cyclical monotonicity <i>Sinho Chewi</i> <i>MIT, USA</i>	

Thursday 4 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	Convex Clustering: Theoretical Guarantee and Efficient Computations <i>Kim-Chuan Toh</i> <i>National University of Singapore, Singapore</i>
	1055–1105	Group Photo & Short Break
1105–1200	Approximation Bounds for Sparse Programs <i>Alexandre d'Aspremont,</i> <i>École Normale Supérieure, France</i>	

Thursday 4 Jan 2024	Time	Title Speaker
	1200–1430	<i>Lunch Reception at IMS</i>
	1430–1525	<u>Mini Course 2</u> Approximately Hadamard matrices and random frames <i>Mark Rudelson</i> <i>University of Michigan, USA</i>
	1525–1530	Short Break
	1530–1625	<u>Mini Course</u> Optimal transport and high-dimensional probability: Wasserstein Spaces <i>Yair Shenfeld</i> <i>Brown University, USA</i>
1800	Conference Dinner @ Jumbo Seafood The Riverwalk <i>1-way transfer provided</i>	

Friday 5 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	Information-Theoretic Thresholds for Planted Dense Cycles <i>Cheng Mao</i> <i>Georgia Institute of Technology, USA</i>
	1055–1100	Short Break
	1100–1155	Randomized tensor-network algorithms for random data in high-dimensions <i>Yuehaw Khoo</i> <i>University of Chicago, USA</i>
	1155–1400	Lunch Break (2 hours)
	1400–1455	Spectral alignment for high-dimensional SGD <i>Aukosh Jagannath</i> <i>University of Waterloo, Canada</i>
	1455–1500	Short Break
	1500–1555	<u>Mini Course</u> Optimal transport and high-dimensional probability: Otto's Calculus on Wasserstein and a dynamic formulation of OT (Benamou-Brenier Formula) <i>Sinho Chewi</i> <i>MIT, USA</i>
	1630–1700	<i>Tea Reception at Dept. of Math Lounge</i>
1700–1800	<u>Distinguished Lecture Series in Statistics</u> Statistical Optimality and Computational Tractability of ICA <i>Ming Yuan</i> <i>Columbia University, USA</i>	

Monday 8 Jan 2024	Time	Title Speaker
	0930–1000	Registration
	1000–1055	Learning bounded-degree polytrees with samples <i>Arnab Bhattacharyya</i> <i>National University of Singapore, Singapore</i>
	1055–1100	Short Break
	1100–1155	Acceleration by Stepsize Hedging <i>Jason Altschuler</i> <i>University of Pennsylvania, USA</i>
	1155–1430	Lunch Break
	1430–1525	Recent Developments in Group Testing: Fundamental Limits and Algorithms <i>Jonathan Scarlett</i> <i>National University of Singapore, Singapore</i>
	1525–1530	Short Break
	1530–1625	<u>Mini Course</u> Optimal transport and high-dimensional probability: Gradient flows on Wasserstein Spaces <i>Sinho Chewi</i> <i>MIT, USA</i>

Tuesday 9 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	Random perturbation of low-rank matrices <i>Ke Wang</i> <i>The Hong Kong University of Science and Technology, China</i>
	1055–1105	Group Photo & Short Break
	1105–1200	Formulation and resolution of inverse problems in signal and image processing - From classical methods to hybrid AI <i>Caroline Chaux</i> <i>CNRS@CREATE, Singapore</i>
	1200–1430	Lunch Break
	1430–1525	Optimal Regularization for a Data Source <i>Yong Sheng Soh</i> <i>National University of Singapore, Singapore</i>
	1525–1530	Short Break
	1530–1625	<u>Mini Course</u> Optimal transport and high-dimensional probability: Functional inequalities (e.g., log-Sobolev inequality and Talagrand's inequality) and convergence of flows, displacement convexity and log-concavity of probability measures <i>Yair Shenfeld</i> <i>Brown University, USA</i>

Wednesday 10 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	The Computational Curse of Big Data for Bayesian Additive Regression Trees: A Hitting Time Analysis <i>Yanshuo Tan</i> <i>National University of Singapore, Singapore</i>
	1055–1100	Short Break
	1100–1155	Least Squares Estimation of a Multivariate Quasiconvex Regression Function <i>Somabha Mukherjee</i> <i>National University of Singapore, Singapore</i>
	1155–1430	Lunch Break
	1430–1525	From Spectral Estimators to Approximate Message Passing... And Back <i>Marco Mondelli</i> <i>Institute of Science and Technology Austria, Austria</i>
	1525–1530	Short Break
	1530–1625	<u>Mini Course</u> Optimal transport and high-dimensional probability: Functional inequalities and concentration of measure: sub-Gaussian variables and Chernoff bound, the entropy method, Bobkov-Götze theorem, tensorization and transport inequalities. <i>Yair Shenfeld</i> <i>Brown University, USA</i>

Thursday 11 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	Convergence of mean field Langevin dynamics and its application to neural network optimization <i>Taiji Suzuki</i> <i>The University of Tokyo, Japan</i>
	1055–1100	Short Break
	1100–1155	Finite-sample performance of the maximum likelihood estimator in logistic regression <i>Jaouad Mourtada</i> <i>ENSAE/CREST, France</i>
	1155–1400	Lunch Break
	1400–1455	<u>Distinguished Visitor Lecture Series</u> Dynamical spectral transition for optimization in very high dimensions <i>Gerard Ben Arous</i> <i>New York University, USA</i>
	1455–1500	Short Break

Thursday 11 Jan 2024	Time	Title Speaker
	1500–1555	<u>Mini Course</u> Optimal transport and high-dimensional probability: Langevin dynamics via calculus on Wasserstein space <i>Sinho Chewi</i> <i>MIT, USA</i>
	1700–1800	<u>Dept of Mathematics: Young Mathematician Lecture Series</u> Optimal Structures in convex geometry and combinatorics <i>Yair Shenfeld</i> <i>Brown University, USA</i>

Friday 12 Jan 2024	Time	Title Speaker
	0945–1000	Registration
	1000–1055	Sampling from convex bodies using multiscale decompositions <i>Piyush Srivastava</i> <i>Tata Institute of Fundamental Research, India</i>
	1055–1100	Short Break
	1100–1155	Robust estimation and regression with MMD <i>Pierre Alquier</i> <i>ESSEC Business School, Singapore</i>
	1155–1430	Lunch Break
	1430–1525	Network-Adjusted Covariates for Community Detection <i>Wanjie Wang</i> <i>National University of Singapore, Singapore</i>
	1525–1530	Short Break
	1530–1625	Graph Transformers and Developments <i>Xavier Bresson</i> <i>National University of Singapore, Singapore</i>