MATH-IMS Joint Pure Mathematics Colloquium Series
The Chinese University of Hong Kong

This Colloquium Series in Pure Mathematics is organized by the Department of Mathematics and the Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The series focuses on all areas of pure mathematics together with theoretical developments and applications.

Date: March 14, 2024 (Thursday)
Time: 4:00PM-5:00PM (Hong Kong Time)
Venue: AB1 501a

Dynamic mass martingale transports

Speaker: Professor Nassif Ghoussoub
University of British Columbia

Abstract: The optimal transport problem provides a fundamental and quantitative way to measure the distance between probability distributions, which has led to many successful applications in statistics and probability theory. We study the optimal transport between probability measures "in convex order", where the cost can either be the standard ones (proposed by Monge) or those given by Lagrangian integrals along Brownian paths. An Eulerian---mass flow---formulation of the problem is introduced. Its dual is given by Hamilton-Jacobi-Bellman type variational inequalities. Our key result is the existence (in a Sobolev class) of optimizers for this new dual problem, which in turn determines a free boundary, where the optimal Skorokhod transport drops the mass in space-time. This complements and provides a constructive PDE alternative to results of Beiglböck, Cox, and Huesmann, and is a first step towards developing a general optimal mass transport theory involving mean field interactions and noise. This is based on joint work with Young Heon Kim and Aaron Palmer.

Bio: Professor Ghoussoub completed his PhD (1975) at the Pierre and Marie Curie University (Paris VI). After graduation, he was a postdoc fellow at Ohio State University before joining the University of British Columbia, where he is currently a Professor of Mathematics and Distinguished University Scholar. Prof. Ghoussoub's research interests are functional analysis, non-linear analysis and partial differential equations. He has received multiple prestigious awards and honours, including e.g. Coxeter-James Prize (1990), Jeffrey-Williams Prize (2007), Queen Elizabeth II Diamond Jubilee Medal (2012), CRM-Fields-PIMS Prize (2019). Prof. Ghoussoub was vice-president of the Canadian Mathematical Society from 1994 to 1996, the founding director of the Pacific Institute for the Mathematical Sciences (PIMS) for the period 1996–2003, the co-editor-in-chief of the Canadian Journal of Mathematics during 1993–2002, a co-founder of the MITACS Network of Centres of Excellence, and is the founder and current scientific director of the Banff International Research Station (BIRS). Prof. Ghoussoub became a fellow of the Royal Society of Canada (1994), the American Mathematical Society (2012), the Fields Institute (2017) and the Canadian Mathematical Society (2018).