The Hong Kong University of Science and Technology

Department of Mathematics

<u>Seminar on Applied Mathematics</u>

Asymptotic Methods for High-Dimensional Inference: Exploiting the Blessings of Dimensionality

by

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<u>Abstract</u>

Extracting meaningful information from the massive data being collected by our society presents challenges and opportunities to signal and information processing research. On the one hand, many classical methods, and the assumptions they are based on, are simply not designed to handle the explosive growth of the dimensionality of the modern datasets. On the other hand, the increasing dimensionality offers many benefits: in particular, the very high-dimensional settings allow one to apply powerful asymptotic methods from probability theory and statistical physics to make precise statements and sharp predictions that would otherwise be too complicated in moderate dimensions. I will mention recent work in my group on exploiting such blessings of dimensionality via asymptotic methods. In particular, I will show (1) the phase transition of a widely-used spectral method for nonconvex estimations; (2) the high-dimensional geometry of solving the phase retrieval problem via linear programming; and (3) how to use scaling and mean-field limits to analyze nonconvex optimization algorithms for high-dimensional inference and learning.

Speaker's Bio:
Yue M. Lu did his undergraduate studies at Shanghai Jiao Tong University. He attended the University of Illinois at Urbana-Champaign, where he received the M.Sc. degree in mathematics and the Ph.D. degree in electrical engineering, both in 2007. After working as a postdoctoral researcher at the Audiovisual Communications Laboratory at Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, he joined Harvard University, where he is currently an Associate Professor of Electrical Engineering and directing the Signals, Information, and Networks Group (SING) at the Harvard John A. Paulson School of Engineering and Applied Sciences.
He received the Most Innovative Paper Award of IEEE International Conference on Image Processing (ICIP) in 2006, the Best Student Paper Award of IEEE ICIP in 2007, and the Best Student Presentation Award at the 31st SIAM SEAS Conference in 2007. Student papers supervised and coauthored by him won the Best Student Paper Award (with Ivan Dokmanic and Martin Vetterli) of IEEE International Conference on Acoustics, Speech and Signal Processing in 2011 and the Best Student Paper Award (with Ameya Agaskar and Chuang Wang) of IEEE Global Conference on Signal and Information Processing (GlobalSIP) in 2014. He has been an Associate Editor of the IEEE Transactions on Image Processing since December 2014, an Elected Member of the IEEE Image, Video, and Multidimensional Signal Processing Technical Committee since January 2015, and an Elected Member of the IEEE Signal Processing Theory and Methods Technical Committee since January 2016. He is a recipient of the 2015 ECE Illinois Young Alumni Achievement Award.

Date: *Wednesday, 25 October 2017*

Time: *11:00a.m. – 12:00noon*

Venue: *Room 5510, Academic Building*
                          (near Lifts 25 & 26), HKUST

All are welcome!