THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE
Geometric Functional Analysis and Probability Seminar

Room 155 ,Ziskind Building
on Thursday, May 31, 2018at 13:30

Bhaswar Bhattacharya (UPenn) and Elliot Paquette (Ohio) -

Double Seminar

Abstract:

Bhaswar Bhattacharya: Large Deviation Variational Problems in Random Combinatorial Structures

The upper tail problem in the Erdos-Renyi random graph $G\sim\mathcal{G}_{n,p}$, where every edge is included independently with probability p, is to estimate the probability that the number of copies of a graph H in G exceeds its expectation by a factor of $1+\delta$. The arithmetic analog of this problem counts the number of k-term arithmetic progressions in a random subset of $\{1, 2, \ldots, N\}$, where every element is included independently with probability p. The recently developed framework of non-linear large deviations (Chatterjee and Dembo (2016) and Eldan (2017)) shows that the logarithm of these tail probabilities can be reduced to a natural variational problem on the space of weighted graphs/functions. In this talk we will discuss methods for solving these variational problems in the sparse regime ($p \rightarrow 0$), and show how the solutions are often related to extremal problems in combinatorics. (This is based on joint work with Shirshendu Ganguly, Eyal Lubetzky, Xuancheng Shao, and Yufei Zhao.)

Elliot Paquette: Random matrix point processes via stochastic processes

In 2007, Virag and Valko introduced the Brownian carousel, a dynamical system that describes the eigenvalues of a canonical class of random matrices. This dynamical system can be reduced to a diffusion, the stochastic sine equation, a beautiful probabilistic object requiring no random matrix theory to understand. Many features of the limiting eigenvalue point process, the Sine--beta process, can then be studied via this stochastic process. We will sketch how this stochastic process is connected to eigenvalues of a random matrix and sketch an approach to two questions about the stochastic sine equation: deviations for the counting Sine--beta counting function and a functional central limit theorem.

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