Cornell Probability Summer School: Invited Talks

Andrew Ahn, Massachussetts Institute of Technology

Title: Difference Operators and Plane Partitions
Date: Tuesday, June 11th 3:30-4:20 PM (Lecture 1), Friday, June 14th 3:30-4:20 PM (Lecture 2)

Abstract: Plane partitions are 2 dimensional generalization of ordinary partitions which may also be viewed as a tiling model. We will study the q^{vol} measure on plane partitions and the method of Macdonald difference operators which provide access to moment formulas. We will then use these moment formulas to obtain asymptotic results about the q^{vol} measure.

Giuseppe Gennovese, University of Zurich

Title: Transformation of Gaussian measures under the DNLS gauge group
Date: Thursday, June 13th 3:30-4:20 PM (Lecture 1), Saturday, June 15th, 3:10-4:00 PM (Lecture 2)

Abstract: The DNLS gauge is a map normally used to simplify the form of the derivative nonlinear Schroedinger equation (DNLS). The resurgence of interest in transformation properties of Gaussian measures under dispersive flows of the last years has motivated the study of the problem for the DNLS gauge. In the periodic setting, in which the map is anticipative, quasi-invariance and Jacobi formula are surprisingly difficult to achieve. In my talks I will present the the recent advances on the topic and explain the main related open questions.

Chenmin Sun, Université Cergy-Pontoise

Title: Gibbs measure for the fractional nonlinear Schrödinger equations
Date: Friday, June 14th 2:30-3:20 PM

Abstract: We consider the fractional nonlinear Schrödinger equation with cubic nonlinearity:

$$i\partial_t u - (-\partial_x^2)^{\alpha/2} u = |u|^2 u. \tag{1}$$

(1) is a Hamiltonian system with conserved energy

$$H(u) = \int_{\mathbb{T}} \left(\frac{1}{2} |D^{\alpha/2} u|^2 + \frac{1}{4} |u|^4 \right) dx.$$

The case $\alpha = 2$ corresponds to the classical nonlinear Schrödinger equation. I will first explain the construction of its Gibbs measure, which is formally of the form $d\mu = e^{-H(u)} du$, for the strong dispersive case $\alpha > 1$. For the weak dispersive case $\alpha \leq 1$, a renormalization procedure is needed, in order to make sense of the formal expression. Next I will discuss three methods for construting global dynamics on the support of the Gibbs measure, according to the value of α. This talk is based on a joint work with N. Tzvetkov.

Yin-Ting Liao, Brown University

Title: Sharp large deviation principles for random projections of ℓ^p balls
Date: Monday, June 17th 1:30-2:20 PM

Abstract: Properties of random projections of high-dimensional probability measures have gained much attention in the past decade. Results have been obtained on different scales of fluctuations, including central limit theorems and large deviation principles. On the other hand, we are interested in refined large deviation estimates in the spirit of Bahadur-Ranga Rao type estimates for iid random variables. In this talk, we will review existing work, and then describe our results on refined large deviation principles for random projections of iid random variables. We will also briefly discuss possible extensions to high-dimensional ℓ^p balls, which are of particular interest in asymptotic convex geometry.

Ankan Ganguly, Brown University

Title: Local Limits of Interacting Particle Systems on Large Sparse Graphs
Date: Tuesday, June 18th, 3:00-3:50 PM (Lecture 1), Wednesday, June 19th 3:00-3:50 PM (Lecture 2)

Abstract: This talk is intended to compliment Kavita Ramanan's lecture series. We are interested in understanding local properties of pure jump interacting particle systems. These are large collections of continuous time stochastic processes on discrete state spaces, "particles," whose evolution is governed by an underlying graph. Such processes arise in a variety of fields including population biology, load balancing, and systems neuroscience. Under suitable assumptions, we identify limit dynamics on such graphs and characterize the limiting marginal dynamics of a small, finite collection of particles as the number of particles goes to infinity via the "local equations." The local equations rely on a Gibbs-like conditional independence property that holds with great generality. However, unlike the local equations introduced in Kavita Ramanan's talks, these can be

applied to a variety of deterministic graph structures not limited by Cayley trees. This talk will be based on joint work with Kavita Ramanan.