Schedule

Friday, November 23

Name: Lin, Shen 林棽 (Sorbonne Universite)

Time： 13:30-14:00

Title: Range of tree-indexed random walks

Abstrct: Given a random walk on the d-dimensional lattice, we call the number of distinct sites visited up to time n the range of this random walk. The study of range when n goes to infinity has witnessed significant progress since the famous works of Dvoretzky & Erdős in 1951, and later of Donsker & Varadhan in 1979. Suppose now that the index set of random walk becomes a tree instead of the set of positive integers. We address a similar problem for random walks indexed by a rooted random tree with n vertices, taking values in the d-dimensional lattice or in the d-regular tree. As n tends to infinity, we investigate the range and the scaling limit of the trace of tree-indexed random walk.

Name: Xu, Daxin 许大昕 (California Institute of Technology)

Time： 14:10-14:40

Title: Generalised kloosterman sheaves and their p-adic variants

Abstract: I will first review the relationship between the classical Bessel equation

\begin{displaymath}

   (x\frac{d}{dx})^{2} u -xu =0,

\end{displaymath}

and the classical Kloosterman sum

\begin{displaymath}

   \Kl(a):= \sum_{xy=a \in \mathbb{F}_p} \exp(\frac{2\pi i}{p}(x+y)).

\end{displaymath}

Such a relation can be regarded as an instance of the geometric Langlands correspondence for $\GL_2$. I will survey the recent generalizations of this story for arbitrary reductive groups, based on the works by Frenkel-Gross, Heinloth-Ngô-Yun, and X. Zhu. In the end, I will report some joint work in progress with X. Zhu, where we study the p-adic aspect of this theory.

Name: Guo, Hailong 郭海龙 (University of Melbourne)

Time： 14:50-15:20

Title: Superconvergent methods in finite element methods and their applications

Abstract: In this talk, I will introduce some recent advances in the development of superconvergent methods. First, we will briefly review the main idea of superconvergence. We will talk about the development of superconvergent methods for nonstandard finite element methods. Then, we will introduce

recovery based finite element methods for higher order partial differential equations. Applications to computing dispersive relation and edge modes in photonic graphene will be also discussed.

Name: Guo, Xiaoqin 郭小钦 (University of Wisconsin-Madison)

Time: 15:50-16:20

Title: Random walks in balanced random environment and stochastic homogenization

Abstract: Random walks in random environment (RWRE) is used to model the movement of a particle in a random media. In this talk, we will discuss a RWRE in Z^d, d>1, which has zero effective speed and is not time-reversible. We will present quenched central limit theorems, Berry-Esseen estimates and explore their connections with the stochastic homogenization of a non-divergence form difference operator.

Name: Li, Zhongyang 李钟洋 (University of Connecticut)

Time: 16:30-17:00

Title: Limit shape and height fluctuations of perfect matchings on square-hexagon lattice

Abstract: We study asymptotics of perfect matchings on a large class of graphs called the contracting square-hexagon lattice, which is constructed row by row from either a row of a square grid or a row of a hexagonal lattice. We assign the graph periodic edge weights with period 1×n, and consider the probability measure of perfect matchings in which the probability of each configuration is proportional to the product of edge weights. We show that the partition function of perfect matchings on such a graph can be computed explicitly by a Schur function depending on the edge weights. By analyzing the asymptotics of the Schur function, we then prove the Law of Large Numbers (limit shape) and the Central Limit Theorem (convergence to the Gaussian free field) for the corresponding height functions. We also show that the distribution of certain type of dimers near the turning corner is the same as the eigenvalues of Gaussian Unitary Ensemble, and explicitly study the curve separating the liquid region and the frozen region for certain boundary conditions.

Saturday, November 24

Name: Li, Penghui 李鹏辉 (IST Austria)

Time： 10:00-10:30

Title: Some progress on Betti Geometric Langlands Conjecture in genus 1

Abstract: We recall the Betti Geometric Langlands Conjecture proposed by Ben-Zvi-Nadler. In genus 1 case, we use an uniformization method to calculate the ellitpic character sheaves in terms of Lusztig's character sheaves. And then construct a functor from the category of elliptic character sheaves (the semistable part of automorphic category) to the spectral category in the Conjecture. The functor is fully-faithful if and only if certain conjecture of Hecke categories holds. We also prove the analogous conjecture for Weyl groups. Construction of the functor uses three previous results: Ben-Zvi-Nadler's identification of character sheaves as trace of Hecke category, Bezrukavnikov's Langlands duality for affine Hecke category, and Ben-Zvi-Nadler-Preygel's gluing of the spectral categories (in genus 1). Most of the talk is a joint work with D. Nadler.

Name: Xue, Hang 薛航 (University of Arizona)

Time：10:40-11:10

Title: The Gan--Gross--Prasad conjectures

Abstract: I will survey some recent results on the Gan--Gross--Prasad conjecture and its arithmetic analogous.

Name: Lau, ChungChing 刘宗政 (University of Illinois at Chicago)

Time：11:20-11:50

Title: On nef subvarieties

Abstract: After Ottem and Hartshorne's work on ample subschemes, we introduce the notion of a nef subscheme, which generalizes the notion of a subvariety with nef normal bundle. We show that restriction of a pseudoeffective (resp. big) divisor to a nef subvariety is pseudoeffective (resp. big). We also show that ampleness and nefness of subschemes are transitive properties. We define the weakly movable cone and shares similar intersection-theoretic properties with it, thanks to the aforementioned properties of nef subvarieties. This is closely related to Hartshorne's conjecture B.