FUDAN-SCMS TWO-DAY WORKSHOP ON NUMBER THEORY

August 27 -28, 2022, Shanghai

Tencent Meeting ID: 592 889 79803, Password: 123456

Speakers

Ruiqi Bai (Peking University)

Li Cai (Capital Normal University)

Rui Chen (Zhejiang University)

Chun Yin Hui (University of Hong Kong)

Chung Pang Mok (Soochow University)

Zhiyu Zhang (MIT)

Bin Zhao (Capital Normal University)

Zhihao Zhao (Morning Center for Mathematics)

Organizers

Kei Yuen Chan (Fudan University)

Rufei Ren (Fudan University)

Haining Wang (Fudan University)

TITLES AND ABSTRACTS

Ruiqi Bai (Peking University)

Title: Special Fibers of Unitary Shimura Varieties with Maximal Parahoric Level

Abstract: Let F be an imaginary quadratic field in which a fixed odd prime p is inert. Let n, h be integers with $1 \leqslant h \leqslant n-1$. We focus on the fiber M over $\mathbb{F}_{p^2}$ of the Shimura variety for $GU(n-1,1)$ with maximal parahoric level K_h at p, that is, the stabilizer of a $\mathbb{Z}_{p^2}$-lattice Λ satisfying $\Lambda \subset \Lambda^\vee \subset p^{-1}\Lambda$ and $\mathrm{length}(\Lambda^\vee/\Lambda) = h$. We globally construct the basic correspondences between the supersingular locus on M and the definite unitary Shimura sets. We compute the basic intersection numbers on the supersingular locus. We also describe the EKOR and Newton stratifications on M in a visual way.

Li Cai (Academy for Multidisciplinary Studies, Capital Normal University)

Title: The full trace formula for Heegner points on Shimura curves

Abstract: We shall discuss the full trace formula for heights of Heegner points on Shimura curves, especially the behaviors of singular terms and what they can be used for.

Rui Chen (Zhejiang University)

Title: Variations of GGP conjecture: twisted and non-tempered case

Abstract: In this talk we will discuss two generalizations of GGP conjecture, namely the twisted and the non-tempered version. In the twisted case, we establish the local conjecture for certain class of L-parameters; in the non-tempered case, we prove that the non-vanishing of the period implies the relevance of A-parameters. These are based on a joint work with Wee Teck Gan and an ongoing joint work with Chuijia Wang.

Chun Yin Hui (University of Hong Kong)

Title: Monodromy of subrepresentations and irreducibility of low degree automorphic Galois representations

Abstract: Given a compatible system $\{\rho_\lambda : \mathrm{Gal}_K \to \mathrm{GL}_n(E_\lambda)\}_\lambda$ of semisimple λ-adic representations of a number field K satisfying mild local conditions, we prove that for almost all λ any type A irreducible subrepresentation of $\rho_\lambda \otimes \overline{\mathbb{Q}}_\ell$ is residually irreducible. If the system $\{\rho_\lambda\}_\lambda$ is attached to a regular algebraic, polarized, cuspidal automorphic representation of $\mathrm{GL}_n(\mathbb{A}_\mathbb{Q})$ and $n \leq 6$, we prove that $\rho_\lambda \otimes \overline{\mathbb{Q}}_\ell$ is residually irreducible for almost all λ.

Chung Pang Mok (Soochow University)

Title: Pseudorandom Vectors Generation Using Elliptic Curves And Applications to Wiener Processes

Abstract: Using the arithmetic of elliptic curves over finite fields, we present an algorithm for the efficient generation of sequence of uniform pseudorandom vectors in high dimension with long period, that simulates sample sequence of a sequence of independent identically distributed random variables, with values in the hypercube $[0,1]^d$ with uniform distribution. As an application, we obtain, in the discrete time simulation, an efficient algorithm to simulate, uniformly distributed sample path sequence of a sequence of independent standard Wiener processes.

Zhiyu Zhang (MIT)

Title: Arithmetic transfers and singularities at parahoric levels

Abstract: I will formulate some arithmetic transfer identities for unitary groups at parahoric levels, which relate some arithmetic intersection numbers to central derivatives of twisted orbital integrals. They could be used in the proof of (p-adic) arithmetic AGGP conjecture at parahoric levels. A key feature at parahoric levels is the singularity of related moduli spaces, see for instance the work of [LTXZZ] at the almost self-dual level. I will discuss the problem of resolving the singularity and doing intersection theory for cycles on singular schemes.

Bin Zhao (Capital Normal University)

Title: Refined spectral halo for eigencurves

Abstract: I will first explain the motivation to study the p-adic slopes of Hecke eigenforms and how it is related with the geometry of eigencurves. In the previous works of Liu-Wan-Xiao and Ren-Zhao, it is proved that over the boundary of the weight space, the eigencurve is a disjoint union of rigid analytic spaces which are finite flat over the weight space. In this talk, I will explain a joint work with Yongquan Hu and Liang Xiao on a refinement of Liu-Wan-Xiao's result. As an application, we are able to determine the p-adic slopes of all the crystabelline lifts of a reducible (local) mod p Galois representation.

Zhihao Zhao (Morningside Center of Mathematics)

Title: Affine and global affine Grassmannians for triality groups

Abstract: Triality groups are algebraic groups of type ${}^3D_4$. These groups can be constructed by certain twisted composition algebras. In this talk, I will give an explicit description of affine Grassmannians for triality groups as functors classifying suitable lattices in a fixed space. If time permits, I will briefly introduce global affine Grassmannians for triality groups. By using methods from Pappas-Zhu construction for local models, we can define local models for triality groups. The singularities of these local models are supposed to model the singularities of certain orthogonal Shimura varieties. This talk is based on my work: J. Algebra, 606:298-322, 2022.