Shenzhen Workshop on Arithmetic Geometry

Time: March 24-26, 2023.

Organizers: Gao Hui, Hu Yong, Qiu Yannan

Hosted by Dept. of Mathematics at SUSTech.

website: https://huigaomath.github.io/arithgeom2023.html

Please note special time on Friday.

Time	Mar. 24, Friday	Time	Mar. 25, Saturday	Mar. 26, Sunday
09:00–10:00 (**SPECIAL time!**)	Zheng Weizhe	09:30–10:30	Xu Daxin	Ren Jinbo
10:00–10:30	Tea break	10:30–10:50	Tea break	Tea break
10:30–11:30	Shen Xu	10:50–11:50	Tian Zhiyu	Luo Caihua
13:00–14:00 (**SPECIAL time!**)	Cheng Chuangxun	14:00–15:00	Xie Heng	
14:10–15:10	Hui Chunyin	15:00–15:30	Tea break	
15:10–15:30	Tea break	15:30–16:30	Yang Enlin	
		16:40–17:40	Jin Fangzhou	

Title and Abstract.

Mar. 24, Friday

Title: tba
Speaker: Zheng Weizhe
Abstract: tba.

Title: F-zips with additional structure on splitting models of Shimura varieties
Speaker: Shen Xu
Abstract: We will talk about constructions on certain mod p Hodge structure for the smooth Pappas-Rapoport splitting models of Shimura varieties. These integral models are resolutions of singularities of the corresponding canonical models for ramified groups. We will also discuss applications to Galois representations associated to torsion classes in coherent cohomology. This is a joint work with Yuqiang Zheng.

Title: On the image of Galois representations attached to modular forms
Speaker: Cheng Chuangxun
Abstract: In this presentation, starting with the results of Swinnerton-Dyer on the congruences of Fourier coefficients of modular forms (small image case) and the results of Serre on the image of Galois representations attached to elliptic curves (big image case), we explain two applications of Galois representations in the study of Fourier coefficients of modular forms.

Title: Monodromy of subrepresentations and irreducibility of low degree automorphic Galois representations
Speaker: Hui Chunyin
Abstract: Given a compatible system $\{\rho_\lambda : Gal_K \to GL_n(E_\lambda)\}_\lambda$ 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 $\rho_\lambda \otimes \overline{Q}_\ell$ is residually irreducible. We apply this result and some potential automorphy theorem to prove that $\rho_\lambda \otimes \overline{Q}_\ell$ is residually irreducible for almost all λ if the compatible system is attached to a regular algebraic, polarized, cuspidal automorphic representation of $GL_n(A_Q)$ and $n \leq 6$.

Mar. 25, Saturday

Title: Drinfeld Lemma for F-isocrystals
Speaker: Xu Daxin
Abstract: Drinfeld's lemma for l-adic local systems is a fundamental result in arithmetic geometry. It plays an important role in the Langlands correspondence for a reductive group over the function field of a curve over a finite field, pioneered by Drinfeld for GL_2 and subsequently extended by L. Lafforgue and then V. Lafforgue. In this talk, we will discuss Drinfeld's lemma for p-adic local systems: overconvergent/convergent F-isocrystals. This is based on a joint work with Kiran Kedlaya.

Title: Local-global principle, integral Tate conjecture, and algebraic equivalence
Speaker: Tian Zhiyu
Abstract: I will talk about my recent results about local-global principles for zero cycles and rational points on geometrically rational surfaces defined over global function fields, which is deduced from certain integral version of the Tate conjecture for some classes of varieties over finite fields. The key ingredient is a new geometric understanding of algebraic equivalence of one cycles on smooth projective varieties that has been recently obtained in a joint work with János Kollár.

Title: I-cohomology of Grassmannians
Speaker: Xie Heng
Abstract: I-cohomology is a version of the singular cohomology in the real algebraic geometry. It is an important part of the Chow-Witt group, which contains obstruction classes for splitting vector bundles. I will talk about computations about I-cohomology of Grassmannians.

Title: Conductor formulas for motivic spectra
Speaker: Yang Enlin
Abstract: In this talk, I will begin by making a survey on conductor formulas for constructible etale sheaves. Then I will introduce a quadratic version of Bloch's conductor formula, which is formulated in collaboration with Fangzhou Jin.

Title: The quadratic Artin conductor of a motivic spectrum
Speaker: Jin Fangzhou
Abstract: We define the quadratic Artin conductor of a motivic spectrum over a smooth scheme under some assumptions, and use it to prove a quadratic refinement of the Grothendieck-Ogg-Shafarevich formula. This is a joint work with Enlin Yang.

Mar. 26, Sunday

Title: 丢番图逼近在群论中的应用
Speaker: Ren Jinbo
Abstract: 一个抽象群Γ被称为是有界生成的，如果它可以被写成有限个循环子群的乘积，即$\Gamma = \langle g_1\rangle \cdots \langle g_r\rangle$。有界生成在算术群的理论有很多重要应用，例如Rigidity Property，同余子群问题, Kazhdan Property (T)等。我们证明，一个特征零的域上的线性群是能够被半单元素有界生成的当且仅当它是几近阿贝尔（virtually abelian）的。特别地，一个数域上的非迷向的代数群的算术子群一定没有有界生成性质。进一步地，我们还得出，一个能够被半单元素有界生成的集合关于高度的增长的速度渐进等于$c(\log T)^s$，其中T是高度函数。我们的证明使用丢番图逼近中的子空间定理以及伽罗瓦理论中的generic element理论。这是与Corvaja, Demeio, Rapinchuk和Zannier的合作。

Title: Singularity of intertwining operators and some applications
Speaker: Luo Caihua
Abstract: Intertwining operators play an important role in the Langlands program, e.g. their relations

with constructing automorphic L-functions. The singularity of those operators is a basic problem. For generic co-rank one generalized principal series, it is characterized by the pole of some Langlands–Shahidi L-functions. While for generic standard modules, an explicit conjecture was proposed by Casselman–Shahidi about 20 years ago. In this talk, we will present a method to partially answer the singularity problem, especially the aforementioned conjecture. If time permits, we will also discuss some applications.