Titles and Abstracts

Yiwen Ding (BICMR, Peking University)

Towards locally analytic p-adic Langlands programme

The locally analytic p-adic Langlands programme aims to understand the relationship between n-dimensional p-adic Galois representations of a finite extension $K/\mathbb{Q}_p$ and locally analytic representations of $\mathrm{GL}_n(K)$. Beyond the case of $\mathrm{GL}_2(\mathbb{Q}_p)$, the picture remains quite mysterious. In this talk, I will briefly recall what is known for $\mathrm{GL}_2(\mathbb{Q}_p)$, and then discuss some recent progress and conjectures for general GL_n, emphasizing how information related to the Hodge filtration on the Galois side might be reflected on the GL_n-representation side.

Heng Du (Tsinghua University)

Taming p-adic monodromy in families via Newton polygons

A guiding principle in arithmetic geometry, originating with Grothendieck, is that certain singularities of objects of geometric origin should be governed by finite, nilpotent data. In the p-adic setting, Berger's theorem realizes this philosophy for de Rham Galois representations: they are potentially log-crystalline. I will discuss a relative version, conjectured by Liu and Zhu, for de Rham local systems.

The main new invariant is the Newton polygon function attached to a de Rham local system. I will show that a relative p-adic monodromy theorem holds over Newton-constant loci. In particular, the Liu–Zhu conjecture holds on a dense open subset. Around rank-one adic points, this criterion is sharp. I will also explain an application to a recent conjecture of Howe and Klevdal on potential good reduction of admissible pairs.

Dorian Goldfeld (Columbia University)

A generalization of Dedekind's eta function for Hecke groups over a real quadratic field

Let $D \equiv 1 \pmod 4$ be a discriminant of a real quadratic field. For z in the upper half plane we consider the Hecke group $H(\sqrt{D})$ generated by the transformations

$$z \mapsto -\frac{1}{z}, \qquad z \mapsto z + \sqrt{D}.$$

The fundamental domain for this Hecke group has infinite volume. For $q = e^{2\pi i z}$ we construct a certain generalization of the q-product for the Dedekind eta function and show that this infinite product is a (non square integrable) holomorphic modular form for the Hecke group $H(\sqrt{D})$ which vanishes at the cusp at ∞. We also show that these modular forms have Fourier expansions where the Fourier coefficients have exponential growth. This is joint work with Debmalya Basak, Winston Heap, Nicolas Robles, and Alexandru Zaharescu.

Haoyu Hu (Nanjing University)

An Hermite–Minkowski theorem for perverse sheaves

In 2012, Esnault and Kerz proved Deligne's finiteness theorem for ℓ-adic sheaves, which says that the number of geometrically irreducible ℓ-adic local systems on a smooth variety over a finite field, with bounded ramification along a normal compactification and fixed ranks, is finite. In this lecture, I will present a generalization and a new proof of this theorem. The new ingredient is a universal bound of Betti numbers for étale sheaves with wild ramifications. This is a joint work with Jean-Baptiste Teyssier.

Bingrong Huang (Shandong University)

Mass distribution, moments, and sup-norms of modular forms

We study the mass distribution of holomorphic cusp forms on the modular surface in the large weight limit, from equidistribution to extreme concentration. We first discuss quantum unique ergodicity, decorrelation, and higher moments for Hecke eigenforms, and explain how these problems are approached via triple product formulas and automorphic L-functions. We then present results on sup-norms and explicit constructions of extremal forms. This talk is based on joint work with Steve Lester, Igor Wigman, and Nadav Yesha, as well as with Xiaolong Han and Peter Humphries.

Qifeng Li (Shandong University)

The geometric structures arising from minimal rational curves

There are minimal rational curves on Fano manifolds. The local structures of minimal rational curves and the associated VMRTs (the varieties of minimal rational tangents) carry much information on global geometry of manifolds. A typical example is the Cartan–Fubini type extension theorem due to Hwang and Mok, which indicates that Fano manifolds of Picard number one can be determined by their local VMRT-structures. We are interested in isotrivial VMRT-structures, the simplest local VMRT-structures. In this talk, we will discuss the geometric structures associated with the isotrivial VMRT-structures as well as the applications in algebraic geometry. This talk is based on joint works with Jun-Muk Hwang.

Sian Nie (Academy of Mathematics and Systems Science, CAS)

Symmetric spaces over a finite ring

Deep level Deligne–Lusztig representations are natural extensions of the classical Deligne–Lusztig representations from the setting of finite fields to finite rings. Recently these representations have found many interesting applications in the Langlands program. In this talk, I will discuss the distinction problem of deep level Deligne–Lusztig representations for symmetric pairs, extending a classical result of Lusztig on symmetric spaces over a finite field. This is based on joint work with Ben Liu.

Wenhao Ou (Academy of Mathematics and Systems Science, CAS)

Recent progress in birational geometry of Kähler manifolds

Birational geometry is one of the core branches of algebraic geometry, in which the Minimal Model Program (MMP) provides a powerful tool for the classification of complex algebraic manifolds.

Compact Kähler manifolds are a generalization of projective manifolds in complex geometry. In the past decade, progress has been made in extending the MMP to compact Kähler manifolds.

In this talk, we will survey these achievements, including the complete MMP for Kähler threefolds, and some results in higher dimensions.

Haowu Wang (Wuhan University)

Singular automorphic products and BKM Lie algebras

In 1992, Borcherds proved the monstrous moonshine conjecture by constructing a specific BKM algebra and identifying its denominator function with an automorphic product of singular weight. In this talk, I will present a classification of singular automorphic products and elucidate their relationship to BKM Lie algebras and vertex algebras. To this end, we prove that every singular automorphic product on certain lattices gives rise to a finite-dimensional semisimple Lie superalgebra structure, and we obtain a complete list of 85 such structures. This talk is based on joint work with K. Sun and B. Williams.

Daxin Xu (Morningside Center of Mathematics, CAS)

Recent developments in the p-adic Simpson correspondence

This talk will provide an overview of recent advancements in the p-adic Simpson correspondence. Following a general survey of the latest progress, we will focus on the curve case, exploring the open problem concerning semi-stability in the correspondence.

Enlin Yang (Capital Normal University)

Cohomological Milnor formula for constructible étale sheaves

In this talk, we will sketch the construction of non-acyclicity classes for constructible étale sheaves on (not necessarily smooth) varieties, which is defined in joint work with Yigeng Zhao. This cohomological class is supported on the non-locally acyclicity locus. As applications, we show that the Milnor formula and Bloch's conductor formula can be reformulated in terms of the functorial properties of non-acyclicity classes. Based on this formalism, we propose a Milnor type formula for non-isolated singularities.

Shou-Wu Zhang (Princeton University)

Gross–Zagier formula: its past and future

This is 40 years after the publication of the Gross–Zagier formula, which connects the arithmetic of elliptic curves and special values of L-series. I will provide a brief history of the Gross–Zagier formula, its consequences, and recent developments.