2022 四川大学代数与数论在线论坛
暨张寿武教授 60 寿辰学术研讨会

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Newton stratification and weakly admissible locus in p-adic Hodge theory

陈苗芬 (华东师范大学)

摘要

The p-adic period domain (also called the admissible locus) is the image of the p-adic period mapping inside the rigid analytic p-adic flag varieties. The weakly admissible locus is an approximation of the admissible locus in the sense that these two spaces have the same classical points. On the flag variety, we have the Newton stratification which has p-adic period domain as its unique open stratum. In this talk, we consider the condition that the weakly admissible locus is maximal (i.e. the weakly admissible locus is a union of Newton strata). This unifies the extreme cases when the weakly admissible locus equals to the admissible locus or the whole flag variety. We will give several equivalent criterions for the condition that the weakly admissible locus is maximal. Moreover, we give a criterion when a single Newton stratum is contained in the weakly admissible locus. This is a joint work with Jilong Tong.

Conjectures on $\mathrm{GL}_n \times \mathrm{GL}_n \backslash \mathrm{GL}_{2n}$ orbital integrals and intersections of Drinfeld's half spaces

李奇芮 (德国波恩大学)

摘要

Collaborated with Andreas Mihatsch, we extend the conjecture of Guo–Jacquet' s Fundamental Lemma to a conjecture about smooth transfers for test functions of inner forms of $\mathrm{GL}_2 n$. We also conjectured that this transfer is arithmetic in the sense of intersections of the corresponding RZ spaces. We confirmed our conjecture in low dimensional cases by a calculation result of GL_4.

This talk will briefly review the motivation and history of Guo–Jacquet Fundamental Lemma and linear Arithmetic Fundamental Lemma and then state our conjecture to inner forms. The global motivation of this project comes from the spirit of Zhang' s Relative Trace Formula approach of Gross–Zagier Formula, where the AFL can be thought of as a local analogue of Gross–Zagier Formula. The original AFL deal with the places where Shimura varieties has good reductions, where our Arithmetic transfer for test functions on inner forms deal with places with bad reductions.

Finiteness problem on Hyper-Kähler varieties

李志远 (复旦大学)

摘要

The classical Shafarevich conjecture is about the finiteness of isomorphism classes of curves of given genus defined over a number field with good reduction outside a finite collection of places. It plays an important role in Falting's proof of the Mordell conjecture. Similar finiteness problems arise for higher dimensional varieties. In this talk, I will talk about various finiteness problems for hyper-Kähler varieties. This includes the (cohomological) unpolarized Shafarevich conjecture for hyper-Kähler varieties of given type, Shafarevich's finiteness conjecture on Picard lattices and Várilly-Alvarado's uniform boundedness conjecture on Brauer groups. Many problems are closely related to the Bombieri-Lang conjecture on Shimura varieties. I will explain the proof of some finiteness problems. Most work is joint with Lie Fu, Teppei Takamatsu and Haitao Zou.

Arithmetic mixed Siegel-Weil formulas and modular forms of arithmetic divisors

邱聪灵 (美国耶鲁大学)

摘要

The classical Siegel–Weil formula relates theta series to Eisenstein series. Its arithmetic version is central in Kudla's program. I will discuss some arithmetic mixed Siegel-Weil formulas. I will focus on the one in the work of Gross-Zagier, and the one in my recent work. As an application of the latter, I obtain modular generating series of arithmetic extensions of special divisors for unitary Shimura varieties over CM fields with arbitrary split levels.

Extremal metrics on toric manifolds

盛利 (四川大学)

摘要

An example of Apostolovet al. indicate that the condition of K-stability may not be correct one for general polarised manifolds. Szekelyhidi modified definition of K-stability by filtration and stated a variant of the Yau-Tian-Donaldson conjecture. We will talk about our proof of this variant of YTD conjecture for toric manifolds. This is jointed with Li An-Min and Lian Zhao.

The arithmetic of power series

唐云清 (美国加州大学伯克利分校)

摘要

In this talk, we will discuss the proof of the unbounded denominators conjecture on Fourier coefficients of $\mathrm{SL}_2(\mathbb{Z})$-modular forms, and the proof of irrationality of 2-adic zeta value at 5 (and maybe some other irrationality results). Both proofs use an arithmetic holonomicity theorem, which can be viewed as a refinement of André's algebraicity criterion. This is joint work with Frank Calegari and Vesselin Dimitrov.

Regular de Rham Galois representations in the completed cohomology of modular curves

潘略 (美国普林斯顿大学)

摘要

Let p be a prime. I want to explain how to use the geometry of modular curves at infinite level and the Hodge–Tate period map to study regular de Rham p-adic Galois representations appearing in the p-adically completed cohomology of modular curves. We will show that these Galois representations up to twists come from modular forms and give a geometric description of the locally analytic representations of $\mathrm{GL}_2(\mathbb{Q}_p)$ associated to them. These results were previously known by totally different methods.

On some recent progress on p-adic comparison theorem with coefficients

田一超 (中国科学院数学与系统科学研究院)

摘要

Recently, Guo and Reinecke proved the crystalline comparison theorem for crystalline local systems using the prismatic cohomology developed by Bhatt and Scholze. In this talk, I will explain what can be done in the semi-stable case.

Mirror structure constants via non-archimedean analytic disks

余越 (美国加州理工学院)

摘要

For any smooth affine log Calabi-Yau variety U, we construct the structure constants of the mirror algebra to U via counts of non-archimedean analytic disks in the skeleton of the Berkovich analytification of U. This generalizes our previous construction with extra toric assumptions. The technique is based on an analytic modification of the target space as well as the theory of skeletal curves. Consequently, we deduce the positivity and integrality of the mirror structure constants. If time permits, I will discuss further generalizations and virtual fundamental classes. Joint work with S. Keel.

The geometric Bombieri-Lang conjecture for varieties of maximal Albanese dimension

袁新意 (北京大学)

摘要

This is a joint work with Junyi Xie. Let $K = k(B)$ the function field a variety B over a field k of characteristic 0. Let X be a projective variety over K. Assume that there is a finite morphism from X to an abelian variety A with trivial trace. We show that $X(K)$ is contained in the algebraic special subset. In particular, if further X is of general type, then $X(K)$ is not Zariski dense.

Stable degenerations of klt singularities

庄梓铨 (美国约翰霍普金斯大学)

摘要

Several years ago, Chi Li introduced the normalized volumes of valuations in his work on K-stability. The stable degeneration conjecture, due to Li and Xu, predicts that every klt singularity has a canonical "stable degeneration" induced by the minimizers of the normalized volume functions. I'll talk about the recent solution of this conjecture, focusing on its connection to certain finite generation property of valuations. Based on joint work with Chenyang Xu.