

May 23-25, 2014, Harvard University, Science Center Room 507

1. Shouwu Zhang

Title: Heegner points and representation theory - 12.5 years after Gross' MSRI lecture.

Abstract: At a MSRI workshop in December of 2001, Gross presented a framework in which the results of Waldspurger and Gross-Zagier can be viewed simultaneously. I will update how his framework be used to prove a general Gross-Zagier formula, and a general p -adic Waldspurger formula, and a general p -adic Gross-Zagier formula.

2. Henri Darmon

Title: The Birch and Swinnerton Dyer conjecture for ring class characters of real quadratic fields.

Abstract: Let E be an elliptic curve over \mathbb{Q} and let χ be a ring class character of a real quadratic field K . I will explain the proof that the non-vanishing of the central critical value $L(E/K, \chi, 1)$ of the Hasse-Weil L -series of E twisted by χ implies the triviality of the χ -component of the Mordell-Weil group of E , in line with a natural Galois-equivariant refinement of the Birch and Swinnerton-Dyer conjecture. The proof relies on Gross-Kudla-Schoen diagonal cycles and on their variation in p -adic families. Possible applications to the theory of "Stark-Heegner points" and to explicit class field theory for real quadratic fields will also be evoked. All of this is joint work with Victor Rotger.

3. Akshay Venkatesh

Title: Derived Hecke algebra.

Abstract: We describe a derived version of the Hecke algebra that acts on the cohomology of an arithmetic group but doesn't preserve degrees.

4. Gordan Savin

Title: A period problem related to Bhargava cubes.

Abstract: Building on a work of Bhargava, we interpret twisted Bhargava cubes in terms of twisted composition algebras: just as a symmetric matrix gives a quadratic form, a twisted Bhargava cube gives a twisted composition algebra. The space of twisted Bhargava cubes appears as a pre homogeneous space in a group of absolute type D_4 . The interpretation of Bhargava cubes in terms of twisted composition algebra is then used to study exceptional theta correspondences for dual pairs where one member of the pair is D_4 . This is a joint work with Wee Teck Gan.

5. Hang Xue

Title: On the Gan-Gross-Prasad conjecture for $U(n) \times U(n)$.

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Abstract: We prove the Gan-Gross-Prasad conjecture $U(n) \times U(n)$ under some local assumptions. We also formulate a refined conjecture and prove it in certain cases.

6. Chao Li

Title: 2-Selmer groups and Heegner points.

Abstract: Given an elliptic curve E over \mathbb{Q} satisfying certain hypotheses, we use level raising of modular forms to produce abelian varieties A sharing the same mod 2 representation as E . We then obtain a comparison between the 2-Selmer groups of E and A over imaginary quadratic fields. When the 2-Selmer rank of E is one, we explain how the 2-part of the BSD conjecture predicts a link between the 2-Selmer rank of A and certain local 2-divisibility properties of Heegner points on E . We establish this link directly and observe different phenomena compared to p -Selmer groups for odd p .

7. David Roe

Title: Geometrizing the Langlands correspondence in mixed characteristic.

Abstract: The geometric Langlands program grew out of the classic Langlands correspondence, replacing a bijection of sets with an equivalence of categories between certain derived categories of sheaves. It has offered a useful perspective for algebraic groups over function fields and fields of Laurent series. In this talk I will describe work with Clifton Cunningham where we give a description of characters of tori in terms of sheaves on an ind-scheme over the residue field, and ongoing work with Cunningham and Takashi Suzuki toward offering versions of the affine Grassmannian and affine flag variety for mixed characteristic local fields. We hope to adapt the theory of character sheaves from finite fields to p -adic fields, and to find new constructions of supercuspidal representations of p -adic groups.

8. Eric Urban

Title: On some p -adic distribution of automorphic periods.

Abstract: In this lecture, I will explain a construction of certain p -adic distributions that interpolate automorphic periods attached to p -adic families of automorphic forms. I will present some general conjectures on the behavior of these distributions and their consequences in some special case to study central values of L-functions.

9. Yiannis Sakellaridis

Title: The L-group of a spherical variety.

Abstract: The "relative Langlands program" attaches an L-group to a spherical variety, generalizing the L-group of a reductive group. This L-group is used in conjectures about the local and automorphic spectrum of the variety. This will be an expository talk,

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describing the definition of the L-group and, time permitting, some other invariants attached to the variety, such as a local unramified L-value.

10. Ioan Filip

Title: A local relative trace formula for spherical varieties.

Abstract: We introduce a relative trace formula for spherical varieties in the local setting. We focus on rank 1 cases, and discuss applications to the Gan-Gross-Prasad conjectures and their refinements.

11. Cheng-Chiang Tsai

Title: Orbital integrals and local character expansions of supercuspidal representations.

Abstract: For a reductive group G over a non-archimedean local field with residue characteristic p sufficiently large, we propose an algorithm to compute certain orbital integrals in terms of number of rational points on specific subvarieties of flag varieties over the residue field. As an application, we show by example how this algorithm together with the character formula of Adler and Spice may be used to compute the local character expansions of supercuspidal representations of G constructed by Yu. This is joint work with Zhiwei Yun.