Bay Area Algebraic Number Theory and Arithmetic Geometry Day 9

Saturday, November 15, 2014
University of California, Berkeley

Speakers:
Ana Caraiani, Princeton University
Brian Conrad, Stanford University
Florian Herzig, University of Toronto
Stephen Kudla, University of Toronto
Junecue Suh, University of California, Santa Cruz

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Please RSVP to sdasgup2 (at) ucs (dot) edu

Titles and Abstracts:

Ana Caraiani, "On the p-adic local Langlands correspondence for GL_2(Q_p) and beyond"
The p-adic local Langlands program is a recent generalization of the classical Langlands program and appears to be the natural context in which to study the latter. In this talk, I will start by talking about relating two-dimensional Galois representations and modular forms, which will serve as motivation. Then I will describe the local p-adic correspondence for GL_2(Q_p) and focus on the compatibility with the global correspondence, given by the p-adically completed cohomology of a tower modular curves with smaller and smaller level at p. I will explain why a deep understanding of this picture led to proving a large number of cases of the Fontaine-Mazur conjecture, showing that many Galois representations do come from modular forms. Finally, I will discuss joint work with Emerton, Gee, Geraghty, Paskunas and Shin, where we reinterpret these ideas to construct a candidate for the p-adic local Langlands correspondence in higher dimensions.

Brian Conrad, "A Lefschetz principle in non-archimedean geometry"In analytic geometry over a non-archimedean field it is often convenient to work over a ground field that is algebraically closed, but that can create some difficulties because such fields have non-noetherian valuation ring.
We explain a technique based on deformation theory to reduce certain problems in relative non-archimedean geometry to the case of a discretely-valued ground field, and give an application to deRham cohomology, answering a question of Scholze. This is joint work with O. Gabber.

**Florian Herzig**, "On mod p local-global compatibility for GL₃(Q_p)"

The goal of this talk is to discuss the hypothetical mod p Langlands correspondence for GL₃(Q_p), which should associate to a 3-dimensional mod p representation of the Galois group of Q_p one (or many) smooth mod p representations π(ρ) of GL₃(Q_p). We focus on the expected global realisation of this correspondence in the cohomology of unitary groups of rank 3. (This is analogous to the local-global compatibility discussed in Ana's talk.) In the special case when ρ is upper-triangular and maximally non-split, its "extension class" is classified by an invariant in Fp. We will show (under suitable assumptions) that this Galois invariant is determined by the GL₃(Q_p)-action on the above cohomology spaces. Joint work with Stefano Morra.

**Stephen Kudla**, "Pullbacks of arithmetic theta series"

After reviewing the definition of arithmetic theta series in several cases, I will survey some results describing their relations under pullback. These arithmetic theta series are q-series constructed from families of special cycles in various Shimura varieties, including Shimura curves and other PEL moduli spaces. They are known/conjectured to be modular forms. Given a morphism of such moduli spaces, the behavior of these series under pullback reflect interesting relations between the families of special cycles on the two spaces. I will discuss various examples.

**Junecue Suh**, "Standard sign conjecture for Shimura varieties"

Grothendieck's theory of (homological) motives is grounded on the conjectural existence of certain algebraic cycles, among others the Künneth projectors (the standard conjecture of Künneth type). The standard sign conjecture is a weakening of this, and is strong enough to imply that the homological motives form a Tannakian category. After reviewing the conjecture, its origin and its consequences, we will sketch some of the ideas involved in our proof of the sign conjecture in the case of Shimura varieties. This is joint work with Sophie Morel.

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**Parking:**

To park in a campus parking lot, you can purchase a permit from a ticket dispenser located in the lot. Permits should be placed on your dashboard. It costs $12 to park all day, and the dispensers take credit cards. If you have a parking permit of the correct "strength" from another UC campus, you can park for free by displaying your UC permit.

The Berkeley campus is launching a new method to pay for campus parking via mobile phones. To use this service, you can set up an account ahead of time as described on the web page and download the iPhone or Android app ahead of time as well.

A list of parking lots is available here; clicking on the second link "Campus Parking Lots" sends you to a Google map displaying the lots. Scroll down on the left panel until you see the name of the desired parking lot; click on the name and you get a description of the lot and its capacities.

Two recommended parking locations are the Upper Hearst Parking Structure and the Lower Hearst Parking Structure. The easiest solution is to park on level 1 of the Lower Hearst Structure. This structure is on the north side of Hearst Avenue, just south of Euclid. Because Hearst is a divided road, you need to be heading west on Hearst in order to turn into the lot. Walking to Evans Hall from either structure takes less than 5 minutes.

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**Registration:**

There is no formal registration, but if you plan to attend, we would appreciate an email to sdasgup2 at ucsc dot edu to help plan the event. Note that an RSVP to this email address is required if you plan to attend the dinner afterwards (see below).
Dinner:

There will be a dinner following the conference at 6:45pm at China Village, 1335 Solano Ave, Albany. Please RSVP to sdasgup2 (at) ucsc (dot) edu. There is a limit of 25 people for the dinner, and slots will be reserved in the order that RSVPs are received.