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Alberta
Number Theory Days

Banff, Alberta April 30 - May 2, 2010

UNIVERSITY OF CALGARY

UNIVERSITY OF ALBERTA

Banff International Research Station
for Mathematical Innovation and Discovery

Pacific Institute *for the* Mathematical Sciences

Schedule

Saturday

09:00 - 10:00 Clifton Cunningham (University of Calgary)
10:15 - 11:15 Kaneenika Sinha (PIMS/University of Alberta)
11:30 - 12:30 Jeremy Sylvestre (University of Alberta, Augustana)

12:30 - 14:00 Lunch

14:00 - 15:00 Vinayak Vatsal (University of British Columbia)
15:15 - 16:15 Dustin Moody (University of Calgary)
16:30 - 17:30 Amir Akbary (University of Lethbridge)

17:30 Dinner

Sunday

09:30 - 10:30 Brandon Fodden (University of Lethbridge)
11:00 - 12:00 Matthew Greenberg (University of Calgary)
12:00 Lunch and Departure

All talks will be held in

MAX BELL 159

Abstracts

Lower bounds for power moments of L-functions
Amir Akbary

We derive general results regarding the lower bounds for power moments of certain analytic functions which have Dirichlet series representations on a complex half plane. As corollaries of these results we establish lower bounds of conjectured order of magnitude for power moments of several number theoretical L-functions. This is a joint work with Brandon Fodden.

Curious L-packets
Clifton Cunningham

Whither L-packets? I will present a brief summary of Arthur's conjectures on L-packets, illustrate the conjectures with some curious examples and also say a few words about the origin of the conjectures. Returning to the curious examples, I will present a geometric explanation for the structure of these L-packets. Most of the talk will be concerned with local L-packets.

An explicit inequality equivalence of the generalized Riemann hypothesis for a member of the Selberg class
Brandon Fodden

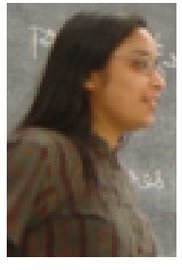
Given a member F of the Selberg class, we find a property P of the natural numbers such that the generalized Riemann hypothesis holds for F if and only if P holds for all natural numbers. P is given as an explicit inequality, depending on F. If one can show that P is a decidable property, then the generalized Riemann hypothesis for F is equivalent to the unsolvability of a particular Diophantine equation. We discuss variants of P for which proving decidability is more practical. Finally, we give some applications of this result for certain L-functions.

Exotic number fields via Hilbert modular forms
Matthew Greenberg

In this talk, I will describe joint work with Lassina Dembele and John Voight in which we identify some exotic number fields by considering mod p Galois representations associated to Hilbert modular forms.

Computing Isogeny Volcanoes of Composite Degree
Dustin Moody

Isogeny volcanoes are an interesting structure that have had several recent applications. An isogeny volcano is a connected component of a larger graph. We further explore properties of and how to compute volcanoes given that we have already computed one of a different degree. This allows us to compute volcanoes of composite degree more efficiently than a direct construction using modular polynomials.



Average rank of Jacobians of modular curves
Kaneenika Sinha

The analytic rank of the Jacobian of the modular curve X_0(N) is closely connected with the behaviour of the traces of Hecke operators acting on spaces of cusp forms of weight 2 and level N. We utilize this connection in order to find upper bounds on average for the analytic rank of J_0(N).

Characters of Supercuspidal Representations of Twisted $\mathrm{GL}_n(F)$
Jeremy Sylvestre

Let θ be a finite-order F-automorphism of $G = \mathrm{GL}_n(F)$, for F a p-adic field. Under certain restrictions on θ, if a supercuspidal representation of G is extended to $G^+ = G \rtimes \langle \theta \rangle$, then the character of this extension satisfies a Harish-Chandra type integral formula when evaluated on sufficiently regular elements of the coset $G\theta$. In this talk, the development of such a formula will be outlined, and, in the case of a depth-zero supercuspidal representation, the formula will be used to express the character of the extended representation as a linear combination of characters of depth-zero supercuspidal representations of the group of fixed points G_θ in G.

Period integrals of modular forms
Vinayak Vatsal

I will talk about work in progress on certain adelic period integrals of modular forms on SL_2 and GL_2. It turns out that the situation for SL_2 is quite different from that of GL_2 and we'll try to explain what some of the differences mean for non-vanishing of L-functions.

Organizers

Paul Buckingham, University of Alberta, and **Matthew Greenberg**, University of Calgary