Description of mug graphics
by Michael Griffin

A few years ago I attended a conference hosted by Ken Ono, who would later become my advisor. Several of the talks centered on the idea that the coefficients of certain modular forms exhibit a kind of fractal structure in a $p$-adic sense. At one point someone raised their hand and asked if it were possible to visualize these “fractals”. Despite the speaker’s response in the negative, this question lead to the creation of the graph on the front cover. The graph is a 2-adic representation of the Fourier coefficients of Klein’s $j$-function,

$$j(z) = q^{-1} + 744 + \sum_{n=1}^{\infty} c(n)q^n,$$

where $q := e^{2\pi iz}$. The 2-adic structure is emphasized by the map $\Phi : \mathbb{N} \to (0, 2)$ given by

$$\Phi \left( \sum_{n \geq 0} b_n 2^n \right) = \sum_{n \geq 0} b_n 2^{-n},$$

where $b_n \in \{0, 1\}$. This map replaces the 2-adic metric on the integers with the real metric on the interval. The graph consists of the points $(\Phi(n), \Phi(c(n)))$. The towers and checker-board patterns reflect Kolberg’s congruences [1] for the coefficients $c(n)$, given by

$$c(n) \equiv \begin{cases} 
20\sigma_7(n) \pmod{2^7} & \text{if } n \equiv 1 \pmod{8}, \\
\frac{1}{2}\sigma(n) \pmod{2^3} & \text{if } n \equiv 3 \pmod{8}, \\
-12\sigma_7(n) \pmod{2^8} & \text{if } n \equiv 5 \pmod{8}.
\end{cases}$$

Kolberg had no congruence for the case $n \equiv 7 \pmod{8}$, and we note that the corresponding tower in the graph seems to have a fairly uniform distribution of points. If $n$ is even, $c(n)$ is divisible by high powers of two resulting in a flat-looking section of the graph. However if we zoom in to the left half or quarter of the graph (or deeper), we find more interesting structure including checkerboards and self-similarity as reflected in Kolberg’s congruence

$$c(2^a n) \equiv -2^{3a+8} \sigma_7(n) \pmod{2^{3a+13}}$$

if $a > 0$.

References

Monday, May 12, 2014

8:30-9:00 AM  Registration

9:00-9:20 AM  Darrin Doud  Highly reducible Galois representations and the homology of $GL(n, \mathbb{Z})$

9:30-9:50 AM  Armin Straub  On a secant Dirichlet series and Eichler integrals of Eisenstein series

10:00-10:40 AM  Fan Zhou  Sato-Tate equidistribution of Satake parameters of automorphic forms

10:40-11:00 AM  Break

11:00-11:20 AM  Nathan Green  Integrality properties of singular moduli

11:30 AM-12:00 PM  Adam Gamzon  Unobstructed Hilbert modular deformation problems

12:00-2:00 PM  Break for Lunch

2:00-2:30 PM  Michael Griffin  A framework of Rogers-Ramanujan identities and their arithmetic properties

2:40-3:10 PM  Sarah Trebat-Leder  Connecting Classical and Umbral Moonshine

3:10-3:30 PM  Break

3:30-4:00 PM  Krzysztof Klosin  P-adic families of automorphic forms on $GSp(4)$

4:10-4:40 PM  Karl Mahlburg  Combinatorial partition identities and automorphic forms

4:50-5:20 PM  Christopher Jennings-Shaffer  Congruences for a Smallest Parts Function via Quasi-Modular Forms
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Wednesday, May 14, 2014

9:00-9:20 AM  Sam Dittmer  Two arithmetic problems related to class group L-functions

9:30-9:50 AM  Detchat Samart  The elliptic trilogarithm and Mahler measures of $K3$ surfaces

10:00-10:40 AM  Ellen Eischen  $p$-adic families of Eisenstein series

10:40-11:00 AM  Break

11:00-11:20 AM  Ka Lun Wong  Zagier’s sums of powers of quadratic polynomials when the discriminants are negative

11:30 AM-12:00 PM  Byungchul Cha  Mobius Disjointness in function fields

12:00 PM  Break for Lunch, and Free Afternoon
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Abstracts

Scott Ahlgren, University of Illinois at Urbana-Champaign
Mock modular forms of weight 5/2 and the partition function

We construct a natural basis for the space of mock modular forms of weight 5/2 on the full modular group and give some applications. Notably, the first element of this basis encodes the values of the ordinary partition function. Joint with N. Andersen.

Hiroki Aoki, Tokyo University of Science

On elliptic modular forms, modular forms of rational (not half integral) weight had been studied by Ibukiyama, Bannai et al. In this talk, we introduce Jacobi forms of rational weight and rational index, from the view point of structure theorem.

Olivia Beckwith, Emory University
Multiplicative properties of $k$-regular partitions

Earlier this year, Bessenrodt and Ono proved that the extended partition function $p(\mu_1 + \cdots + \mu_k) := \prod_{i=1}^k p(\mu_i)$ has an explicit maximum. They showed this by proving $p(a+b) > p(a)p(b)$ is true for almost all pairs $(a, b)$. We extend their results to a variation of $p(n)$. A $k$-regular partition is a partition for which no part is a multiple of $k$. We generalize these results using Rademacher-type formulas proved by Hagis for the $k$-regular partition counting function.

Tobias Berger, University of Sheffield
Theta lifts of Bianchi modular forms and paramodularity

Brumer and Kramer have formulated a conjecture on the modularity of abelian surfaces involving paramodular Siegel modular forms. I will report on joint work with Lassina Dembele, Ariel Pacetti and Haluk Sengun providing further evidence for this conjecture, using theta lifts of Bianchi modular forms.
Hatice Boylan, Istanbul Unuversitesi
Representations of SL(2) over arithmetic Dedekind domains

For describing automorphic forms of singular weight over number fields it is indispensable to understand the representations of groups like SL(2,O), where O is the ring of integers of a number field. Even for SL(2,Z) there are open questions. We report about recent progress on this problem for general arithmetic Dedekind domains, and we discuss still open problems.

Byungchul Cha, Muhlenberg College
Mobius Disjointness in function fields

Sarnak’s Mobius Disjointness Conjecture expresses the randomness of Mobius function in the language of dynamical systems. In particular, the conjecture states that the Mobius flow is disjoint from any deterministic flow. An old theorem of Davenport and Vinogradov can be interpreted as the proof of this conjecture for the dynamical system of rotation of unit circle by a fixed angle. In this talk, we present a function field analog of Davenport and Vinogradov’s result and of Sarnak’s conjecture in the case of rotation. This is joint work with Dong Han Kim.

William Cocke, Brigham Young University
Cohomology of Congruence Subgroups of SL(3,Z) Below the Cohomological Dimension

I will demonstrate some of the conjectured correspondence between Galois representations and the cohomology of arithmetic groups. These objects are not at first related, but their interplay provides a wealth of arithmetic information; for example, the proof of Fermat’s Last Theorem is built on an established piece of this correspondence. I will explain an algorithm used to generate new results regarding the conjecture. This algorithm uses a modification of the modular symbol reduction algorithm to calculate the action of the Hecke Operators on cohomology below the cohomological dimensions. I have applied this algorithm to SL(3,Z) to generated new data regarding the aforementioned correspondence.
Martin Dickson, University of Bristol

Cusps of level N Siegel modular varieties and Hecke action on Klinge-Eisenstein series

Analogously to the compactification of modular curves associated to classical modular forms, Satake constructed a compactification of the modular variety associated to Siegel modular forms of higher degree. In this higher-dimensional setup the situation is more complicated because instead of adding only points we now must add copies of modular varieties of all intermediate dimensions, and moreover these boundary components may have non-trivial intersections. In this talk we describe this boundary structure explicitly in the case of modular varieties associated to Hecke-type congruence subgroups of squarefree level. We then show how, in this case, we can also describe the multiplicative relations satisfied by Hecke operators at the various cusps. Finally we apply this to determining the action of Hecke operators on Klinge-Eisenstein series.

Sam Dittmer, Brigham Young University

Two arithmetic problems related to class group L-functions

It is well known that the $L$–function $L(\chi, s)$ of an ideal class group character $\chi$ of an imaginary quadratic field $K = \mathbb{Q}(\sqrt{-D})$ can be expressed in terms of values of the real-analytic Eisenstein series for $SL_2(\mathbb{Z})$ at Heegner points. We will discuss how this relationship can be used to prove that, for each fundamental discriminant $-D < 0$, there exists at least one $\chi$ such that the central value $L(\chi, \frac{1}{2}) \neq 0$.

Darrin Doud, Brigham Young University

Highly reducible Galois representations and arithmetic cohomology

In joint work with Avner Ash, we prove that certain highly reducible Galois representations, consisting of a sum of a two- or three-dimensional irreducible representation with arbitrarily many characters, are attached to Hecke eigenclasses in arithmetic cohomology.

Ellen Eischen,
p-adic families of Eisenstein series

One approach to constructing certain $p$-adic $L$-functions relies on construction of a $p$-adic family of Eisenstein series. I will explain how to construct such $p$-adic families for certain unitary groups. As part of the talk, I will explain how to $p$-adically interpolate certain values of both holomorphic and non-holomorphic Eisenstein series. I will also mention some applications to number theory and beyond.
Adam Gamzon, Hebrew University of Jerusalem
Unobstructed Hilbert modular deformation problems

Let $\rho$ be an $l$-adic Galois representation associated to a Hilbert newform $f$. This talk discusses how, under certain conditions on $f$, the universal ring $R$ for deformations of the semisimple mod $l$ reduction of $\rho$ with fixed determinant is unobstructed for almost all primes $l$. Our method follows the approach of Weston, who carried out a similar program for classical modular forms in 2004. As such, the problem essentially comes down to verifying that various local invariants vanish at all places dividing $l$ or the level of the newform. We conclude with an explicit example illustrating how one can in principle find a lower bound $B$ such that $R$ is unobstructed for all $l > B$.

Nathan Green, Texas A&M University
Integrality properties of singular moduli

We discuss the integrality properties of singular moduli of a special non-holomorphic function $\gamma(z)$ which was previously studied by Siegel, Masser, Bruinier, Sutherland, and Ono. Similar to the modular $j$-invariant, $\gamma(z)$ has algebraic values at any CM-point. We show that primes dividing the denominators of these values must have absolute value less than that of the discriminant and are not split in the corresponding quadratic field. Moreover we give a bound for the size of the denominator.

Michael Griffin, Emory University
A framework of Rogers-Ramanujan identities and their arithmetic properties

The two Rogers–Ramanujan $q$-series

$$
\sum_{n=0}^{\infty} \frac{q^{n(n+\sigma)}}{(1-q) \cdots (1-q^n)},
$$

where $\sigma = 0, 1$, play many roles in mathematics and physics. By the Rogers–Ramanujan identities, they are essentially modular functions. Their quotient, the Rogers–Ramanujan continued fraction, has the special property that its “singular values” are algebraic integral units. We find a framework which extends the Rogers–Ramanujan identities to doubly-infinite families of $q$-series identities. If $a \in \{1, 2\}$ and $m, n \geq 1$, then we have

$$
\sum_{\lambda \leq m} q^{a|\lambda|} P_{2\lambda}(1, q, q^2, \ldots ; q^n) = \text{“Infinite product modular function”},
$$

where the $P_{\lambda}(x_1, x_2, \ldots ; q)$ are Hall–Littlewood polynomials. We identify our $q$-series as specialized characters of affine Kac–Moody algebras, and show that their singular values are algebraic. Generalizing the Rogers–Ramanujan continued fraction, we prove in the case of $A^{(2)}_{2n}$ that the relevant $q$-series quotients are again algebraic integral units.
Christopher Jennings-Shaffer, University of Florida
Congruences for a Smallest Parts Function via Quasi-Modular Forms

Using a PDE due to Bringmann, Lovejoy, and Osburn involving the M2-rank function for partitions without repeated odd parts, we find a combination of moments of the M2-rank function to be a quasi-modular form multiplied by a fixed product. The moments of various m2-crank functions turn out to also be quasi-modular forms multiplied by the same product. For low weights this allows us to find exact relations between moments of the m2-rank function and moments of the m2-crank functions. These exact relations lead to congruences for the smallest parts function of partitions without repeated odd parts along with a higher order analog of this spt function.

Matija Kazalicki, University of Zagreb
Divisor polynomials of Hecke eigenforms

Let \( f_E(z) \) be a newform associated to an elliptic curve \( E/Q \) of prime conductor \( p \) by the Modularity theorem. There is a cusp form \( F_E(z) \) of weight \( p + 1 \) and level 1 (Serre) such that \( F_E(z) \equiv f_E(z) \pmod{p} \). Ono (Web of modularity, pp.118) observed that the divisor polynomial modulo \( p \) of \( F_E(z) \) has unexpectedly many zeros that are j-invariants of supersingular elliptic curves over \( \mathbb{F}_p \). In this talk, we will present some results and conjectures inspired by this phenomena.

Susie Kimport, Yale University
An infinite family of quantum modular forms

In 2010, Zagier defined quantum modular forms, which are functions that exhibit almost modular behavior on a subset of the rational numbers. Since then, a handful of examples have been generated of these new objects. In this talk, I will present an infinite family of quantum modular forms of arbitrary half-integral weight. These forms arise from a universal mock theta function and the method extends results related to mock Jacobi forms to this quantum setting.

Krzysztof Klosin, Queens College
P-adic families of automorphic forms on GSp(4)

We will report on a recent progress in obtaining Lambda-adic versions of some automorphic liftings (especially the Saito-Kurokawa lift). We will discuss a construction of congruences between such a lift and a p-adic family of Siegel modular forms which do not arise as lifts. This is joint work with Jim Brown.
Robert J. Lemke Oliver, Stanford University
The distribution of the Tamagawa ratio in the family of elliptic curves with a two-torsion point

In recent work, Bhargava and Shankar have shown that the average size of the 2-Selmer group of an elliptic curve over $\mathbb{Q}$ is exactly 3, and Bhargava and Ho have shown that the average size of the 2-Selmer group in the family of elliptic curves with a marked point is exactly 6. In contrast to these results, we show that the average size of the 2-Selmer group in the family of elliptic curves with a two-torsion point is unbounded. In particular, the existence of a two-torsion point implies the existence of rational isogeny. A fundamental quantity attached to a pair of isogenous curves is the Tamagawa ratio, which measures the relative sizes of the Selmer groups associated to the isogeny and its dual. We consider the distribution of the Tamagawa ratio in the family of elliptic curves with a two-torsion point, and we show that it is essentially governed by a normal distribution with mean zero and growing variance. This is joint work with Zev Klagsbrun.

Sheng-Chi Liu, Washington State University
The distribution of integral points on homogeneous varieties

In this talk we will give a broad overview of the Linnik problems concerning the equidistribution of integral points on homogeneous varieties. One particular example concerns the Heegner points, which are roots in the complex upper-half plane of certain quadratic forms. We will discuss certain “sparse” equidistribution problems concerning these points and give an application of an analog of Linnik’s famous theorem on the first prime in an arithmetic progression.

Adele Lopez, Emory University
Kummer congruences arising from the mirror symmetry of an elliptic curve

In the genus 1 case, mirror symmetry reduces to the statement that a certain family of generating functions, relating to an elliptic curve, are quasimodular. In their proof of this fact, Kaneko and Zagier used a related family of generating functions $A_n(\tau)$, which they show to be quasimodular. We show that these $A_n$’s also satisfy Kummer-type congruences. Additionally, we show that for a prime $p$, the $p$th power coefficients of $A_n$ $p$-adically converge to zero, for specific values of $n$. 
Karl Mahlburg, Louisiana State University
Combinatorial partition identities and automorphic forms

I will discuss results arising from the study of combinatorial partition identities, including the famous product formulas of Rogers-Ramanujan, Schur, Gollnitz, and Gordon. Recent work has illuminated the widespread role of automorphic forms in such identities, including eta-quotients, modular units, and partial theta functions.

Jolanta Marzec, University of Bristol
Non-vanishing of fundamental Fourier coefficients of Siegel modular forms

We are going to investigate Fourier coefficients of Siegel modular forms of degree 2. The ones of special interest are those determined by matrices with fundamental discriminant. Whenever we are able to say that one of them does not vanish, we get - through the generalized Bocherer’s conjecture - the non-vanishing results for central values of L-functions. We will discuss the cases of congruence subgroups $\Gamma_0(N)$ and $\Gamma_{para}(N)$ with $N$ square-free.

Michael H. Mertens, University of Cologne
Mock Modular Forms and Class Number Relations

In this talk, we prove an almost 40 year old conjecture by H. Cohen concerning the generating function of the Hurwitz class number of quadratic forms using the theory of mock modular forms. This conjecture yields an infinite number of so far unproven class number relations. If there is time, we will also discuss a generalization of Cohen’s conjecture to Fourier coefficients of mock modular forms instead of class numbers.

Samuel Reid, University of Calgary
Nilpotent Orbit Varieties

The condition of nilpotency is studied in the general linear Lie algebra $\mathfrak{gl}_n(\mathbb{K})$ and the symplectic Lie algebra $\mathfrak{sp}_{2m}(\mathbb{K})$ over an algebraically closed field of characteristic 0. In particular, the conjugacy class of nilpotent matrices is described through nilpotent orbit varieties $O_\lambda$ and an algorithm is provided for computing the closure $\overline{O}_\lambda \cong \text{Spec} (\mathbb{K}[X]/J_\lambda)$.

We provide new generators for the ideal $J_\lambda$ defining the affine variety $\overline{O}_\lambda$ which show that the generators provided in [J. Weyman - ”The equations of conjugacy classes of nilpotent matrices”, 1989] are not minimal. Furthermore, we conjecture the existence of local weak Néron models for nilpotent orbit varieties based on bounding $p$ in the polynomial ring with $p$-adic integer coefficients for which the equations defining $O_\lambda$ can embed.
**Joseph Richey, University of Michigan**  
**Polynomial Identities on Eigenforms**

We fix a polynomial with complex coefficients and determine the eigenforms for SL2(Z) which can be expressed as the fixed polynomial evaluated at other eigenforms. In particular, we show that when one excludes trivial cases, only finitely many such identities hold for a fixed polynomial. (Joint with Noah Shutty)

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**Jeremy Rouse, Wake Forest University**  
**Elliptic curves over Q and 2-adic images of Galois**

We give a classification of all possible 2-adic images of Galois representations associated to elliptic curves over Q. To this end, we compute the “arithmetically maximal” tower of 2-power level modular curves, develop techniques to compute their equations, and classify the rational points on these curves.

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**Abhishek Saha, University of Bristol**  
**Supnoms of cusp forms in the level aspect**

Bounding sup-norms of automorphic forms in terms of the level has been the focus of much recent study by Blomer, Harcos, Holowinsky, Ricotta, Templier and various others. However, all previous work has been restricted to the case of squarefree level. I will talk about my very recent work that removes this restriction and successfully generalizes previously known bounds to the case of arbitrary levels growing to infinity.

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**Detchat Samart, Texas A&M University**  
**The elliptic trilogarithm and Mahler measures of $K3$ surfaces**

The Mahler measure of an $n$-variable Laurent polynomial $P$ is defined to be the arithmetic mean of $\log(|P|)$ over the $n$-dimensional torus. We derive explicitly a connection between the Zagier elliptic trilogarithm and Mahler measures of certain families of three-variable polynomials. These results exhibit new relationships between families of $K3$ surfaces and the families of elliptic curves which give rise to Shioda-Inose structures of the surfaces. We will also briefly explain how these results imply some identities relating the elliptic trilogarithm to special values of $L$-functions.
Adrian Barquero Sanchez, Texas A&M University
A Chowla-Selberg formula for CM abelian fields

The Chowla-Selberg formula relates values of the Dedekind eta function at CM points to values of the gamma function at rational numbers. We will present some analogs of this result for CM values of a certain automorphic function for the Hilbert modular group. This is joint work with Riad Masri.

Noah Shutty, University of Michigan
Polynomial Identities on Eigenforms

We fix a polynomial with complex coefficients and determine the eigenforms for SL(2,Z) which can be expressed as the fixed polynomial evaluated at other eigenforms. In particular, we show that when one excludes trivial cases, only finitely many such identities hold for a fixed polynomial. (Joint with Joseph Richey)

Nils Skoruppa, University of Siegen and Max-Planck Institute for Mathematics, Bonn
Computation of Jacobi forms over number fields

For understanding and computing examples for a “Birch-Swinnerton Dyer conjecture” for elliptic curves over number fields the not yet completely developed theory of Jacobi forms over number fields will play an important role. Yet, there are very few explicit examples of these automorphic forms. We propose a method for systematically generating such examples with emphasis on and concrete results for Jacobi forms over Q(√5).

Armin Straub, University of Illinois at Urbana-Champaign
On a secant Dirichlet series and Eichler integrals of Eisenstein series

This talk is motivated by the secant Dirichlet series $\psi_s(\tau) = \sum_{n=1}^{\infty} \sec(\pi n \tau) / n^s$, recently introduced and studied by Lalín, Rodrigue and Rogers as a variation of results of Ramanujan. We review some of its properties, which include a modular functional equation when $s$ is even, and demonstrate that the values $\psi_{2m}(\sqrt{r})$, with $r > 0$ rational, are rational multiples of $\pi^{2m}$. These properties are then put into the context of Eichler integrals of Eisenstein series of higher level. In particular, we determine the period polynomials of such Eichler integrals and indicate that they appear to give rise to unimodular polynomials, an observation which complements recent results by Conrey, Farmer and Imamoglu as well as El-Guindy and Raji on zeros of period polynomials of Hecke eigenforms in the case of level 1. This talk is based on joint work with Bruce C. Berndt.
Jesse Thorner, Emory University
Bounded Gaps Between Primes in Chebotarev Sets

A new and exciting breakthrough due to Maynard establishes that there exist infinitely many pairs of distinct primes whose difference is at most 600 as a consequence of the Bombieri-Vinogradov Theorem. In this paper, we apply his general method to the setting of Chebotarev sets of primes. We study applications of these bounded gaps with an emphasis on ranks of prime quadratic twists of elliptic curves, congruence properties of the Fourier coefficients of normalized Hecke eigenforms, and representations of primes by binary quadratic forms.

DJ Thornton, Brigham Young University
Congruences for Coefficients of Modular Functions

We examine canonical bases for weakly holomorphic modular forms of weight 0 and level $p = 2, 3, 5, 7, 13$ with poles only at the cusp at $\infty$. We show that many of the Fourier coefficients for elements of these canonical bases are divisible by high powers of $p$, extending the results of Jenkins and Andersen. Additionally, we prove similar congruences for elements of a canonical basis for the space of modular functions of level 4, and give congruences modulo arbitrary primes for coefficients of such modular functions in levels 1, 2, 3, 4, 5, 7, and 13.

Sarah Trebat-Leder, Emory University
Connecting Classical and Umbral Moonshine

The classical theory of monstrous moonshine describes the unexpected connection between the representation theory of the monster group $M$, the largest of the simple sporadic groups, and certain modular functions, called Hauptmoduln. In particular, the $n$th Fourier coefficient of Klein’s $j(\tau)$ function is the dimension of the grade $n$ part of a special infinite dimensional representation $V$ of the monster group. More generally the coefficients of Hauptmoduln are graded traces $T_g$ of $g \in M$ acting on $V$. Similar phenomena have been shown to hold for the Mathieu group $M_{24}$, but instead of modular functions, mock-modular forms must be used. This has been conjecturally generalized even further, to umbral moonshine, which associates to each of 23 Niemeier lattices a finite group, infinite dimensional representation, and mock-modular form. We use generalized Borcherds products to relate monstrous moonshine and umbral moonshine. Namely, we use mock-modular forms from umbral moonshine to construct via generalized Borcherds products rational functions of the Hauptmoduln $T_g$ from monstrous moonshine. This allows us to associate to each pure $A$-type Niemeier lattice a conjugacy class $g$ of the monster group, and gives rise to identities relating dimensions of representations from umbral moonshine to values of $T_g$. We also show that the logarithmic derivatives of some of the Borcherds products are $p$-adic modular forms, and hence their coefficients have properties modulo $p$. 
Luke Wassink, University of Iowa
The Local Langlands-Shahidi Method for SL(2) via Types and Covers

The Local Langlands Shahidi method allows one to define local L factors and gamma factors associated to smooth generic representations of p-adic groups. This is done by calculating the Whittaker functional applied to a test vector in the representation, then calculating the Whittaker functional composed with a certain intertwining map and comparing the two results. This intertwining map is given by an integral, and in general it can be quite difficult to calculate when applied to an arbitrary vector. The theory of types and covers reduces the study these representations to the study of modules over certain finite dimensional algebras. I will show how this allows one to greatly simplify the calculation of the local factors in the case of split principal series representations of the group SL(2), and discuss my efforts towards carrying out similar calculations for SO(5).

Ka Lun Wong, University of Hawaii at Manoa
Zagier’s sums of powers of quadratic polynomials when the discriminants are negative

Zagier studied some functions defined as sums of powers of quadratic polynomials with integer coefficients and discovered that these functions have several surprising properties and are related to many other subjects, including modular forms of weight $2k$ and special values of zeta functions. Zagier mentions that his definition does not work well and/or becomes unnatural when $k$ is odd. We redefine Zagier’s sums by changing the summation condition. That allows us to consider splittings of positive discriminants of the quadratic forms under summation into products of two (positive or negative) discriminants. Finally, our sums, while essentially coincide with those of Zagier in the case when $k$ is even, allow us to cover in a similar way the case when $k$ is odd.

Michael Woodbury, Columbia University
An Adelic Kuznetsov Trace Formula for GL(n)

The Kuznetsov trace formula for GL(2) has many application to number theory, and more recently Blomer and Goldfeld/Kontorovich have extended some of these ideas to GL(3). We will discuss how to extend these ideas to higher rank general linear groups. This is joint work with Dorian Goldfeld.
Fan Zhou, Ohio State University
Sato-Tate Equidistribution of Satake Parameters of Automorphic Forms

We formulate a conjectured orthogonality relation between the Fourier coefficients of Maass forms on $\text{PGL}(N)$. Based on the work of Goldfeld-Kontorovich and Blomer for $N=3$, and on our conjecture for $N \geq 4$, we prove that the Satake parameters at a finite prime of the family of Maass cusp forms on $\text{PGL}(N)$ is equidistributed with respect to the generalized Sato-Tate measure, when weighted by $1/L(1, \text{Adjoint})$. Our paper is to appear in the Ramanujan Journal (online first at http://link.springer.com/article/10.1007/s11139-013-9535-6?sa_campaign=email/event/articleAuthor/onlineFirst).