Abstracts

Jim Brown

Congruences for paramodular Saito-Kurokawa lifts and applications

Let $\phi \in S_k(\Gamma_0(M))$ be a newform whose functional equation has sign -1. It is well known there is a lift of ϕ to a Siegel modular form $f_\phi \in S_k(\Gamma[M])$ where $\Gamma[M] \subset \mathrm{Sp}_4(\mathbf{Q})$ is the paramodular group. In this talk we specialize the congruence result described in Huixi Li's talk to the case the Siegel modular form is f_ϕ. We show there is a congruence between f_ϕ and a cuspidal Siegel eigenform with irreducible Galois representation. This congruence provides evidence for the Bloch-Kato conjecture for ϕ not covered by previous work. This is joint work with Huixi Li.

Stevo Bozinovski

Intrinsic Theory of Divergent Series

Contemporary the dominant theory of divergent series is the summation method theory, in which a divergent series is assigned a finite sum although divergent series are named divergent because they do nit have a finite sum. A theory presented in this talk appreciates the fact that divergent series have no sum, and looks for other relations between divergent series. Some new results related to Riemann zeta function are revealed. This is a joint work with Adrijan Bozinovski.

Michael Bush

Non-abelian generalizations of the Cohen-Lenstra heuristics

In the last few years, my collaborators and I have proposed a non-abelian version of the Cohen-Lenstra heuristics for both real and imaginary quadratic fields in which one replaces the p-part of the class group (p odd prime) with the Galois group of the maximal unramified p-extension of the base field. One big difference when making this switch is that the latter objects can be infinite while the former are always finite. Our conjectures originally only dealt with the frequency of occurrence of finite p-groups and certain special finite quotients of the infinite pro-p groups that arise. After giving an overview, I'll discuss some recent developments including an extension covering infinite groups. This is joint work with Nigel Boston and Farshid Hajir.

Sungkon Chang

Average Number of Zeckendorf Integers

By Zeckendorf's theorem each positive integer is uniquely written as a sum of distinct non-adjacent terms of the Fibonacci sequence. In this talk we consider sequences $\{G_n\}$ that are given by the Fibonacci recurrence but has different initial values, and investigate the number of positive integers up to X that are written as a sum of distinct non-adjacent terms of G_n. We also introduce generalizations of this result for so called *the Nth order Fibonacci sequence*, and for general linear recurrences with positive coefficients.

Kwangho Choiy

Restriction of tempered L-packets for p-adic groups

From the behavior of irreducible smooth representations of a p-adic group restricted to its closed subgroup with the same derived group, we derive arithmetic information which can be applied to establish the local Langlands correspondence of the subgroup.
In this talk, we shall focus on the multiplicity of tempered representations in the restriction and relate it to its counterpart of corresponding irreducible representations in the Langlands dual side. This relation is utilized to study the internal structure of tempered L-packets.

Will Craig

On Repeated Prime Divisors of Trinomial Discriminants

The discriminant of a trinomial of the form $x^n \pm x^m \pm 1$ takes the form $\pm n^n \pm m^m(n-m)^{n-m}$ whenever n and m are relatively prime. Several papers have been written studying when these values are squarefree, and it has been conjectured that they are squarefree infinitely often, and in particular, the special case of $x^n - x - 1$, whose discriminant is $n^n + (-1)^n(n-1)^{n-1}$, is squarefree infinitely often. The aim of this talk is to generalize the methods used previously to attack the squarefree to investigate when these numbers are n^{th}-powerfree, and in the end to prove a weaker form of these conjectures; namely, that the special case $n^n + (-1)^n(n-1)^{n-1}$ is cubefree infinitely often and that whenever m is fixed, all discriminants of this form are fourth-powerfree infinitely often. Furthermore, additional observations about these values is discussed, and methods by which the case of squarefreeness might be attacked are outlined.

Nathan Fontes

Explicit Computations of Higher Weight Modular Forms

Modular forms are holomorphic functions on the complex upper half plane with special conditions imposed upon them. Many people learn the theory of modular forms without ever seeing how to compute their spaces, so we will examine computational methods on these structures. This process involves looking at modular symbols and Manin symbols, as well as the corresponding Hecke operators on them. I will discuss computations on weight $k4$ modular forms and their differences from computing weight 2 modular forms.

Stephen M Gagola III

Multiplicative properties of partitions

Here we solve a problem that was proposed by Ken Ono and Christine Bessenrodt. Ono and Bessenrodt proved that the number of partitions of n, say p(n), satisfies p(a)p(b) ¿ p(a + b) for a, b ¿ 1 and a + b ¿ 9 by using a result of Lehmer and asked whether a combinatorial proof exists. Here we show that such a proof exists and also show that the proof carries over to the analogous inequality for k-regular partitions with k 2. For 2 k 6, these inequalities were first proven to hold for k-regular partitions by Olivia Beckwith and Christine Bessenrodt using similar methods to the p(n) case.

Hugh Geller

Ramanujan Type Congruences for Klingen-Eisenstein Series over $\Gamma_0^n(N)$

In 2014, Kikuta and Takemori published results on degree n Siegel modular forms stating that for all but finitely many primes $\mathfrak{p}$ in any ring of algebraic integers, mod $\mathfrak{p}^m$ cusp forms are congruent to true cusp forms of the same weight. In this talk, we discuss work in progress to generalize their result to Siegel modular forms over the congruence subgroup $\Gamma_0^n(N)$.

Jon Grantham

Yet Another Conjecture of Goldbach: Preliminary Results

Let A be the set of numbers a for which a^2+1 is prime. Goldbach conjectured that every $a \in A, (a > 1)$ can be written in the form $a = b + c$, for $b, c \in A$. We present verification of the conjecture as well as conditional results related to it.

Marie Jameson

Congruences for generalized Frobenius partitions

In 1984, George Andrews introduced k-colored generalized Frobenius partitions, whose counting function $c\phi_k(n)$ is a generalization of the partition function. In this talk, we will discuss congruences for generalized Frobenius partitions.

Huixi Li

Congruence primes of Hilbert Siegel eigenforms

Congruences between modular forms play an important role in number theory. For example, it is an important ingredient in the proof of the Herbrand-Ribet theorem and the Iwasawa main conjecture for GL_2. In this presentation I will provide a sufficient condition for a prime ℓ to be a congruence prime for a Hilbert Siegel eigenform f for a large class of totally real fields F via a divisibility of a special value of the standard L-function associated to f. In the special case that $F = \mathbb{Q}$ and f is an Ikeda lift, we recover an earlier result of Brown-Keaton as a special case of our main theorem. This is joint work with Jim Brown.

Aleksander Morgan

Bounded generation of SL_2 over S-integers of algebraic number fields with infinitely many units.

Let $\mathcal{O}$ be the ring of S-integers in a number field k. We prove that if the group of units $\mathcal{O}^\times$ is infinite, then every matrix in $G = \mathrm{SL}_2(\mathcal{O})$ is a product of at most 9 elementary matrices. As a consequence, we obtain that G is boundedly generated as an abstract group.

Jeremy Rouse

Integers represented by positive-definite quadratic forms and Petersson inner products

Let Q be a positive-definite quaternary quadratic form with integer coefficients. We study the problem of giving bounds on the largest positive integer n that is locally represented by Q but not represented. Assuming that n is relatively prime to $D(Q)$, the determinant of the Gram matrix of Q, we show that n is represented provided that $n \gg \max\{N(Q)^{3/2+\epsilon}D(Q)^{5/4+\epsilon}, N(Q)^{2+\epsilon}D(Q)^{1+\epsilon}\}$. These results are proven by bounding the Petersson norm of the cuspidal part of the theta series, which is accomplished using an explicit formula for the Weil representation due to Scheithauer.

James Rudzinski

Monotone Organization of Symmetric Chains

A symmetric chain decomposition (SCD) of a Boolean lattice is a partition into symmetric chains. In this talk we present and analyze an algorithm which organizes the chains of a SCD into a tree. This allows each element of the decomposition to be constructed in an increasing or ”monotone” fashion. One could use this to efficiently check for certain monotone properties such as connectivity in subgraphs of a graph.

Tom Wright

Reframing the \$620 problem in terms of other, equally unsolvable problems

In this talk, we clean up a heuristic by Pomerance to show exactly how the infamous \$620 problem would follow from some reasonable conjectures about primes in arithmetic progressions and smoothness of various $p - 1$'s and $p + 1$'s.

Dan Yasaki

On the cohomology of congruence subgroups of GL_3 over the Eisenstein integers

Cohomology provides a framework for doing explicit computations of certain types of automorphic forms. In joint work with Mark McConnell and Paul Gunnells, we develop the geometric techniques needed to carry out this computation for GL_3 over the imaginary quadratic field of discriminant -3. In this talk, I will discuss some of the techniques involved and present some of the interesting phenomena we observed.