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Algebra & Number Theory Seminar

The ANT Seminar presents research and concepts in Algebra as well as Number Theory. The format is a series of talks from researchers and widely-recognized experts, with an informal tea beforehand. Talks are once a week, and about an hour long with time for Q&A at the end. In-person talks will be in **McHenry 4130** and will have a 30m **tea (drinks and snacks) in McHenry 4161 beforehand.** Remote talks will have a meet-and-greet ~15m before the talk.

Fall 2024 || **Winter 2025** || **Spring 2025**

Fall 2023 || Winter 2024 || Spring 2024

Fall 2022 || Winter 2023 || Spring 2023

Archives

2022-23 Algebra & Number Theory Seminar
Fridays

[Give feedback]

For further information please contact
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FALL 2024

Oct 4			
Oct 11			
Oct 18			
Oct 25			
Nov 1			
Nov 8			
Nov 15			
Nov 22			
Nov 29	**HOLIDAY**	**HOLIDAY**	**HOLIDAY**
Dec 6			

Friday, Oct 4, at 4pm PST – IN PERSON (tea in 4161, talk in 4130)

who

title

Abstract

SPRING 2024

THURS 4/11 @ 3:15pm	Marty Weissman	UCSC	Octonions and Exceptional Groups (introduction to dual pairs for 4/12 talk)
4/12	Gordan Savin	University of Utah	Exceptional dual pairs where one member is F_4
4/26	Rusiru Gambheera Arachchige	UCSB	Equivariant Iwasawa Theory for the Ritter-Weiss module and Applications
5/3	Amit Ophir	UCSD	Stable lattices in representations over p-adic fields
5/10	Sam K Miller	UCSC	On endotrivial complexes and the generalized Dade group
5/17	Deewang Bhamidipati	UCSC	q-Frobenius Trace distributions

			of Abelian varieties
~~5/24~~	~~Chi-Yun Hsu~~	~~Santa Clara University~~	~~Eigenvariety for partially classical Hilbert modular forms~~
5/31	David Rubinstein	UCSC	Stratification of Derived Categories of Tate Motives
6/7	Justin Lake	UCSC	The Generic Semimodule of an Analytic Plane Branch with a Single Puiseux Pair

THUR April 11 @ 3p-4pm. Special meeting. Talk in 4130; no tea.

Marty Weissman, UCSC. *Preparation talk for 4/12 talk – intro to dual pairs*

Octonions and Exceptional Groups

I'll talk about Hurwitz algebras over fields, which include quaternion and octonion algebras in broad generality. I'll talk about automorphism groups of such algebras, most notably the exceptional groups of type G2 as automorphism groups of octonion algebras. I'll finish with a study of subgroups of G2, connecting "root subgroups" indexed by the G2 root system to octonions. This will highlight "dual pairs," which are pairs of mutually centralizing subgroups. No familiarity with quaternions or octonions is necessary... the talk should be accessible to students who have completed Math 200 and 201 or something equivalent.

April 12 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

Gordan Savin, University of Utah

Exceptional dual pairs where one member is F_4

We will describe these dual pairs in full generality, and then go on to study p-adic theta correspondences in cases that are similar to classical (semi) stable range. As a consequence, we can prove uniqueness of Spin(9)-invariant functionals for representations F_4 and classify those that are Spin(9)-distinguished. This is a joint work with Ed Karasiewicz.

April 26 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

Rusiru Gambheera, UC Santa Barbara

Equivariant Iwasawa Theory for the Ritter-Weiss module and Applications

We will discuss a new equivariant main conjecture in Iwasawa theory associated with the cyclotomic Z_p−extension of a CM number field over a totally real number field. Our object of interest $∇_T^S(H∞)_p$ is the projective limit of certain p−adic Ritter-Weiss modules which is class field theoretically significant and has nice cohomological properties. Our main result is a

number field analogue of the recent result of Bley and Popescu on a certain Drinfeld modular Iwasawa tower of function fields. As an application, we compute the 0-th Fitting ideal of a naturally arising Iwasawa module over the relevant equivariant Iwasawa algebra. This is joint work with Cristian Popescu.

May 3 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

Amit Ophir, UC San Diego

Stable lattices in representations over p-adic fields

P-adic representations of Galois groups are prominent in number theory. In such representations, lattices that are stable under the action of the group encode arithmetical information. Interestingly, the collection of stable lattices (up to homothety) can be equipped with the structure of a simplicial complex, and there is an interplay between the geometry of this complex, and some properties of stable lattices. My focus will be on generalizations of a lemma by Ribet. I will survey known results and discuss some recent results in a joint work with Ariel Weiss.

May 10 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

Sam K Miller, UC Santa Cruz

On endotrivial complexes and the generalized Dade group

Let G be a finite group and k be a field of characteristic $p > 0$. In previous work, we introduced the notion of an endotrivial chain complex. These complexes are closely tied to other objects of interest in modular representation theory, including endotrivial modules, splendid Rickard equivalences, and the trivial source ring. In this talk, we will highlight an additional surprising connection to endopermutation modules and the Dade group and demonstrate how this connection is used to classify all the endotrivial complexes. If time permits, we will explain the interplay between endotrivial complexes and the trivial source ring and how we are using this to understand better the connection between splendid Rickard equivalences and p-permutation equivalences.

May 17 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

Deewang Bhamidipati, UC Santa Cruz

q-Frobenius Trace distributions of Abelian varieties

Elliptic curves over a finite field \(\mathbf{F}_q\) famously come in two flavours: ordinary and supersingular. As q varies over powers of a fixed prime p, the eigenvalues of Frobenius of an ordinary elliptic curve are uniformly distributed on a circle, while those of a supersingular elliptic curve are supported in many places. In joint work with Santiago Arango-Piñeros and Soumya Sankar, we study this phenomenon for abelian varieties in higher dimensions and provide a

classification of the possible scenarios in low dimensions. This phenomenon is informed by the angle rank of an abelian variety over a finite field, which measures the algebraic independence of the eigenvalues of the Frobenius. In this talk, I will discuss some of our results and some open questions in this area.

May 24 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

Chi-Yun Hsu, Santa Clara U

{POSTPONED}

May 24 @ 2:30pm. Talk in McH 4130; tea beforehand (4161)

David Rubinstein, UC Santa Cruz

Stratification of Derived Categories of Tate Motives

Barthel, Heard, and Sanders, motivated by earlier work of Benson-Iyengar-Krause and Neeman, have made significant progress in developing a theory of stratification for a rigidly-compactly generated tensor-triangulated category \(\mathcal T\), which provides a framework for classifying the localizing ideals of \(\mathcal T\). In my thesis, I studied a particular example of a rigidly-compactly generated tensor-triangulated category, arising from the theory of Motives. More specifically, I studied the derived category of Tate motives over certain algebraically closed fields, using the beautiful computation of its Balmer spectrum by Martin Gallauer as our starting point. I proved this category is stratified, which provides a classification for arbitrary Tate motives. In this talk, we'll illustrate the highlights of the theory of stratification and sketch how we proved the derived category of Tate motives is stratified.

June 7 @ 2:30pm

Justin Lake, UC Santa Cruz

The Generic Semimodule of an Analytic Plane Branch with a Single Puiseux Pair

Singular analytic plane branches have many known discrete topological invariants attached to them. One such invariant is the Puiseux characteristic. Another is the semigroup of the curve. There are finer discrete analytic invariants attached to singular plane curve germs as well. One of particular interest is given by the set of valuations of differential one-forms on the curve. This set of valuations forms a semimodule over the semigroup of the curve germ. We can form the moduli space of singular irreducible analytic plane curve germs by considering topological equivalence of the germs modulo analytic equivalence. If we fix a topological (equisingularity) class of plane curve germs, we find that there is a generic component of this moduli space. All curve germs that lie on this generic component share the same semimodule over the semigroup of the equisingularity class. In this talk we present a recursive formula for the generic semimodule in the case where the semigroup is generated by two coprime positive integers. To do so we utilize the Euclidean algorithm on the generators of the semigroup. We will also

discuss various ways as to how one determines all possible semimodules of plane curve germs with a fixed two generator semigroup.

WINTER 2024

Algebra talks

1/18
1/23
1/25
1/30
2/1
2/6

Seminar

3/19	Stephen DeBacker	U Michigan	Where the tame tori are

Upcoming (Spring '24)

4/12	Gordan Savin	University of Utah	Exceptional dual pairs where one member is F_4
5/10	Deewang Bhamidipati	UCSC	TBD

March 19 @ 11am. In-person meeting (4130); tea beforehand (4161)

Stephen DeBacker, U Michigan

Where the tame tori are

For any local field k and any reductive group G defined over k, the rational classes of maximal k-tori in G can be classified via Galois cohomology. While often useful, this classification doesn't provide much information about what the maximal k-tori look like. In the 1950s Borel, Harish-Chandra, Kostant, and Sugiura gave a concrete description of what the rational maximal tori look like for real Lie groups. If k is a p-adic field, then outside of a few families of classical groups, we do not have a good idea of what the rational maximal tori look like. In this talk we will

present a way to classify, via Bruhat-Tits theory, the rational conjugacy classes of maximal tame k-tori in a connected reductive k-group.

FALL 2023

ANT Seminar will be Fridays at 10:30am

(click dates for title and abstract)

Oct 6	James Upton	UCSC	Zeros of the Goss Zeta Function
Oct 13	Marty Weissman	UCSC	From representations of p-adic groups to barcodes
Oct 20	Peter Haine	UC Berkeley	Weight filtrations from the perspective of homotopy theory
Oct 27	Alex Rasmussen	Stanford	Disintegrating curve graphs
Nov 3	Sameera Vemulapalli	Stanford	Counting low degree number fields with almost prescribed successive minima
Nov 10	**NO TALK**	**NO TALK**	**NO TALK (holiday)**
Nov 17	Owen Barrett	UC Berkeley	The singular support of an ℓ-adic sheaf
Nov 24	**NO TALK**	**NO TALK**	**NO TALK (holiday)**
Dec 1	Daping Weng	UC Davis	Cluster Duality and Canonical Bases of Grassmannians
Dec 8	NO TALK ?		

Oct 6 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

James Upton, UCSC

Zeros of the Goss Zeta Function

The Goss zeta function is a characteristic-p analogue of the Riemann zeta function for function fields. In the spirit of the Riemann hypothesis, Goss made several conjectures concerning the distribution of its zeros. We discuss the history of these questions and some recent progress we have made in collaboration with Joe Kramer-Miller. Our main result is a comparison of the distribution of zeros between the higher-genus and genus-zero cases. As a consequence, we are able to prove a "Riemann Hypothesis" for all function fields satisfying a generic "ordinary" condition.

Oct 13 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

Marty Weissman, UCSC

From representations of p-adic groups to barcodes

The representation theory of real and p-adic groups, like SL(2,R) and SL(2,Qp), plays a central role in number theory via the Langlands program. The representation theory of SL(2,R) has been understood since the 1940s, when it was related to spaces of functions on the upper half plane. An analogue for p-adic groups was given in the late 1990s by Schneider and Stuhler, who relate representations of SL(2,Q_p) to sheaves on the Bruhat-Tits tree. We describe this connection, and how such sheaves yield a "barcode" -- a classification device that features prominently in persistent homology.

Oct 20 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

Peter Haine, UC Berkeley

Weight filtrations from the perspective of homotopy theory

Let X be a complex variety. In his work on Hodge theory and solution to the Weil conjectures, Deligne introduced a canonical *weight filtration* on the rational singular cohomology H*(X(ℂ); ℚ) of the underlying complex points of X. Deligne's construction is rather ingenious, and is specific to working with rational coefficients. Using different methods, Gillet and Soulé later refined Deligne's weight filtration to a filtration to a filtration on integral cohomology. In this talk, we'll discuss joint work with Piotr Pstrągowski that gives a further refinement of Deligne's filtration. Given a cohomology theory A with a "generalized first Chern class" (e.g., ordinary cohomology or complex K-theory), we construct a canonical weight filtration on the cohomology A*(X(ℂ)). Chromatic homotopy theory provides many examples of these sorts of cohomology theories; moreover, the weight filtrations with these exotic coefficients give rise to some new invariants of varieties. Our construction of this weight filtration is a consequence of a new description of Voevodsky's motivic stable homotopy category, which may be of independent interest.

Oct 27 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

Alex Rasmussen, Stanford

Disintegrating curve graphs

Curve graphs are crucial tools for studying mapping class groups of surfaces. However, many basic questions on their geometry remain open. In this talk, we will shed light on the geometry of curve graphs by describing "filtrations" of them by hyperbolic graphs. These filtrations yield quasi-isometric disintegrations of curve graphs into trees. As a corollary, we provide a new proof of finite asymptotic dimension of curve graphs. Finally, we describe some useful aspects of the dynamics of the mapping class group actions on the graphs in the filtrations.

Nov 3 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

Sameera Vemulapalli, Stanford

Counting low degree number fields with almost prescribed successive minima

The successive minima of an order in a degree n number field are n real numbers encoding information about the Euclidean structure of the order. How many orders in degree n number fields are there with almost prescribed successive minima, fixed Galois group, and bounded discriminant? In this talk, I will address this question for n = 3,4,5. The answers, appropriately interpreted, turn out to be piecewise linear functions on certain convex bodies. If time permits, I will also discuss a geometric analogue of this problem: scrollar invariants of covers of P^1.

Nov 17 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

Owen Barrett, UC Berkeley

The singular support of an ℓ-adic sheaf

Given a sheaf F and a map f of spaces, f is locally acyclic relative to F at a point x in the source if the cohomology of the various Milnor fibers at x with coefficients in F (a key geometry arising in the study of singularities) compute the stalk of F at x. Despite its complicated definition, local acyclicity is in fact the natural generalization of the notion of smooth morphism to something akin to a 'smooth morphism with parameters.' Given its importance, it's interesting to ask whether the notion of local acyclicity can be controlled by linear algebra. It turns out that this is possible when F lives on a smooth variety, and the corresponding linear-algebraic data then lives in the cotangent bundle and is called the singular support of F, or SS(F). The singular support has for several decades been defined for holonomic D-modules and sheaves on manifolds, where it admits a particularly concrete description. In 2015, Beilinson defined SS(F) for a constructible étale sheaf F on a smooth variety over any field. In this talk, I will review the classical story of local acyclicity, explain some recent breakthrough of Lu and Zheng, and define the singular support of an ℓ-adic sheaf on a smooth variety.

Dec 1 @ 10:30am. In-person meeting (4130); tea beforehand (4161)

Daping Weng, UC Davis

Cluster Duality and Canonical Bases of Grassmannians

A cluster variety is an affine variety equipped with an atlas of torus charts, which are glued birationally in a specific way. Cluster varieties come in dual pairs, whose torus charts are dual algebraic tori. Cluster duality, formulated by Fock and Goncharov, states that the coordinate ring of a cluster variety admits a canonical basis parametrized by the integral tropical points of its dual cluster variety. Furthermore, for any compatible (partial) compactification of a cluster variety, one can follow the work of Gross-Hacking-Keel-Kontsevich and construct a superpotential function, whose tropicalization gives the divisorial valuation along the boundary divisor. In this talk, we will discuss the realization of cluster duality in the case of Grassmannians, whose canonical bases are parametrized by plane partitions. As an application, we will prove a cyclic sieving phenomenon on plane partitions under a certain toggling action. This is based on joint work with L. Shen (arXiv:1803.06901). If time allows, we will also discuss a similar construction in an upcoming work on braid varieties (which include all open Richardson varieties).

SPRING 2023

ANT Seminar will be Fridays at 11am

For 2022-23, it will be **Fridays**, mostly in-person but perhaps with some remote talks. In-person talks will be in **McHenry 4130** and will have a 30m **tea (drinks and snacks) in McHenry 4161 beforehand.** Remote talks will have a meet-and-greet ~15m before the talk.

***** Spring '23 talks will be 11am to noon, or 11 to 11:50, Fridays.**

(click dates for title and abstract)

Apr 14	Xu Gao	UCSC	P-adic representations and simplicial distance in Bruhat-Tits buildings
Apr 28	Nariel Monteiro	UCSC	The Stable Representations of GL_n over Finite Local Principal Ideal Rings
May 5	George McNinch	Tufts	Reductive subgroup schemes of a parahoric group scheme
May 19	Mona Merling	U Penn	Equivariant K-theory and spaces of equivariant h-cobordisms
May 26	John McHugh	UCSC	Characters of p-permutation modules

Friday, April 14, at 11am PST – IN PERSON (tea in 4161, talk in 4130)

Xu Gao, UCSC

P-adic representations and simplicial distance in Bruhat-Tits buildings

P-adic representations are important objects in number theory, and stable lattices serve as a connection between the study of ordinary and modular representations. These stable lattices can be understood as stable vertices in Bruhat- Tits buildings. From this viewpoint, the study of fixed point sets in these buildings can aid research on p-adic representations. The simplicial distance holds an important role as it connects the combinatorics of lattices and the geometry of root systems. In particular, the fixed-point sets of Moy-Prasad subgroups are precisely the simplicial balls. In this talk, I'll explain those findings and compute their simplicial volume under certain conditions.

Friday, April 28, at 11am PST – IN PERSON (tea in 4161, talk in 4130)

Nariel Monteiro, UCSC

The Stable Representations of GL_n over Finite Local Principal Ideal Rings

In this talk, we will give a survey of the representation theory of GL_n over finite local principal ideal rings via Clifford's theory, emphasizing the construction of irreducible stable representations. The study of those representations is motivated by constructions of strongly semisimple representations, introduced by the work of Hill, which is a special case of stable representations.

Friday, May 5, at 11am PST – IN PERSON (tea in 4161, talk in 4130)

George McNinch, Tufts

Reductive subgroup schemes of a parahoric group scheme

Let G be a reductive algebraic group over K where K is the field of fractions of a complete discrete valuation ring A. The parahoric group schemes attached to G are certain smooth group schemes P over A for which the group P_K obtained by base-change coincides with G.

Write k for the residue field of A. In general, the special fiber P_k of a parahoric group scheme is not reductive. When G splits over an unramified extension of K, we proved in a relatively recent paper that for any parahoric group scheme P attached to G that there is a closed A-subgroup scheme M of P for which the special fiber M_k is a Levi factor of the group P_k, and the generic fiber M_K is a maximal rank reductive subgroup of P_K = G.

The talk will aim to describe this result and some background material: among other things, it will describe the notion of a Levi factor, of a parahoric group scheme, and of a maximal rank reductive subgroup.

Friday, May 19, at 11am PST – IN PERSON (tea in 4161, talk in 4130)

Mona Merling, U Penn

Equivariant K-theory and spaces of equivariant h-cobordisms

Waldhausen's algebraic K-theory of manifolds satisfies a homotopical lift of the classical h-cobordism theorem and provides a critical link in the chain of homotopy theoretic constructions that show up in the classification of manifolds and their diffeomorphisms. I will give an overview of joint work with Goodwillie, Igusa and Malkiewich about the equivariant homotopical lift of the h-cobordism theorem. The talk will not assume any background and will also give some motivation for equivariant stable homotopy theory.

Friday, May 26, at 11am PST – IN PERSON (tea in 4161, talk in 4130)

John McHugh, UCSC

Characters of p-permutation modules

In finite group representation theory, the concept of a p-permutation module generalizes the notions of permutation module and projective module. In earlier work, a necessary and sufficient condition for a character of a finite group to "come from" a p-permutation module was found. One problem is that two non-isomorphic p-permutation modules can have the same character. Boltje and Carman fixed this issue by introducing so-called "coherent character tuples." Two p-permutation modules are isomorphic if and only if their corresponding coherent character tuples are equal. We show how to refine their work to the case where the p-permutation modules of interest belong to a fixed block of the group algebra. I will only assume that the audience members have a hazy memory of what a character of a finite group is.

WINTER 2023

***** Starting on 1/27, ANT will be 9 to 10 a.m. Fridays, and ugrad talks will be 10:30 to 11:30 a.m. Fridays. This is to avoid time conflicts, and to give participants in both series an hour to present.**

(click dates for title and abstract)

1/27	Peter Webb	University of Minnesota	Biset functors for categories
2/3	Peter Webb	University of Minnesota	Biset functors, part 2
2/24	Daniel Martin	UC Davis	Short Vector Problems and Simultaneous Approximation
3/10	Lea Beneish	UC Berkeley	Degree d points on plane curves
3/17	Jef Laga	Princeton	Arithmetic statistics via graded Lie algebras

Friday, Jan 27, at 9am PST – IN PERSON (tea in 4161, talk in 4130)

Peter Webb, University of Minnesota

Biset functors for categories

In the context of group theory, biset functors are a way to encode operations of restriction, induction, inflation and deflation, and are closely related to Mackey functors. The theory may be extended to have definition on finite categories, instead of just finite groups. This new theory allows the definition of a Burnside ring of a category, and provides circumstances when we have transfer in the cohomology of a category. It provides a way to interpret the theory of correspondences, as well as the structure of representation rings of categories. It suggests fundamental structural questions to do with relationships between finite categories. We give an overview of what can be done and the problems that arise.

Friday, Feb 3, at 9am PST – IN PERSON (tea in 4161, talk in 4130)

Peter Webb, University of Minnesota

Biset functors for categories, Part 2

In the context of group theory, biset functors are a way to encode operations of restriction, induction, inflation and deflation, and are closely related to Mackey functors. The theory may be extended to have definition on finite categories, instead of just finite groups. This new theory allows the definition of a Burnside ring of a category, and provides circumstances when we have transfer in the cohomology of a category. It provides a way to interpret the theory of correspondences, as well as the structure of representation rings of categories. It suggests fundamental structural questions to do with relationships between finite categories. We give an overview of what can be done and the problems that arise.

Friday, Feb 24, at 9am PST – IN PERSON (tea in 4161, talk in 4130)

Daniel Martin, UC Davis

Short Vector Problems and Simultaneous Approximation

In 1982, Lagarias proved that simultaneous approximation reduces to the Shortest Vector Problem. That is, any algorithm that can find a short nonzero vector in a lattice can also be used to approximate multiple real numbers by rationals with a common denominator. We will provide a reduction in the reverse direction, showing that the Shortest Vector Problem and simultaneous approximation are essentially equivalent. Our reduction relies on a tool from analytic number theory, called Jacobsthal's function, which more commonly finds use in bounding gaps between primes. We will also discuss the relevance of this result to lattice-based cryptography.

Friday, March 10, at 9am PST – IN PERSON (tea in 4161, talk in 4130)

Lea Beneish, UC Berkeley

Degree d points on plane curves

Given a plane curve C defined over Q, when the genus of the curve is greater than one, Faltings' theorem tells us that the set of rational points on the curve is finite. It is then natural to consider higher degree points, that is, points on this curve defined over fields of degree d over Q. We ask for which natural numbers d are there points on the curve in a field of degree d. There is a lot of structure in the set of values d, some of which I will explain in this talk. This talk is based on joint work with Andrew Granville.

Friday, March 17, at 9am PST – IN PERSON (tea in 4161, talk in 4130)

Jef Laga, Princeton

Arithmetic statistics via graded Lie algebras

I will explain how various results in arithmetic statistics by Bhargava, Gross, Shankar and others on 2-Selmer groups of Jacobians of (hyper)elliptic curves can be organized and reproved using the theory of graded Lie algebras, following earlier work of Thorne. This gives a uniform proof of these results and yields new theorems for certain families of non-hyperelliptic curves. I will also mention some applications to rational points on certain families of curves.

The talk will involve a mixture of representation theory, number theory and algebraic geometry and I will assume no familiarity with arithmetic statistics.

FALL 2022

(click dates for title and abstract)

Oct 14	Ang Li	UCSC
Dec 2	Cameron Franc	McMaster University

For 2022-23, the ANT seminar will be **Fridays**, mostly in-person but perhaps with some remote talks. Fall talks will start at **4pm**. **Zoom meetings at**

Meeting ID: 977 4116 4135
Passcode: 177550

https://ucsc.zoom.us/j/97741164135?pwd=ZjBBbkRmbWFmcG9wLzJRS0tSR3hLUT09

Friday, Oct 14, at 4pm PST – IN PERSON (tea in 4161, talk in 4130)

Ang Li, UCSC

The real motivic Steenrod subalgebra A(1) and its 128 module structures

If we take the cohomology group with coefficients to be the group of order 2, all the cohomology operations form the mod 2 Steenrod algebra A. Let A(1) be the subalgebra generated by Sq^1 and Sq^2. It turns out that A(1) has 4 different A-module structures distinguished by the action of Sq^4, which match up with different homotopy types of the spectra realizing them. I will talk about the analogy in the real motivic setting and establish the 128 realizations of the real motivic Steenrod subalgebra A(1). This is joint work with Prasit Bhattacharya and Bertrand Guillou.

Friday, Dec 2, at 4pm PST – IN PERSON (tea in 4161, talk in 4130)

Cameron Franc, McMaster University

P-adic vertex operator algebras

Since their dramatic inception via the resolution by Borcherds of the moonshine conjectures, vertex operator algebras (VOAs) have been intimately connected both with the theory of modular forms, and with conformal field theory and the physics underlying string theory. Both of these fields have explored connections with p-adic arithmetic. In this talk we will discuss a corresponding new theory of p-adic VOAs, which are not quite VOAs in the classical sense, though closely connected. We will give some basic results on the theory and explain some of the motivation arising from the theory of p-adic modular forms. In particular, we will describe concrete examples of p-adic modular forms that can be obtained from the p-adic Heisenberg algebra by building on work of Tuite-Mason and interpreting the classical Kummer congruences for Bernoulli numbers in this new setting.