GTA PHILADELPHIA 2025: TITLES AND ABSTRACTS

Friday May 30

Plenary Talk **Friday 1:30–2:30**

Tian Yang – Texas A&M University *Gladfelter L013*

"Turaev-Viro invariants from $U_q\mathfrak{sl}(2;\mathbb{R})$: state-integral convergence, topological invariance and asymptotics"

Abstract: We define a family of Turaev-Viro type invariants of hyperbolic 3-manifolds with totally geodesic boundary from the 6j-symbols of the modular double of $U_q\mathfrak{sl}(2;\mathbb{R})$, and prove that these invariants decay exponentially with the rate the hyperbolic volume of the manifolds and with the 1-loop term the adjoint twisted Reidemeister torsion of the double of the manifolds. This is a joint work with Tianyue Liu, Shuang Ming, Xin Sun and Baojun Wu

Student Talks: Block I **Friday 2:50–3:20**

Andy Day – Penn State University *SERC 108A*

"Algebraic skew embedding of curves"

Abstract: Given a smooth manifold X, a totally skew embedding of X is an embedding of X into an euclidean space R^N such that for any two distinct points x, y in X, their embedded tangent spaces in R^N neither intersect nor contain parallel lines. The concept can be generalized to algebraic skew embeddings of complex smooth varieties into complex projective spaces. In this work, we establish an upper bound and a lower bound of the minimal dimension N such that there exists a skew embedding into the space CP^N for a given smooth variety X. In particular, we classify the algebraic curves in terms of their minimal skew embedding dimension N.

Amanda Tran – Tufts University *SERC 108B*

"Bilinear Forms - Revenge Of The Hypergraphs"

Abstract: The world of bilinear forms and their relation to configuration geometry highlights interesting constructions and phenomena; in this paper, we discuss the tools required to make constructions of polar spaces associated with sesquilinear (with a focus on bilinear) forms over finite fields. In particular, when we talk about totally singular of bilinear forms as hypergraphs, we often find that they live in highly regular configurations (where the dual of the "graph" formed by the totally singular lines is the same graph).

Here, we seek to explore various bilinear forms over finite fields as configurations, and tie it together the machinery native to graph coloring.

Shashini Marasinghe – Michigan State University *Gladfelter L013*

"Seifert fibered 3-manifolds and Turaev-Viro invariants volume conjecture."

Abstract: We study the large r asymptotic behaviour of the Turaev-Viro invariants of oriented Seifert fibered 3-manifolds at the root $q = e^{\frac{2\pi i}{r}}$. As an application, we prove the volume conjecture for large families of oriented Seifert fibered 3-manifolds with empty and non-empty boundary.

Hunter Stufflebeam – University of Pennsylvania *Gladfelter L021*

"Stability of the 2D Min-Oo Conjecture"

ABSTRACT: The notorious Min-Oo Conjecture asked if the n-hemisphere satisfies a certain rigidity behavior, as a positive curvature analogue of the celebrated Positive Mass Theorem from general relativity. Despite holding true in many special cases, as well as in full generality when $n = 2$, surprising counterexamples were found by Brendle-Marques-Neves in all dimensions $n \geqslant 3$. Over the last thirty-odd years, a great deal of effort has gone into proving stronger, quantitative versions of rigidity theorems–sometimes called stability theorems. We prove that *stability* for the one fully true case of the Min-Oo Conjecture (ie dimension 2) holds iff the boundary of the hemisphere is strictly convex.

Our methods include a blend of elliptic PDE theory, conformal mapping theory, and metric geometry.

Student Talks: Block II — Friday 3:30–4:00

Suzanne O'Hara – Wesleyan University — *SERC 108A*

"Heavenly Elliptic Curves over Cubic Fields"

ABSTRACT: Motivated by an open question of Ihara in the case $K = \mathbb{Q}$, we consider the distinction between the maximal pro-ℓ extension of $K(\mu_\ell^\infty)$ unramified away from ℓ and the field fixed by the kernel of the outer pro-ℓ Galois representation attached to $\mathbb{P}^1_K - \{0, 1, \infty\}$. In order to approach this question, we study intermediate extensions. One such class is generated by considering K and adjoining the ℓ-power torsion of an elliptic curve E/K that is heavenly at ℓ. In previous work, Rasmussen and McLeman have established finiteness results around examples of heavenly elliptic curves defined over quadratic fields. In this talk, we will cover the techniques used in the quadratic case and discuss which of these results have analogues when working over number fields of odd degree.

Ajmain Yamin – CUNY Graduate Center — *SERC 108B*

"Sums of Binary Hamiltonian Forms"

ABSTRACT: We investigate sums of binary Hamiltonian forms, analogous to Zagier's sums of binary quadratic forms and Karabulut's sums of binary Hermitian forms. We prove that these sums live in finite dimensional vector spaces and compute explicit bases for some of these spaces. This results in new identities satisfied by certain elementary arithmetic functions. This talk presents work done in collaboration with Gautam Chinta (CCNY).

Ziyal Jandrasi – Montana State University — *Gladfelter L013*

"Morita Equivalence of Categories" (Expository)

ABSTRACT: Motivated by the familiar concept in the setting of rings, we introduce a notion that is weaker than equivalence of categories, Morita equivalence. We will see a striking example provided by the Dold-Kan theorem, and briefly outline how one might go about proving a Morita equivalence.

Zach Norfolk – Penn State University — *Gladfelter L021*

"Totally skew embeddings of manifolds"

ABSTRACT: A totally skew embedding of an n-dimensional manifold in Euclidean space is an example of an embedding with extra regularity conditions. For totally skew embeddings, we require the tangent spaces at all distinct points on the manifold to be pairwise skew. I will give a brief history of this problem, discuss some of the older results as well as more recent ones, and explain some connections with other areas of topology/geometry. Other types of embeddings with extra regularity conditions will be mentioned as well.

Plenary Talk — Friday 4:15–5:15

André Arroja Neves – University of Chicago — *Gladfelter L013*

"Minimal surfaces in negatively curved manifolds"

ABSTRACT: I will talk about the area grown of minimal surfaces in negatively curved 3-manifold and how it relates with other geometric invariants such as scalar curvature and Liouvillle Entropy.

SATURDAY MAY 31

Plenary Talk **Saturday 9:30–10:30**

Marissa Loving – University of Wisconsin Madison *Gladfelter L013*

"End-periodic homeomorphisms"

ABSTRACT: In this talk, I will introduce the notion of end-periodic homeomorphisms of infinite-type surfaces. My goal will be to illustrate the ways these homeomorphisms mimic the behavior of pseudo-Anosov homeomorphisms of finite-type surfaces by displaying interesting geometric, dynamical, and topological behavior. Time allowing, I will discuss some of my recent work on the dynamics of these maps (joint with Chenxi Wu) and the geometry of their associated mapping tori (joint with Elizabeth Field, Autumn Kent, Heejoung Kim, and Chris Leininger).

Student Talks: Morning Block I **Saturday 11:00–11:30**

Rawin Hidalgo – Stony Brook University *SERC 108A*

"Degree bounds for Rational Invariants of $\mathbb{Z}/p\mathbb{Z}$ and other finite abelian groups"

ABSTRACT: Degree bounds for algebra generators of invariant rings are a topic of longstanding interest in invariant theory. We study the analogous question for field generators for the field of rational invariants of a representation of a finite group, focusing on abelian groups and especially the case of $\mathbb{Z}/p\mathbb{Z}$. The inquiry is motivated by an application to signal processing. We give new lower and upper bounds depending on the number of distinct nontrivial characters in the representation. We obtain additional detailed information in the case of two distinct nontrivial characters. We conjecture a sharper upper bound in the $\mathbb{Z}/p\mathbb{Z}$ case, and pose questions for further investigation.

Xinyu Zhou – Boston University *SERC 108B*

"On the Langlands-Kottwitz method for Drinfeld modular varieties at bad primes"

ABSTRACT: Following a method of Scholze's, we study the Hasse-Weil zeta functions for the Drinfeld modular varieties of arbitrary rank at the primes where they have bad reductions. We achieve this by defining a canonical level structure map with the aid of Anderson A-motives and scrutinizing the "shape" of the bad fibers. We also relate the zeta function to automorphic L-functions by applying the Langlands-Kottwitz paradigm

Shana Li – University of Illinois Urbana-Champaign *Gladfelter L013*

"Multivariable knot polynomials, the V_n-polynomials, and their patterns"

ABSTRACT: Quantum knot invariants are known to come from R-matrices along with some extra structures, a process called the Reshetikhin–Turaev functor. In 2019, Rinat Kashaev proved that R-matrices alone are sufficient to define knot invariants, as long as they satisfy some nondegeneracy conditions called rigidity. More recently, Stavros Garoufalidis and Rinat Kashaev developed a new method of constructing rigid R-matrices, which recovers several known knot polynomials such as the colored Jones polynomials, and gives a new family of multivariable knot polynomials, the V_n-polynomials. In this talk, I will talk about the Reshetikhin–Turaev functor in this context, the computation of V_n-polynomials and the patterns of the results based on 361404 knots computed. Joint work with Stavros Garoufalidis.

Andrew Edwards – Case Western Reserve University *Gladfelter L021*

"Minimal Hypersurfaces in $\mathbb{H}^2 \times \mathbb{H}^2$ Invariant under Isometries"

ABSTRACT: The simplest minimal submanifolds of a given space are those which are invariant under an isometry of the space. In $\mathbb{R}^3$, these are the classical examples of the helicoid and the catenoid, and generalizations of these examples have been constructed in space forms of all dimensions. Recent work has examined the construction of such submanifolds in symmetric spaces of rank 2 which are not space forms (i.e. do not have constant sectional curvature. In particular, there are a number of results in the product 3-manifolds $S^2 \times \mathbb{R}$ and $\mathbb{H}^2 \times \mathbb{R}$. In this talk, we discuss how these techniques may be extended to submanifolds of $\mathbb{H}^2 \times \mathbb{H}^2$.

Student Talks: Morning Block II **Saturday 11:40–12:10**

Ruoxi Li – University of Pittsburgh *SERC 108A*

"Motivic Classes of Varieties and Stacks with Applications to Higgs Bundles"

ABSTRACT: In this talk, we will first discuss the motivations for motivic classes coming from point counting over finite fields. Then we will give the definitions of the motivic classes of varieties, in particular we explain that an extra relation is needed in finite characteristic. We will introduce symmetric powers and motivic zeta functions that are universal versions of local zeta functions.

For the second part of the talk, we will focus on the motivic classes of stacks. In particular, we will give the explicit formulas for the motivic classes of moduli of Higgs bundles.

Audrey Rosevear – University of California Berkeley *SERC 108B*

"Reeb Flows with Prescribed Dynamics and Applications to Topology"

ABSTRACT: While the definition of a Reeb flow is relatively easy to state, until recently it has not been clear what differentiates Reeb flows from more general volume-preserving flows on 3-manifolds. Recent advances demonstrate the link between Reeb flows and Birkhoff sections, which allows one to go back and forth between Reeb flows and certain area-preserving surface diffeomorphisms. In this talk, I'll discuss ongoing work using Birkhoff sections to construct Reeb flows with prescribed dynamical properties, such as hypertightness and (pseudo)-Anosovity.

Ipsa Bezbarua – CUNY Graduate Center *Gladfelter L013*

"Contractibility of the knot complex of incompressible spanning surfaces"

ABSTRACT: One of the fundamental structures studied in knot theory is a compact surface whose boundary is the link under consideration, called a spanning surface. Osamu Kakimizu constructed two closely related simplicial complexes using the spanning surfaces of a given link - the incompressible complex and the Kakimizu complex - to study the properties of the link. In 2012, Piotr Przytycki and Jennifer Schultens showed that the Kakimizu complex is contractible for any link. In this talk, we will see that their arguments can be modified to show contractibility of the incompressible complex as well.

Ryan Gelnett – University at Albany *Gladfelter L021*

"Configuration Spaces of Circles in the Plane"

ABSTRACT: We consider the space of all configurations of finitely many (potentially nested) circles in the plane and compute the fundamental group of each of its connected components. These groups can be viewed as "braided" versions of the automorphism groups of finite rooted trees. This is joint work with Justin Curry and Matthew Zaremsky.

Student Talks: Afternoon Block I **Saturday 3:00–3:30**

Bella Finkel – University of Wisconsin Madison *SERC 108A*

"Concerning the existence of non-hyperelliptic curves with trivial Ceresa class"

ABSTRACT: The Ceresa cycle is a natural example of an algebraic cycle that is homologically trivial but algebraically nontrivial. It arises in many natural questions about the geometry of curves and is correlated with their analytic, combinatorial, and arithmetic properties. However, in most cases it is difficult to explicitly characterize the Ceresa class for non-hyperelliptic curves. We investigate a cohomological vanishing criterion for Ceresa cycles of curves with nontrivial automorphisms due to Qiu and Zhang. Let G be a group generated by elements g_1, g_2, g_3 such that $g_1g_2g_3$ is the identity. We show that if the tensor cube of the Hurwitz representation associated with the data (G, g_1, g_2, g_3) has no G-invariant subspace and $|g_1|, |g_2|, |g_3|$ are prime, then G has bounded order. This provides a response to a conjecture concerning the vanishing of Ceresa cycles for G-curves of signature $(|g_1|, |g_2|, |g_3|)$.

Joshua Perlmutter – Brandeis University *SERC 108B*

"The Morse Local-to-Global Property for Graph Products"

ABSTRACT: Morse local-to-global (MLTG) groups are a generalization of hyperbolic groups that includes CAT(0) groups, hierarchically hyperbolic groups (HHGs), and injective groups. MLTG groups have many nice properties including a regular language for Morse geodesics and a growth rate gap for stable subgroups. It is natural to ask how large the class of MLTG groups is. In this talk, I will use HHG techniques to expand the class of known MLTG groups by showing that graph products of MLTG groups are MLTG.

Nikhil Sahoo – Cornell University *Gladfelter L013*

"Kirby calculus and the Borromean rings" (Expository)

ABSTRACT: Low-dimensional topologists love to draw pictures, but most 4-manifolds (and even 3-manifolds) are impossible to visualize in the most literal sense, as our brains have only ever encountered objects embedded in a 3-ball. So how do we go about drawing pictures of spaces that are beyond our visual comprehension? One approach is to construct a manifold out of certain standard building blocks, called handles, successively attached along the boundary — in 4 dimensions, the instructions for how to put these pieces together can be captured by a framed link, an object that we can visualize and manipulate in 3 dimensions. This framed link also describes the boundary 3-manifold, which can be seen as coming from successive modifications of the 3-sphere along the link components, in a process called surgery. In this talk, we will illustrate the processes of handle attachment and surgery (and their interactions with branched covers) through my favorite example: zero-framed surgery on the Borromean rings.

Spencer Cattalani – Stony Brook University *Gladfelter L021*

"Holomorphic Lines in Symplectic Geometry"

ABSTRACT: Holomorphic curves are important to both complex and symplectic geometry. Both study closed holomorphic curves, but (non-compact) holomorphic lines are mainstream objects of study only in complex geometry. In this talk, I will present a collection of results which indicate the untapped potential of holomorphic lines in symplectic geometry.

Student Talks: Afternoon Block II — Saturday 3:40–4:10

Kenz Kallal – Princeton University *SERC 108A*

"Algebraic theory of indefinite theta functions"

ABSTRACT: Number theory students often learn a proof of the fact that the theta function $\theta(q) := 1 + 2q + 2q^4 + 2q^9 + \cdots$ is a modular form of weight $1/2$ using the Poisson summation formula. The key step of that proof uses analysis, despite the fact that the definition of θ only involves $\mathbf{Z}$. So it is worthwhile to ask: is there a purely algebraic way of proving the modularity property of θ ? In this talk, I will give such a proof by providing an algebraic characterization of the heat equation. This brings us back to the characterization of θ as being related to the fundamental solution of the heat equation on the circle, an idea that dates back to Fourier's 1822 work *Théorie analytique de la chaleur* (*Analytic Theory*

of Heat). I will further explain how to apply this technique in greater generality and in combination with other tools from algebraic geometry and number theory to produce a new algebraic theory of Siegel modular theta functions (possibly in positive characteristic) attached to (possibly indefinite) quadratic forms. This is joint work with Akshay Venkatesh.

Maxwell Plummer – Rice University *SERC 108B*

"Axis Bundles in Free-by-Cyclic Groups"

ABSTRACT: A free-by-cyclic group $G = F_N \rtimes_\varphi \mathbb{Z}$ can potentially split as a semidirect product in many ways. We'll investigate a "folded mapping torus" that allows us to study these splittings and discuss the associated "axis bundles."

Fran Herr – University of Chicago *Gladfelter L013*

"Leafwise Branched Coverings of Foliated 3-Manifolds" (Expository)

ABSTRACT: A foliation of a 3-manifold is a decomposition into a disjoint collection of surfaces so that it locally looks like a product $\mathbb{R}^2 \times \mathbb{R}$. A well-loved example is a 3-manifold fibering over the circle (a mapping torus) where the fibers form the surfaces in the foliation. Such a foliation is *taut*: there is a closed circle transversely intersecting all the fibers. In a 2021 paper, Calegari gives a combinatorial proof that a taut foliation is equivalent to the existence of a leafwise branched covering. We examine the relationship between the monodromy of a mapping torus and the necessary complexity of this leafwise branched cover. We are interested in mapping tori of both finite and infinite type surfaces.

Toni Scroggin – University of California Davis *Gladfelter L021*

"Splicing Braid Varieties"

ABSTRACT: Braid varieties are a class of affine algebraic varieties associated with positive braids, encompassing open Richardson and positroid varieties, and closely related to augmentation varieties of Legendrian links. In this talk, we introduce a novel operation termed splicing on braid varieties, inspired by the behavior of braid multiplication and its induced maps in Khovanov-Rozansky homology. This operation allows for the construction of new braid varieties from existing ones, shedding light on how algebraic and combinatorial structures interact under composition. We investigate how splicing interacts with cluster structures on these varieties and explore implications for link invariants, including those arising in categorified link homologies. This presentation is based on joint work with E. Gorsky, S. Kim, and J. Simental.

Student Talks: Afternoon Block III — Saturday 4:20–4:50

Shilpi Mandal – Emory University *SERC 108A*

"An Initiation to Differential Algebraic Geometry" (Expository)

ABSTRACT: Differential algebra consists of studying differential equations and differential operators as algebraic objects. This theory was first proposed by Joseph Ritt in 1950, in which differential rings, differential fields, and differential algebras are rings, fields, and algebras equipped with finitely many derivations. Differential algebraic geometry is an area of differential algebra that adapts concepts and methods from algebraic geometry and applies them to systems of differential equations.

In this talk, I will give the motivation to this topic through basic definitions and examples. We will also look at defining valuations on such objects and discuss their properties.

Inyoung Ryu – Texas A&M University *SERC 108B*

"Connected components of spaces of type-preserving representations"

ABSTRACT: We investigate the spaces of representations of surface groups into $\mathrm{PSL}(2,\mathbb{R})$. For a closed surface, by the classic result of Goldman, the Euler class together with the Milnor-Wood inequality provide a complete classification of the connected components of the spaces of the representations. However, describing the connected components becomes more subtle when considering the space of

type-preserving representations for punctured surfaces. In this talk, I will present a recent joint work with Tian Yang that addresses this problem.

Thomas Carlson – Montana State University *Gladfelter L013*

"Singular Support of a Knot"

ABSTRACT: To an oriented 3-manifold with boundary, we can associate a pair of algebraic structures: the Kauffman Bracket Skein Module of the manifold, as a module for the Skein Algebra of the boundary surface. It has been conjectured that if the manifold is compact, then this module will be finitely generated. In this talk, we will discuss the construction of a certain algebraic variety associated to a finitely generated module, with the intention of applying this construction to the skein module of a 3-manifold. In particular, by considering the complement of a knot in the 3-sphere, assuming the conjecture, we can define a knot invariant which takes values in subvarieties of $(\mathbb{C}^*)^2$.

Ali Naseri Sadr – Boston College *Gladfelter L021*

"Periodic Inscription of Isosceles Trapezoids"

ABSTRACT: Consider two continuous embeddings of the real line into the plane that are disjoint and periodic under translation by i. Tao suggested a variation of the square peg problem for these curves, and conjectured that every such pair of curves inscribes a square. I will talk about how we can generalize Tao's conjecture to other quadrilaterals. In particular, we prove a pair of disjoint, periodic curves inscribe every isosceles trapezoid using Lagrangian Floer homology.

SUNDAY JUNE 1

Plenary Talks

Samit Dasgupta – Duke University *Gladfelter L013*

"On the special values of abelian L-functions: from explicit class field theory to transcendence theory"

ABSTRACT: What do the deepest symmetries of number fields have to do with the values of infinite series at special points? In this talk, I will explore the rich and unexpected connections between three major themes in number theory: the classification of abelian extensions of number fields (the heart of class field theory), the behavior of special values of L-functions (which encode deep arithmetic data), and the structure of matrices of logarithms of algebraic numbers (a central focus of transcendence theory). A celebrated conjecture of Harold Stark predicts a precise link between the first two, while Schanuel's conjecture governs the third.

I'll present recent joint work with Mahesh Kakde and others that resolves two long-standing problems in this landscape. The first is a proof of the Brumer–Stark conjecture, establishing a direct connection between special L-values and explicit generators of number fields known as Brumer–Stark units. The second is a new, exact formula for these units that had remained conjectural for over twenty years. Together, these results yield a computable description of all abelian extensions of totally real fields—providing a solution to the problem of explicit class field theory in these cases.

I will conclude by discussing emerging ideas on the transcendence theory of logarithmic matrices and how they relate to the special values of L-functions.

Student Talks: Block I **Sunday 11:00–11:30**

Siwei Xu – Ohio State University *SERC 108A*

"Unique quantization of polynomial Lie algebra"

ABSTRACT: In his seminal paper "Hopf algebras and the quantum Yang–Baxter equation," Drinfeld claimed—without proof—that Yangian is the unique homogeneous quantization of the polynomial current algebra $\mathfrak{g}[t]$, where $\mathfrak{g}$ is a finite-dimensional simple Lie algebra. In recent joint work with Gautam

and Wendlandt, we provide a complete proof of this statement. Our approach is to construct a double chain complex that reveals a subspace of the quantization isomorphic to $\{x, J(x)\}_{x\in\mathfrak{g}}$, which respects both the algebra and coalgebra structures. We then verify that certain higher-order algebraic relations hold, from which the entire algebra is uniquely determined. The proof is a combination of cohomological arguments and explicit, detailed computations.

Annie Holden – University of Notre Dame *SERC 108B*

"Cohomology of Handlebody Torelli Groups"

ABSTRACT: In this talk, we aim to answer the following question. Given a group G, how can we calculate as much as possible of the cup product structure

$$\cup : \bigwedge^2 H^1(G;\mathbb{Q}) \to H^2(G;\mathbb{Q})$$

when *nothing* is known about the cohomology of G? We outline how we approach this problem for two notions of "Torelli" subgroups of the mapping class group of the handlebody. First, we review the (more commonly studied) mapping class group of a surface Σ_g and its Torelli group, the subgroup that acts trivially on $H_1(\Sigma_g;\mathbb{Z})$. We discuss the clever ways Johnson, Hain, and others detected the cohomology of the Torelli group, and how we can use similar ideas to study handlebody Torelli groups.

Adam Robertson – Utah State University *Gladfelter L013*

"A modified Reshetikhin–Turaev invariant from $\mathfrak{sl}(2,\mathbb{C})$" (Expository)

ABSTRACT: In 1990, Reshetikhin and Turaev defined link invariants from a semisimple ribbon category. A well-known example of such a category comes from the representation theory of the quantum group of $\mathfrak{sl}(2,\mathbb{C})$. For non-semisimple categories this approach fails because of vanishing quantum dimensions. A result due to Costantino, Geer, Patureau-Mirand and Turaev defined a modified Reshetikhin–Turaev invariant for generically semisimple ribbon categories. Moreover, if the category is relative modular, this link invariant extends to 3-manifolds.

In this talk, I will give an elementary explanation of the modified Reshetikhin–Turaev invariant in the context of the unrolled quantum group of $\mathfrak{sl}(2,\mathbb{C})$. No background in quantum groups is required.

Based on joint work with Nathan Geer, Jan-Luca Spellmann, and Matthew Young.

Indira Zeinikesheva – University of Pittsburgh *Gladfelter L021*

"Moment-angle complexes in toric topology"

ABSTRACT: We talk about moment-angle manifolds, a family of manifolds with torus actions on them, which are central objects in toric topology. We also talk about a related construction of moment-angle complexes and their generalizations, polyhedral products. We give a description of ordinary cohomology of moment-angle complexes and equivariant cohomology with respect to the action of coordinate subtori.

Student Talks: Block II — Sunday 11:40–12:10

Patrick Mayeda – Montana State University *SERC 108A*

"The p-adics and the Pontryagin dual of the rationals" (Expository)

ABSTRACT: Consider all group homomorphisms from the rationals to the circle. Giving the rationals the discrete topology, we may take these as all continuous group homorphisms and this is the Pontryagin dual. On the way to characterizing exactly what this dual is, $\widehat{\mathbb{Q}}$, we'll offer some constructions of the p-adic numbers and the adeles.

Mitra Alizadeh – Bowling Green State University *SERC 108B*

"Rigidity of pattern-preserving quasi-isometries of the Heisenberg groups"

ABSTRACT: Quasiisometries of the Heisenberg groups are very flexible. However, if the quasiisometries preserve additional structures then they could be very rigid. Let H be the first Heisenberg group and identify it with the three dimensional Euclidean space. With this identification the x-axis and y-axis are 1-dimensional subgroups. If f is a self quasiisometry of H and there is a constant $D > 0$ such that the image of each coset of the x-axis or the y-axis under f is at Hausdorff distance at most D from a coset of the x-axis or the y-axis, then f is a finite distance from an affine map of the Heisenberg group. A similar statement also holds for quasiisometries of the discrete Heisenberg group. Quasiisometries that preserve such structures arise naturally when one studies the quasiisometries of a graph of groups where the vertex groups are discrete Heisenberg groups and the edge groups are infinite cyclic. As a consequence we obtain quasiisometric rigidity result of the fundamental groups of this type of graphs of groups.

Peyton Wood – University of California Davis *Gladfelter L013*

"Finding n-distinguishing quandles"

ABSTRACT: One topic of great interest the last 25 years is finding a small set of quandles which can distinguish all knots of crossing number n and lower (up to reversal and mirror imaging). One could conjecture that for all n it may take only one, possibly quite large and complex, quandle to do this task. In this talk we explore finding such quandles for small crossing numbers, discuss the underlying behavior of this class of quandle, and explain how one may try and find such quandles for larger crossing numbers.

Eleftherios Chatzitheodoridis – University of Virginia *Gladfelter L021*

"Rational complete Segal spaces"

ABSTRACT: Complete Segal spaces, as introduced by Rezk, can be interpreted as categories up to homotopy that are enriched in spaces. Drawing motivation from rational homotopy theory, we introduce rational complete Segal spaces, which can be interpreted as categories up to homotopy that are enriched in rational spaces (spaces whose higher homotopy groups are rational vector spaces). In analogy with Rezk's approach, we produce a model category whose fibrant objects are the rational complete Segal spaces, and we establish that it is compatible with the Cartesian closure of the Reedy model structure on bisimplicial sets.

Student Talks: Block III — Sunday 12:20–12:50

Zecheng Yi – Boston University *SERC 108A*

"Continuous Cohomology of Steinberg Representations"

ABSTRACT: Geometrically, Steinberg representations of $\mathrm{GL}_n(\mathbb{Q}_p)$ arise as cohomology groups of Drinfeld spaces. The extensions between such representations are well-understood when the coefficient ring is a characteristic 0 field equipped with the discrete topology. I will discuss the analogue of such results when the coefficient is $\mathbb{Q}_p$ equipped with the p-adic topology.

Amin Idelhaj – University of Wisconsin Madison *SERC 108B*

"Kazhdan's Property (T)" (Expository)

ABSTRACT: A locally compact group G is said to satisfy Kazhdan's Property (T) if the trivial representation is an isolated point in its unitary dual with the Fell topology. In this talk, I will discuss Kazhdan's Property (T), with an eye toward connections to other topics in math, such as ergodic theory, expansion in graphs, rotation-invariant measures on the sphere, and group cohomology.

Quinn McMichael Salix – University of California Davis *Gladfelter L013*

"Transvection Groups of Quandles"

ABSTRACT: Quandles are algebraic objects that were created in the 1980s as an invariant of knots. Recently, there has been more effort to study the structure of quandles on their own, specifically by

identifying their automorphism groups and certain normal subgroups of these. In particular, I have focused on transvection groups of quandles. In this talk, I will give some background on automorphism groups of quandles, and then present my recent results that classify the transvection groups of the dihedral quandles and of any quandle with a trivial element.

Ian MacIntyre – University of Pittsburgh *Gladfelter L021*

"Census of Mixed-Platonic Manifolds"

Abstract: In this talk, we will describe the census of mixed-platonic 3-manifolds, extending earlier work on tetrahedral and platonic manifolds by Goerner et al. We will introduce 3-manifold censuses and computational tools for 3-manifolds like Regina and SnapPy. Next, we will discuss the hyperbolic geometry behind these constructions. Specifically, we will discuss polyhedral decompositions of hyperbolic 3-manifolds by regular hyperbolic polyhedra. We will motivate this census by describing some known examples of (mixed-)platonic manifolds that arise from knot theory. We will describe Goerner's algorithm-based on Burton's isomorphism signatures–a combinatorial triangulation invariant which provides an efficient criterion for pruning branches in the tree of candidate triangulations. Further applications include censuses of closed mixed-platonic manifolds and those with totally geodesic boundary.