<table>
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<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>Monday, February 01</td>
<td>3:00-4:00pm</td>
<td><strong>Algebraic Topology</strong> -- Tyler Lawson (University of Minnesota) Cocycle representatives for local systems of differential graded modules -- online Virtual</td>
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<td></td>
<td>3:00-5:00pm</td>
<td><strong>RTG Seminar on Number Theory</strong> -- Alex Dobner (UCLA) Zeros of Riemann zeta-type functions -- Virtual</td>
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<td>4:00-5:00pm</td>
<td><strong>Midwest Dynamics and Group Actions</strong> -- Kurt Vinhage (Penn State) Entropy Rigidity for Anosov Flows in Dimension Three -- Virtual</td>
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<td>6:00-7:00pm</td>
<td><strong>Student Dynamics/Geometry Topology</strong> -- () Planning meeting --</td>
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<tr>
<td>Tuesday, February 02</td>
<td>4:00-5:00pm</td>
<td><strong>Colloquium Series</strong> -- Samit Dasgupta (Duke University) Stark's Conjectures and Hilbert's 12th Problem -- Virtual</td>
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<td>5:00-6:00pm</td>
<td><strong>Complex Analysis, Dynamics and Geometry</strong> -- Ethan Farber (Boston College) Constructing pseudo-Anosov homeomorphisms from expanding interval maps -- Virtual</td>
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<td><strong>Student Combinatorics</strong> -- Will Dana () Quiver representations, reflection, and the Dynkin diagrams -- Virtual</td>
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<td>Wednesday, February 03</td>
<td>4:00-5:00pm</td>
<td><strong>Financial/Actuarial Mathematics</strong> -- Gu Wang (WPI) Sharing Profits in the Sharing Economy -- Virtual</td>
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<td>4:00-5:00pm</td>
<td><strong>Algebraic Geometry</strong> -- Naoki Koseki (University of Edinburgh) Stronger Bogomolov-Gieseker inequality via tilt stability -- Zoom</td>
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<td>4:00-5:30pm</td>
<td><strong>RTG Seminar on Geometry, Dynamics and Topology</strong> -- Thang Nguyen (U Michigan) Measure rigidity for actions of unipotent subgroups II -- <a href="https://umich.zoom.us/j/92258297975">https://umich.zoom.us/j/92258297975</a> East Hall</td>
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<td>Thursday, February 04</td>
<td>3:00-4:00pm</td>
<td><strong>Topology</strong> -- Leandro Lichtenfelz (University of Pennsylvania) Smooth Fibrations of the 3-Sphere by Simple Closed Curves -- Virtual</td>
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<td>4:00-5:30pm</td>
<td><strong>Arithmetic Geometry Learning</strong> -- Bhargav Bhatt () Review of constructible sheaves -- East Hall</td>
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<td>4:00-5:00pm</td>
<td><strong>Differential Equations</strong> -- Peter Miller (U. of Michigan, Ann Arbor) Universal Wave Breaking in the Semiclassical Sine-Gordon Equation -- zoom: 939 4435 0940</td>
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<td>Friday, February 05</td>
<td>12:30-2:30pm</td>
<td><strong>Special Events</strong> -- Mark Greenfield (UM) Dissertation Defense: Some new directions in Teichmüller theory -- Virtual</td>
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<td>3:00-4:00pm</td>
<td><strong>Applied Interdisciplinary Mathematics (AIM)</strong> -- Dominic Vella (University of Oxford) Buffering by buckling: New wrinkles on Gauss' Pizza Theorem -- (Zoom) East Hall</td>
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<td>3:00-4:00pm</td>
<td><strong>Student Algebraic Geometry</strong> -- Devlin Mallory (UM) Rational curves on algebraic varieties --</td>
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<td>4:00-5:30pm</td>
<td><strong>Preprint Algebraic Geometry</strong> -- James Hotchkiss () de Jong: The period-index problem for the Brauer group of an algebraic surface (part I) -- East Hall</td>
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Abstracts for the week of January 31st, 2021 - February 6th, 2021

Algebraic Topology
Monday, February 01, 2021, 3:00pm-4:00pm
online Virtual
Tyler Lawson (University of Minnesota)
Cocycle representatives for local systems of differential graded modules

Every differential graded algebra A gives rise to an associative ring spectrum HA, and every associative ring spectrum R has a space BGL_1(R) classifying local systems of R-modules. Perhaps unexpectedly, the space BGL_1(HA) can have non-trivial homotopy theory even in examples of a purely algebraic nature. For a space X, we will discuss cocycle-type models for maps X -> BGL_1(HA) and exhibit the resulting connections cohomology operations.

RTG Seminar on Number Theory
Monday, February 01, 2021, 3:00pm-5:00pm
Virtual
Alex Dobner (UCLA)
Zeros of Riemann zeta-type functions

Pre-talk at 3pm: Properties of the Riemann zeta function"

Main talk at 4pm, Abstract:

In this talk I will discuss two loosely related results about the zeros of $L$-functions. The first result is a proof of a generalization of Newman's conjecture. This conjecture may be viewed as a quantitative version of the statement that the generalized Riemann hypothesis, if true, is only barely so. The second result concerns irregularities in the vertical distribution of the zeros of the Riemann zeta function. The number of zeros of the zeta function up to a given height is estimated by the Riemann-von Mangoldt formula, but the error term in this formula is known to get somewhat large. I will discuss what is known about the distribution of this error term and prove a new lower bound on the tails of this distribution.

Zoom link:

https://umich.zoom.us/j/95185733075
Meeting ID: 951 8573 3075
Passcode: umrtg
Midwest Dynamics and Group Actions  
Monday, February 01, 2021, 4:00pm-5:00pm  
Virtual  
Kurt Vinhage (Penn State)  
*Entropy Rigidity for Anosov Flows in Dimension Three*

In the 80's, A. Katok proved that for a geodesic flow on a negatively curved surface, coincidence of its entropy with respect to the Liouville measure with its topological entropy is equivalent to that surface being hyperbolic. The Katok Entropy conjecture states that similar conclusions should hold in higher dimensions as well. In this talk, I will discuss recent work, joint with Jacopo de Simoi, Martin Leguil and Yun Yang, which extends the scope of the rigidity phenomenon to Anosov flows in three dimensions. Time permitting, I will discuss ongoing progress in the dual question of entropy flexibility.

Zoom link: https://iu.zoom.us/j/661711533?pwd=RTFVTjMrQ1pYTCtIZzIvVGVvODV2QT09  
password is 076877 if needed.

Student Dynamics/Geometry Topology  
Monday, February 01, 2021, 6:00pm-7:00pm  

()  

*Planning meeting*

We will plan our student Dynamics/Geometry/Topology seminar for Winter 2021 semester. We welcome all graduate students, especially first and second years.

Zoom link: https://umich.zoom.us/j/99788564257  
passcode: -4040
Colloquium Series  
**Tuesday, February 02, 2021, 4:00pm-5:00pm**  
Virtual  
Samit Dasgupta (Duke University)  
*Stark's Conjectures and Hilbert's 12th Problem*

In this talk we will discuss two central problems in algebraic number theory and their interconnections: explicit class field theory (also known as Hilbert's 12th Problem), and the special values of L-functions. The goal of explicit class field theory is to describe the abelian extensions of a ground number field via analytic means intrinsic to the ground field. Meanwhile, there is an abundance of conjectures on the special values of L-functions at certain integer points. Of these, Stark's Conjecture has special relevance toward explicit class field theory. I will describe my recent proof, joint with Mahesh Kakde, of the Brumer-Stark conjecture away from $p=2$. This conjecture states the existence of certain canonical elements in CM abelian extensions of totally real fields. Next I will describe our proof of an exact formula for these Brumer-Stark units that had been developed by many authors over the last 15 years. We show that the Brumer-Stark units along with other elementary quantities generate the maximal abelian extension of totally real number fields, thereby giving a solution to Hilbert's 12th problem for these fields.

https://msu.zoom.us/j/96609890257  
Meeting ID: 966 0989 0257  
Passcode: 298471

Complex Analysis, Dynamics and Geometry  
**Tuesday, February 02, 2021, 5:00pm-6:00pm**  
Virtual  
Ethan Farber (Boston College)  
*Constructing pseudo-Anosov homeomorphisms from expanding interval maps*

The celebrated Nielsen-Thurston classification of surface homeomorphisms says that, up to isotopy, there are three types of homeomorphisms of a closed, connected surface: (1) finite order, (2) reducible, and (3) pseudo-Anosov. Of these three types, pseudo-Anosovs are the most intriguing to dynamicists, with connections to symbolic dynamics and flat geometry. In this talk we investigate a construction of generalized pseudo-Anosovs from interval maps, first introduced by de Carvalho. In particular, for a certain class of interval maps we give necessary and sufficient conditions for the construction to produce a true pseudo-Anosov, which may be recast in terms of the kneading data of the interval map. We also describe a bijection between such interval maps and the rationals in the open unit interval which captures the kneading data, and which seems to increase monotonically in the entropy of the interval map.
Student Combinatorics  
Tuesday, February 02, 2021, 5:00pm-6:00pm  
3088 Virtual  
Will Dana ()  
*Quiver representations, reflection, and the Dynkin diagrams*

This talk will examine two questions:
- Which quivers have only finitely many indecomposable representations? In other words, when can the behavior of a collection of linear maps be summarized by discrete data?
- Consider a collection of hyperplanes in $\mathbb{R}^n$. When do the reflections across these hyperplanes generate a finite group?

The answers to both questions are classified by the Dynkin diagrams, a list of graphs which shows up throughout representation theory, combinatorics, and algebraic geometry. We'll track these two questions back to the source of their commonality and showcase some other hidden connections between them.

Financial/Actuarial Mathematics  
Wednesday, February 03, 2021, 4:00pm-5:00pm  
Virtual  
Gu Wang (WPI)  
*Sharing Profits in the Sharing Economy*

A monopolist platform (the principal) shares profits with a population of affiliates (the agents), heterogeneous in skill, by offering them a common nonlinear contract contingent on individual output. The principal cannot discriminate across individual skill, but knows its distribution and aims at maximizing profits. This paper identifies the optimal contract, its implied profits, and agents' effort as the unique solution to an equation depending on skill distribution and agents' costs of effort. If skill is Pareto-distributed and agents' costs include linear and power components, closed-form solutions highlight two regimes: If linear costs are low, the principal's share of revenues is insensitive to the distribution of skills, and decreases as agents' costs increase. If linear costs are high, the principal's share is insensitive to the agents' costs, while it decreases as skill diversity increases.

Algebraic Geometry  
Wednesday, February 03, 2021, 4:00pm-5:00pm  
Zoom  
Naoki Koseki (University of Edinburgh)  
*Stronger Bogomolov-Gieseker inequality via tilt stability*

I will explain how to obtain the stronger forms of the Bogomolov-Gieseker inequality for certain classes of varieties. This in particular implies the existence of Bridgeland stability conditions on Calabi-Yau threefolds obtained as double/triple covers of the projective space. The main technical tool is the theory of tilt-stability conditions on the derived categories.

http://www.math.lsa.umich.edu/seminars_events/ - Page 5/8
RTG Seminar on Geometry, Dynamics and Topology
Wednesday, February 03, 2021, 4:00pm-5:30pm
https://umich.zoom.us/j/92258297975  East Hall
Thang Nguyen (U Michigan)
Measure rigidity for actions of unipotent subgroups II

In a sequence of celebrated works, Ratner classified invariant ergodic measures and orbit closures of actions of groups generated by unipotent elements on a homogenous space. Namely, such an orbit closure must be a single orbit by a closed subgroup, and the invariant ergodic measure is the Haar measure on that orbit. In this talk, we go over a special case of Ratner's measure classification theorem when the action group is semisimple. We will follow the exhibition given by Einsiedler.
This week, we will discuss the main proof.
Zoom Info:
https://umich.zoom.us/j/92258297975

Topology
Thursday, February 04, 2021, 3:00pm-4:00pm
Virtual
Leandro Lichtenfelz (University of Pennsylvania)
Smooth Fibrations of the 3-Sphere by Simple Closed Curves

We show that the moduli space of all smooth fibrations of a 3-sphere by oriented simple closed curves has the homotopy type of a disjoint union of a pair of 2-spheres, which coincides with the homotopy type of the finite-dimensional subspace of Hopf fibrations. In the course of the proof, we present a pair of entangled fiber bundles in which the diffeomorphism group of the 3-sphere is the total space of the first bundle, whose fiber is the total space of the second bundle, whose base space is the diffeomorphism group of the 2-sphere. This is joint work with D. DeTurck, H. Gluck, M. Merling and J. Yang.

Arithmetic Geometry Learning
Thursday, February 04, 2021, 4:00pm-5:30pm
East Hall
Bhargav Bhatt ()
Review of constructible sheaves
Differential Equations  
Thursday, February 04, 2021, 4:00pm-5:00pm  
zoom: 939 4435 0940  
Peter Miller (U. of Michigan, Ann Arbor)  
*Universal Wave Breaking in the Semiclassical Sine-Gordon Equation*

The sine-Gordon equation has slowly-modulated librational wave solutions that are approximated at leading-order by a Whitham averaging formalism. The Whitham modulation equations are an elliptic quasilinear system whose solutions develop singularities in finite time. We show that when the solution of the Whitham system develops a generic type of gradient catastrophe singularity, the solution of the sine-Gordon equation locally takes on a universal form, independent of initial data and described in terms of the real tritronquée solution of the Painlevé-I equation and a two-parameter family of exact solutions of sine-Gordon that represent space-time localized defects on an otherwise periodic background wave. This is joint work with Bing-Ying Lu.

**Special Events**  
Friday, February 05, 2021, 12:30pm-2:30pm  
Virtual  
Mark Greenfield (UM)  
*Dissertation Defense: Some new directions in Teichmüller theory*

In this thesis we will extend the study of Teichmüller spaces in two relatively unexplored new directions. First, beginning with the Teichmüller space of the flat 2-torus, rather than increasing the genus, we will explore higher dimensional tori. This yields Riemannian symmetric spaces with very different, yet analogous, behavior to classically studied Teichmüller spaces of hyperbolic surfaces. Second, in the setting of hyperbolic surfaces, we study a certain kind of rigidity for maps between different Teichmüller spaces of finite-type hyperbolic surfaces. We will classify most of the possible cases of holomorphic isometric submersions between Teichmüller spaces of infinite-type and begin exploration in the case of infinite-type.

Mark's advisor is Lizhen Ji.

Join Zoom Meeting  
https://umich.zoom.us/j/94865577229
Applied Interdisciplinary Mathematics (AIM)
Friday, February 05, 2021, 3:00pm-4:00pm
(Zoom) East Hall
Dominic Vella (University of Oxford)
Buffering by buckling: New wrinkles on Gauss' Pizza Theorem

The deformations of thin elastic objects are familiar from everyday life, from a piece of paper or clothes crumpling, to vibrations of bridges and other structures. A guiding principle of such deformations is that the material chooses to bend, rather than change its length, whenever possible. I will describe some of the consequences of this desire to avoid stretching and Gauss’ Remarkable Theorem, which include everyday examples like the geometrical rigidification of pizza slices by curving the crust. However, I will show that these consequences can be subverted by buckling instabilities such as wrinkling. Finally, I will talk about how fast these deformations happen.

Student Algebraic Geometry
Friday, February 05, 2021, 3:00pm-4:00pm
Devlin Mallory (UM)
Rational curves on algebraic varieties

The study of rational curves on a variety is a powerful tool to study the variety itself, and provides examples of many of the more abstract tools of algebraic geometry (e.g., cohomology, deformation theory, moduli spaces, and so on). In this talk, I’ll give an elementary introduction to the study of rational curves on varieties: when do they exist, how do they fit together into “families”, and what does this tell us about the variety? The focus will be on examples and ideas rather than technical details, and should be accessible to anyone who’s taken a first course in algebraic geometry. There will also be some cool Desmos graphs to help make things concrete!

Preprint Algebraic Geometry
Friday, February 05, 2021, 4:00pm-5:30pm
East Hall
James Hotchkiss ()

de Jong: The period-index problem for the Brauer group of an algebraic surface (part I)