<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday, October 19, 2020</strong></td>
<td></td>
<td><strong>11:00am-11:50am</strong> <strong>Student Analysis</strong> -- () <strong>Zoom Social Hour!</strong> -- Virtual East Hall</td>
</tr>
<tr>
<td></td>
<td><strong>3:00pm-4:00pm</strong></td>
<td><strong>RTG Seminar on Number Theory</strong> -- Angus Chung (UM) <em>v</em>-adic convergence for exp and log in function fields and applications to <em>v</em>-adic L-values --</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-5:00pm</strong></td>
<td><strong>Algebraic Topology</strong> -- Mike Hill (UCLA) <em>Transchromatic questions in Real bordism</em> -- online Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-5:00pm</strong></td>
<td><strong>Integrable Systems and Random Matrix Theory</strong> -- Thomas Bothner (University of Bristol) <em>A threefold way to integrable probabilistic models</em> -- Zoom Meeting: 9161739235 Passcode: 651935 Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-5:00pm</strong></td>
<td><strong>Special Events</strong> -- Florian Richter (Northwestern) <strong>MIDWEST DYNAMICS AND GROUP ACTIONS SEMINAR: Additive and geometric transversality of fractal sets in the reals and integers</strong> -- Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>7:00pm-8:00pm</strong></td>
<td><strong>Student Math Finance</strong> -- Jingjie Zhang (University of Michigan) <em>Equilibrium concepts for time-inconsistent stopping problems in continuous time</em> -- <a href="https://umich.zoom.us/j/99487325343">https://umich.zoom.us/j/99487325343</a> Virtual</td>
</tr>
<tr>
<td><strong>Tuesday, October 20, 2020</strong></td>
<td></td>
<td><strong>4:00pm-5:00pm</strong> <strong>Colloquium Series</strong> -- Alexander Volberg (Michigan State University) <strong>Metric properties of Banach spaces, Enflo’s problem, Pisier’s inequality and quantum random variables</strong> -- Zoom: 99862364093, Passcode: 391794 East Hall</td>
</tr>
<tr>
<td></td>
<td><strong>5:00pm-6:00pm</strong></td>
<td><strong>Student Combinatorics</strong> -- Shelby Cox (UM) <strong>Tropicalizing Matroids and the Grassmannian</strong> -- Virtual</td>
</tr>
<tr>
<td><strong>Wednesday, October 21, 2020</strong></td>
<td></td>
<td><strong>3:00pm-4:00pm</strong> <strong>Student Dynamics/Geometry Topology</strong> -- Christopher Zhang (University of Michigan) <strong>What is a translation surface?</strong> -- Zoom link: <a href="https://umich.zoom.us/j/94090012548">https://umich.zoom.us/j/94090012548</a> Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-12:00am</strong></td>
<td><strong>Algebraic Geometry</strong> -- Ziquan Yang (Harvard) <strong>A Crystalline Torelli Theorem for Supersingular K3^n-type Varieties</strong> -- Zoom</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-5:00pm</strong></td>
<td><strong>Financial/Actuarial Mathematics</strong> -- Indrajit Mitra (Federal Reserve Bank of Atlanta) <strong>Time-varying Unemployment Benefits</strong> -- Passcode: 790109 <a href="https://umich.zoom.us/j/95407665241">https://umich.zoom.us/j/95407665241</a> Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-5:00pm</strong></td>
<td><strong>MCAIM Colloquium</strong> -- Monica Valluri (UMICH, Dept. Astronomy) <strong>The dynamical inference of the properties of dark matter halos</strong> -- Zoom Meeting ID: 947 2346 1309 . Zoom Link: <a href="https://umich.zoom.us/j/94723461309">https://umich.zoom.us/j/94723461309</a> . Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>7:00pm-8:00pm</strong></td>
<td><strong>Student Arithmetic</strong> -- Jacob Haley (UM) <strong>Introduction to p-adic Symmetric Spaces</strong> -- Virtual</td>
</tr>
<tr>
<td><strong>Thursday, October 22, 2020</strong></td>
<td></td>
<td><strong>4:00pm-5:00pm</strong> <strong>Differential Equations</strong> -- Yu Deng (USC) <strong>Random tensors and application to nonlinear dispersive equations</strong> -- Zoom ID: 983 6567 6067 Virtual</td>
</tr>
<tr>
<td></td>
<td><strong>5:00pm-6:00pm</strong></td>
<td><strong>Student Commutative Algebra</strong> -- Anna Brosowsky (University of Michigan) <strong>Introduction to Strong F-regularity</strong> -- Virtual</td>
</tr>
<tr>
<td><strong>Friday, October 23, 2020</strong></td>
<td></td>
<td><strong>11:00am-11:50am</strong> <strong>Representation Stability</strong> -- Rohit Nagpal (UM) <strong>K-L theory I: K-L polynomials via Hecke algebras</strong> -- Online</td>
</tr>
<tr>
<td></td>
<td><strong>3:00pm-4:00pm</strong></td>
<td><strong>Applied Interdisciplinary Mathematics (AIM)</strong> -- Harm Derksen (Northeastern University) <strong>Algorithms for tensors and their applications</strong> -- (Zoom) East Hall</td>
</tr>
<tr>
<td></td>
<td><strong>3:00pm-4:00pm</strong></td>
<td><strong>Student Algebraic Geometry</strong> -- Will Dana () <strong>Hilbert polynomials and the BKK theorem</strong> -- 3096EH</td>
</tr>
<tr>
<td></td>
<td><strong>4:00pm-5:00pm</strong></td>
<td><strong>Preprint Algebraic Geometry</strong> -- Sanal Shivaprasad () <strong>Non-archimedean integrals as limits of complex integrals</strong> -- Zoom East Hall</td>
</tr>
</tbody>
</table>
Abstracts for the week of October 18th, 2020 - October 24th, 2020

Student Analysis
Monday, October 19, 2020, 11:00am-11:50am
Virtual East Hall

Zoom Social Hour!

Join us for a fun hour of socializing with your graduate student colleagues! This event is open to all grad students regardless of research area. A zoom link will be emailed to the Student Analysis seminar email list. If you are not on our email list but wish to attend, please email Lizbee at elicoll@umich.edu to receive the link.

RTG Seminar on Number Theory
Monday, October 19, 2020, 3:00pm-4:00pm

Angus Chung (UM)

v-adic convergence for exp and log in function fields and applications to v-adic L-values

Classically over the rational numbers, the exponential and logarithm series converge p-adically within some open disc of C_p. For function fields, exponential and logarithm series arise naturally from Drinfeld modules, which are objects constructed by Drinfeld in his thesis to prove the Langlands conjecture for GL_2 over function fields. For a "finite place" v on such a curve, one can ask if the exp and log possess similar v-adic convergence properties. For the most basic case, namely that of the Carlitz module over F_q[T], this question has been long understood. In this talk, we will show the v-adic convergence for Drinfeld-(Hayes) modules on elliptic curves and a certain class of hyperelliptic curves. As an application, we are then able to obtain a formula for the v-adic L-value L_v(1,\Psi) for characters in these cases, analogous to Leopoldt's formula in the number field case.

Algebraic Topology
Monday, October 19, 2020, 4:00pm-5:00pm

Mike Hill (UCLA)

Transchromatic questions in Real bordism

The Real bordism spectrum of Fujii and Landweber has become an indispensable tool in chromatic computations at the prime $2$. In many ways, it behaves just like its non-equivariant counterpart $MU$. In many other ways, it has surprising features that cut against our classical intuition. I'll talk about $MU_(\mathbb{R})$, about some of its quotients, and about some unexpected, transchromatic computations described in joint work with Beaudry, Shi, and Zeng.
Integrable Systems and Random Matrix Theory  
Monday, October 19, 2020, 4:00pm-5:00pm  
Zoom Meeting: 91617339235       Passcode: 651935 Virtual  
Thomas Bothner (University of Bristol)  
A threefold way to integrable probabilistic models

This talk is intended for a broad math and physics audience in particular including students. It will focus on the speaker's recent contributions to the analysis of the real Ginibre ensemble consisting of square real matrices whose entries are i.i.d. standard normal random variables. In sharp contrast to the complex and quaternion Ginibre ensemble, real eigenvalues in the real Ginibre ensemble attain positive likelihood. In turn, the spectral radius of a real Ginibre matrix follows a different limiting law for purely real eigenvalues than for non-real ones. We will show that the limiting distribution of the largest real eigenvalue admits a closed form expression in terms of a distinguished solution to an inverse scattering problem for the Zakharov-Shabat system. This system is directly related to several of the most interesting nonlinear evolution equations in 1 + 1 dimensions which are solvable by the inverse scattering method. The results of this talk are based on our joint work with Jinho Baik (arXiv:1808.02419 and arXiv:2008.01694).

Special Events  
Monday, October 19, 2020, 4:00pm-5:00pm  
Virtual  
Florian Richter (Northwestern)  
MIDWEST DYNAMICS AND GROUP ACTIONS SEMINAR: Additive and geometric transversality of fractal sets in the reals and integers

Using the language of fractal geometry and dynamical systems, Furstenberg proposed a series of conjectures in the 1960s that explore the relationship between digit expansions of real numbers in distinct prime bases. While his famous $x^2 \times 3$ conjecture remains open, recent solutions to some of his "transversality conjectures" have shed new light on old problems. In this talk we explore analogues of results surrounding Furstenberg's conjectures in the discrete setting of the integers, with the aim of understanding the independence of sets of integers that are structured with respect to different prime bases. This is based on joint work with Daniel Glasscock and Joel Moreira.

Zoom link: https://iu.zoom.us/j/661711533?pwd=RTFVTjMrQ1pYTCtIZzIvVGVVvODV2QT09 password is 076877 if needed.
Student Math Finance
Monday, October 19, 2020, 7:00pm-8:00pm
https://umich.zoom.us/j/99487325343 Virtual
Jingjie Zhang (University of Michigan)

*Equilibrium concepts for time-inconsistent stopping problems in continuous time*

A new notion of equilibrium, which we call strong equilibrium, is introduced for time-inconsistent stopping problems in continuous time. Compared to the existing notions introduced in Time-Consistent Stopping Under Decreasing Impatience and On Finding Equilibrium Stopping Times for Time-Inconsistent Markovian Problems, which in this paper are called mild equilibrium and weak equilibrium respectively, a strong equilibrium captures the idea of subgame perfect Nash equilibrium more accurately. When the state process is a continuous-time Markov chain and the discount function is log sub-additive, we show that an optimal mild equilibrium is always a strong equilibrium. Moreover, we provide a new iteration method that can directly construct an optimal mild equilibrium and thus also prove its existence.

Colloquium Series
Tuesday, October 20, 2020, 4:00pm-5:00pm
Zoom: 99862364093, Passcode: 391794 East Hall
Alexander Volberg (Michigan State University)

*Metric properties of Banach spaces, Enflo's problem, Pisier's inequality and quantum random variables*

A nonlinear analogue of the Rademacher type of a Banach space was introduced in classical work of Enflo. The key feature of Enflo type is that its definition uses only the metric structure of the Banach space, while the definition of Rademacher type relies on its linear structure.

In the joint paper with Paata Ivanisvili and Ramon Van Handel we prove that Rademacher type and Enflo type coincide, settling a long-standing open problem in Banach space theory. The proof is based on a novel dimension-free analogue of Pisier's inequality on the discrete cube, which, in its turn, is based on a certain formula that we used before in improving the constants in scalar Poincare inequality on Hamming cube. I will also show several extensions of Pisier's inequality with ultimate assumptions on a Banach space structure.

Some of our results use approach via quantum random variables.

Zoom Link: https://msu.zoom.us/j/99862364093
Passcode: 391794
Student Combinatorics
Tuesday, October 20, 2020, 5:00pm-6:00pm
Virtual
Shelby Cox (UM)
Tropicalizing Matroids and the Grassmannian

The intention of this talk is a very brief introduction to tropical geometry, focused on exploring the tropicalization of matroids and the Grassmannian. We will begin by reviewing several definitions of matroids and some key matroid examples. We will then move on to valuations and defining tropicalization for polynomials and matroids and I will mention some cool facts about tropical hypersurfaces. Lastly, we will describe the tropical Grassmannian Gr(2,m) as parameterizing some familiar combinatorial objects.

Student Dynamics/Geometry Topology
Wednesday, October 21, 2020, 3:00pm-4:00pm
Zoom link: https://umich.zoom.us/j/94090012548 Virtual
Christopher Zhang (University of Michigan)
What is a translation surface?

We define a translation surface and explain its relations to many fields of math such as Riemann surfaces, negatively curved geometry, measured foliations, and billiards. There will be a short crafts project that you can follow along with using just paper and scotch tape.
In 1983, Ogus proved that a supersingular K3 surface in characteristic at least 5 is determined up to isomorphism by the Frobenius action and the Poincare pairing on its second crystalline cohomology. This is an analogue of the classical Torelli theorem for K3's, due to Shapiro and Shafarevich, which says that a complex algebraic K3 surface is determined up to isomorphism by the Hodge structure and the Poincare pairing on its second singular cohomology. I will explain how to re-interpret Ogus' theorem from a motivic point of view and generalize the stronger form of the theorem to a class of higher dimensional analogues of K3 surfaces, called K3^[n]-type varieties. This is also an analogue of Verbitsky's global Torelli theorem for general irreducible symplectic manifolds. A new feature in Verbitsky's theorem, which did not appear in the classical Torelli theorem for K3's, is the notion of "parallel transport operators". I will explain how to work with this notion in an arithmetic setting.

As an application, I will also present a similar crystalline Torelli theorem for supersingular cubic fourfolds, the Hodge theoretic counterpart of which is a theorem of Voisin.

---

We analyze the benefit of varying the amount of unemployment insurance (UI) over the business cycle in a model featuring optimal job-search effort by unemployed workers. In our model, increasing UI benefits reduces the incentive to search for a job, but has the benefit of smoothing consumption of unemployed workers. Our calibrated model predicts that a policy which commits to increasing UI benefits when the unemployment rate increases reduces the welfare of almost all individuals. Our result overturns the partial equilibrium result in the existing literature because in the general equilibrium, a countercyclical UI benefit policy leads to lower labor supply, output, and consumption.

Joint work with Erhan Bayraktar and Jingjie Zhang.
MCAIM Colloquium  
Wednesday, October 21, 2020, 4:00pm-5:00pm  
Zoom Meeting ID: 947 2346 1309. Zoom Link: https://umich.zoom.us/j/94723461309. Virtual  
Monica Valluri (UMICH, Dept. Astronomy)  
The dynamical inference of the properties of dark matter halos

Dark Matter is thought to constitute about 85% of the matter in the Universe. The inference of its properties is largely based on astronomical observations of normal matter (stars and gas) in the outskirts of galaxies and on comparisons of observations with cosmological simulations. I will give a brief overview of the astrophysical evidence for dark matter on various scales. I will then describe what cosmological simulations predict regarding the properties of the dark matter halos that galaxies are embedded in. Finally, I will describe the dynamical modeling and simulation methods that are being used to model the 3-dimensional motions of stars in order to characterize the properties of the Milky Way's dark matter halo.

Zoom Link: Join Zoom Meeting:  
https://umich.zoom.us/j/94723461309

Meeting ID: 947 2346 1309  
Passcode: 618309

Student Arithmetic  
Wednesday, October 21, 2020, 7:00pm-8:00pm  
Virtual  
Jacob Haley (UM)  
Introduction to p-adic Symmetric Spaces

A p-adic symmetric space is a variety which emerges from a p-adic algebraic group equipped with an involution. In this talk, we will look at some basic examples and properties of p-adic symmetric spaces. In particular, I will try to convince you that many properties and results in the group setting have analogues in the symmetric space setting which allow one to recover the original result, and I will briefly discuss a result of Hakim and Murnaghan which uses symmetric spaces to prove a result about representations of p-adic groups.
Differential Equations
Thursday, October 22, 2020, 4:00pm-5:00pm
Zoom ID: 983 6567 6067 Virtual
Yu Deng (USC)
Random tensors and application to nonlinear dispersive equations

We discuss recent progress on random data problems for nonlinear Schrodinger equations. In joint works with Andrea R. Nahmod and Haitian Yue, we develop the theory of random tensors and prove almost-sure local well-posedness in the optimal ("probabilistic subcritical") range of regularity. This can be viewed as the dispersive counterpart of the parabolic theories like the regularity structures theory. We also prove invariance of Gibbs measure for the 2D nonlinear Schrodinger equation with any power nonlinearity, solving a major open problem since Bourgain's famous 1996 paper.

Join Zoom Meeting
https://umich.zoom.us/j/98365676067
Meeting ID: 983 6567 6067
Passcode: 2020

Student Commutative Algebra
Thursday, October 22, 2020, 5:00pm-6:00pm
Virtual
Anna Brosowsky (University of Michigan)
Introduction to Strong F-regularity

This talk will present an introductory overview of strong F-regularity. We will review all necessary definitions, while providing motivation by stating some theorems relating the Frobenius and strong F-regularity to other properties you may have heard of. We will also get our hands dirty by looking at some examples and proofs of easy facts. This talk should be accessible to anyone currently taking Math 614.

The link for the seminar meeting is here: https://umich.zoom.us/j/99835724541

Representation Stability
Friday, October 23, 2020, 11:00am-11:50am
Online
Rohit Nagpal (UM)
K-L theory I: K-L polynomials via Hecke algebras
Tensors are multi-dimensional arrays and are ubiquitous in data applications. Some interesting challenges arise, such as estimating missing entries (tensor completion), denoising and decomposing a tensor as a sum of a small number of rank 1 tensors. I will also discuss my collaboration with the Biomedical & Clinical Informatics Lab at the University of Michigan on medical applications of tensors.

If we have a generic system of $n$ polynomial equations in $n$ variables, Bezout's theorem states that the number of solutions is the product of their degrees. However, sometimes polynomials aren't actually generic, and it's natural to ask if we can make Bezout's theorem more precise when there are restrictions on which polynomials can show up. The Bernstein-Kuchnirenko-Khovanskii (BKK) theorem provides a beautiful answer to one version of this question, showing that when we require our polynomials to be built out of specific monomials, the number of solutions relates to volumes of polytopes.

In this talk, we'll see a simple proof of a special case of the theorem using Hilbert polynomials. As time permits, we'll sketch out the general case, highlighting connections to toric varieties. This talk should be accessible to students in Math 631.

Non-archimedean integrals as limits of complex integrals