

Fall 2008
University of Michigan-Department of Mathematics
<http://www.math.lsa.umich.edu/seminars/index.shtml>
Ann Arbor, MI 48109-1043

November 10th – November 16th

Monday, November 10

- 3:10-4:00pm **Topics in Algebraic Geometry Seminar** --- Paul Johnson (UM) *Connectedness of the Hurwitz Scheme* --- 2866 EH
- 3:10-5:00pm **Group Theory/Lie Theory/Number Theory Seminar** --- Kai-Wen Lan (Princeton) *Extensions over Toroidal Boundaries of Shimura Varieties* --- 4096 EH
- 4:10-5:00pm **Several Complex Variables and Complex Dynamics Seminar** --- TBA --- 3096 EH
- 4:10-5:00pm **Student Combinatorics** --- Kelli Talaska (UM) *An introduction to cluster algebras* --- 3866 EH
- 5:15-6:30pm **Teaching Mathematics** --- Not meeting this week --- 3096 EH

Tuesday, November 11

- 2:10-3:00pm **"What is ... " Seminar** --- Not meeting this week --- 3096 EH
- 3:10-4:00pm **Geometry Seminar** --- Xiaodong Cao (Cornell) *New Differential Harnack Inequalities in the Ricci Flow* --- 4096 EH
- 3:10-4:00pm **Algebra Seminar** --- TBA --- 3096 EH
- 3:10-4:00pm **Student Algebraic Geometry Seminar** --- TBA --- 3088 EH
- 4:10-5:00pm **Colloquium** --- Not meeting this week --- 1360 EH
- 4:10-5:00pm **Student AIM Seminar** --- TBA --- 3088 EH

Wednesday, November 12

- 3:10-4:00pm **Geometric Function Theory Seminar** --- Roman Vershynin (UM) *Concentration of measure* --- 4096 EH
- 3:10-4:00pm **Student Representation Theory Seminar** --- Harlan Kadish (UM) *Reynolds Rap* --- 3096 EH
- 3:10-4:00pm **Student Arithmetic Seminar** --- TBA --- 3866 EH
- 3:10-4:00pm **Commutative Algebra Seminar** --- Sean Sather-Wagstaff (North Dakota State U) *Gorenstein presentations and semidualizing modules* --- 3096 EH
- 4:10-5:00pm **RTG Working Seminar in Several Complex Variables and Complex Dynamics** --- Chris Hammond (UM) *Complex Affinely Homogeneous Real Hypersurfaces in $\mathbb{C}P^2$* --- 3096 EH
- 4:10-6:00pm **Algebraic Geometry Seminar** --- Lawrence Ein (UIC, visiting UM) *Extension theorems* --- 3088 EH

Thursday, November 13

- 3:10-4:00pm **Commutative Algebra Seminar** --- Sean Sather-Wagstaff (North Dakota State U) *Gorenstein presentations and semidualizing modules* --- 3096 EH
- 3:10-4:00pm **Financial/Actuarial Mathematics Seminar** --- TBA --- 3088 EH
- 3:10-4:00pm **Topology Seminar** --- Emmanuel Breuillard (Polytechnique) *A strong Tits alternative and arithmetic heights on character varieties* --- 4096 EH
- 4:10-5:00pm **Differential Equations** --- Jeffrey Rauch (UM) *Dispersive Stabilization* --- 4088 EH
- 4:10-5:00pm **Math Club** --- Benjamin Weiss (UM) *Random Walks* --- 2nd floor Nesbitt Common Room
- 4:10-5:00pm **Reading Group in Probabilistic Methods in Geometric Functional Analysis and Combinatorics** --- 3096 EH
- 4:10-6:00pm **RTG Study Seminar** --- Moon Duchin (UM) *Bonahon's theory of geodesic currents* --- 3866 EH
- 4:10-6:00pm **Geometry and Physics Seminar** --- Stefano Vidussi (UC-Riverside) *Twisted Alexander polynomials and fibered 3-manifolds* --- 4096 EH

Friday, November 14

- 11:10-12:00pm **Theoretical Computer Science Seminar** --- Ran Duan (UM) *Market Equilibrium via a Primal-Dual Algorithm for a Convex Program* --- CSE 3941
- 3:10-4:00pm **Applied and Interdisciplinary Mathematics Seminar** --- Ralf Wittenberg (Simon Fraser University) *Spatiotemporal Chaos with Strong Scale Separation* --- 1084 EH
- 3:10-4:00pm **Student Geometry/Topology** --- Paul Johnson (UM) *The Holonomy Groupoid* --- 3096 EH
- 4:10-5:00pm **Combinatorics** --- Luis Serrano (UM) *The shifted plactic monoid* --- 3866 EH

UPCOMING EVENTS

Mathematica 6 in Education and Research
Tuesday, November 18, 2:30-4:00pm
4088 EH

Presented by: Josh Lietz (Wolfram Research)

This talk illustrates capabilities in Mathematica 6 that are directly applicable for use in teaching and research on campus. Topics of this technical talk include:

- * 2D and 3D visualization
- * Dynamic interactivity
- * On-demand scientific data
- * Example-driven course materials
- * Symbolic interface construction
- * Practical and theoretical applications

Current users will benefit from seeing the many improvements and new features of Mathematica 6 (<http://www.wolfram.com/mathematica/newin6>), but prior knowledge of Mathematica is not required.

Ziwet Lecture Series (I, II, III)
Tuesday-Thursday, November 18-20
Speaker: Ioannis Karatzas (Columbia University)

Ziwet Lectures I (Colloquim)
Tuesday, November 18, 4:10-5:00pm
1360 EH
Stochastic Portfolio Optimization

Ziwet Lectures II
Wednesday, November 19, 3:10-4:00pm
3088 EH
Aspects of Stochastic Portfolio Theory

Ziwet Lectures III
Thursday, November 20, 3:10-4:00pm
3088 EH
Optimal Arbitrage

ABSTRACTS FOR THE WEEK OF NOV. 10 – NOV. 16, 2008

Group Theory/Lie Theory/Number Theory Seminar
Monday, November 10, 3:10-5:00pm
4096 EH
Kai-Wen Lan (Princeton)
Extensions over Toroidal Boundaries of Shimura Varieties

We will explain how to construct systematically "good" extensions of objects such as automorphic bundles, products of universal families, Hecke correspondences, etc over the boundaries of toroidal compactifications of smooth integral models of PEL-type Shimura varieties.

Student Combinatorics
Monday, November 10, 4:10-5:00pm
3866 EH
Kelli Talaska (UM)
An introduction to cluster algebras

This talk will be a gentle introduction to cluster algebras. Roughly following notes of Fomin and Zelevinsky, we will use several examples to understand the basic definitions and some important properties of cluster algebras.

Geometry Seminar
Tuesday, November 11, 3:10-4:00pm
4096 EH
Xiaodong Cao (Cornell)
New Differential Harnack Inequalities in the Ricci Flow

In this talk, we will talk about differential Harnack inequalities (also known as Li-Yau estimates) for geometric flows. In particular, we will discuss some new Harnack inequalities for the conjugate heat equation and forward conjugate heat equation under the Ricci flow.

Geometric Function Theory Seminar
Wednesday, November 12, 3:10-4:00pm
4096 EH
Roman Vershynin (UM)
Concentration of measure

This is a survey talk on the theory of concentration of measure and its connections to isoperimetric problems in geometry, analytic methods, deviation inequalities in probability theory, and applications in convex geometry and functional analysis.

Student Representation Theory Seminar
Wednesday, November 12, 3:10-4:00pm
3096 EH
Harlan Kadish (UM)
Reynolds Rap

Let G be an algebraic group (e.g. matrix group) acting on a vector space V . The Reynolds operator plays a central role in the study of the G -invariant subspace of V , for the operator provides a G -equivariant projection onto that subspace. We will construct the Reynolds operator for finite groups, tori, and the general and special linear groups. We will then outline an algorithm for constructing the Reynolds operator for any semisimple algebraic group. Only basic algebra is required. Actual rapping is unlikely.

Commutative Algebra Seminar
Wednesday, November 12, 3:10-4:00pm
3096 EH
Sean Sather-Wagstaff (North Dakota State U)
Gorenstein presentations and semidualizing modules

A famous result of Foxby, Reiten and Sharp says that a Cohen-Macaulay local ring admits a dualizing module if and only if it is a homomorphic image of a Gorenstein ring. We augment this result by showing that such a ring admits a nontrivial semidualizing module if and only if it admits a Gorenstein presentation Q/I such that the ideal I has a nontrivial decomposition. This is joint work with David Jorgensen and Graham Leuschke.

RTG Working Seminar in Several Complex Variables and Complex Dynamics
Wednesday, November 12, 4:10-5:00pm
3096 EH
Chris Hammond (UM)
Complex Affinely Homogeneous Real Hypersurfaces in \mathbb{C}^2

Given a Lie group G acting on a manifold M , one would like to classify all submanifolds L of a fixed dimension on which the action is transitive, e.g., what are the hypersurfaces for which the action is transitive. We will discuss a procedure developed by Doubrov, et al. for solving this problem. We will try to use it to find the real hypersurfaces in \mathbb{C}^2 on which the group of complex affine transformations acts transitively.

Differential Equations
Thursday, November 13, 4:10-5:00pm
4088 EH
Jeffrey Rauch (UM)
Dispersive Stabilization

Quasilinear first order systems of partial differential operators defining ill posed initial value problems may be stabilized, that is turned into well posed initial value problems, by adding **nonscalar** dispersive terms of Schrödinger type. In nonlinear optics such equations describe common instabilities. The stabilization is related to Turing's instability where stable equilibria can be destabilized by the addition of a nonscalar diffusive term. Research with Guy Metivier.

Math Club
Thursday, November 13, 4:10-5:00pm
2nd floor Nesbitt Common Room
Benjamin Weiss (UM)
Random Walks

Say you start walking from your home, but instead of walking in a straight line, you flip a coin at every corner to decide which way to go. Will you ever get home again? Will you ever get other places you wish to go? How long will it take to get there? We'll discuss the mathematics of randomly walking through towns.

Geometry and Physics Seminar
Thursday, November 13, 4:10-6:00pm
4096 EH
Stefano Vidussi (UC-Riverside)
Twisted Alexander polynomials and fibered 3-manifolds

We will show that twisted Alexander polynomials determine whether a 3-manifold N admits a fibration. As a corollary of this, we will show that if a product manifold of the form $S^1 \times N$ admits a symplectic structure, N fibers over the circle. (Joint work with Stefan Friedl).

Applied and Interdisciplinary Mathematics Seminar
Friday, November 14, 3:10-4:00pm
1084 EH
Ralf Wittenberg (Simon Fraser University)
Spatiotemporal Chaos with Strong Scale Separation

Numerous physical, chemical and biological systems display the phenomenon of pattern formation: as a control parameter passes a critical value, a spatially uniform equilibrium becomes unstable to a stable nonuniform, finite-wavelength pattern. The scaling and stability of these patterned solutions beyond the instability threshold is by now well-understood via the Ginzburg-Landau partial differential equation, which describes modulations of the pattern (in one space dimension).

I will discuss the profound effects of an additional continuous symmetry on pattern formation by describing recent results on the Nikolaevskiy equation, a paradigmatic (6th-order) PDE model for short-wave pattern formation with Galilean invariance. In this case, all periodic steady states are unstable beyond the instability threshold, and one observes a direct transition from spatial homogeneity to spatiotemporal chaos with strong scale separation. The asymptotically consistent modulation equation description associated to this PDE, proposed by Matthews and Cox, predicts scaling different from the usual Ginzburg-Landau scaling. I will present some of the novel dynamical and statistical behaviors of these PDE models. These include anomalous scaling of the large-scale mode inconsistent with the Matthews-Cox prediction (but captured by higher-order corrections to the amplitude equations), localized coexistence of ordered and chaotic states, coarsening to domain size-dependent fronts, and stabilization of Burgers-like fronts by spatiotemporal chaos.

Student Geometry/Topology
Friday, November 14, 3:10-4:00pm
3096 EH
Paul Johnson (UM)
The Holonomy Groupoid

We pick up the foliation theme of Nina and Michelle from another direction. Given a foliation, an obvious thing to consider is the space of leaves. We might have hoped for this space to have some nice structure, but in fact it can be horribly behaved: the space of a leaves of an irrational foliation on the torus is an uncountable set with the concrete topology. The holonomy groupoid is a way to study the space of leaves that keeps more structure. Most of the work will go into explaining and motivating the definition, but with luck we will explain why the Reeb foliation cannot be real analytic, and how this story leads to noncommutative geometry.

Combinatorics
Friday, November 14, 4:10-5:00pm
3866 EH
Luis Serrano (UM)
The shifted plactic monoid

We introduce a shifted analog of the plactic monoid of Lascoux and Schützenberger, the *shifted plactic monoid*. It can be defined in two different ways: via the *shifted Knuth relations*, or using Haiman's mixed insertion.

Applications include: a new combinatorial derivation (and a new version of) the shifted Littlewood-Richardson Rule; similar results for the coefficients in the Schur expansion of a Schur P-function; and a shifted counterpart of the theory of noncommutative Schur functions in plactic variables.