Winter 2007
University of Michigan-Department of Mathematics
http://www.math.lsa.umich.edu/seminars/index.shtml
Ann Arbor, MI 48109-1043
January 15th – January 21st

Monday, January 15

3:10-4:00pm **Topics in Algebraic Geometry Seminar** --- Not meeting this week --- 3866 EH
3:10-4:30pm **Arithmetic/Number Theory Seminar** --- Not meeting this week --- 4096 EH
4:00-5:00pm **Marjorie Lee Brown Colloquium** – William A. Massey (Princeton) *The Legacy of the Black Scientific Renaissance at Bell Laboratories in the 70's, 80's and 90's* --- 1360 EH
4:10-6:00pm **Group Theory/Lie Theory Seminar** --- Not meeting this week --- 4088 EH

Tuesday, January 16

12:10-1:00pm **Student Algebraic Geometry Seminar** --- Rob Easton (UM) *Branched Group Covers and their Applications* --- 3088 EH
2:10-3:00pm "**What is … " Seminar** --- Ralf Spatzier (UM) *What is … Anosov System?* --- 3096 EH
2:10-4:00pm **Geometry & Physics (Non-Standard Day, Time & Room)** --- James Sparks (Harvard) *Sasaki-Einstein geometry* --- 2866 EH
3:10-4:00pm **Geometry Seminar** --- Not meeting this week --- 4088 EH
3:10-4:00pm **Algebra Seminar** --- Not meeting this week --- 3096 EH
4:10-5:00pm **Colloquium** --- Yongbin Ruan (UM) *Search the quantum symmetry in topology* --- 1360 EH

Wednesday, January 17

3:10-4:00pm **Student Arithmetic Seminar** --- Hester Graves (UM) *Euclidean Ideal Classes* --- 3866 EH
3:10-4:00pm **Student AIM Seminar** --- Brian Jennings (UM) TBA --- 3096 EH
3:10-5:00pm **Geometric Function Theory Seminar** --- Not meeting this week --- 4096 EH
4:10-5:00pm **Several Complex Variables Seminar (Non-Standard Day & Room)** --- Kyounghee Kim (Florida State U) *Dynamics of Rational Surface Automorphisms* --- 4088 EH
4:10-5:00pm **Student Analysis Seminar** --- Not meeting this week --- 3866 EH
4:10-5:30pm **Working Seminar in Several Complex Variables and Complex Dynamics** --- Not meeting this week ---4088 EH
4:10-6:00pm **Algebraic Geometry Seminar** --- Robert Easton (Stanford) *Branched group covers of surfaces and their applications* --- 3088 EH

Thursday, January 18

3:10-4:00pm **Commutative Algebra Seminar** --- Not meeting this week --- 3096 EH
3:10-4:00pm **Financial/Actuarial Mathematics Seminar** --- Not meeting this week --- 3088 EH
3:10-4:00pm **Topology Seminar** --- Not meeting this week --- 4096 EH
3:10-5:00pm **Study Seminar** --- Mario Bonk (UM) *Manifolds that are homeomorphic, but not diffeomorphic* --- 2866 EH
4:10-5:00pm **Differential Equations** --- Joel Smoller (UM) *Finite Mass Cosmology and Inflation* --- 4096 EH
4:10-5:00pm **Math Club** --- Marty Weissman (U of CA at Santa Cruz) *Describing Real Numbers* --- 2nd Floor Nesbitt Room
4:10-5:30pm **Logic Seminar** --- Not meeting this week --- 3096 EH
4:30-5:30pm **Theoretical Computer Science Seminar** --- Multiple Speakers (UM) *5-minute intro talks* --- CSE 3941
5:10-6:00pm **Student Combinatorics** --- Florian Block (UM) *Oriented Matroids, Bergman Complexes and Nested Sets* --- 3866 EH
5:15-6:30pm **Teaching Mathematics** --- Not meeting this week --- 3088 EH

Friday, January 19

2:30-4:00pm **Birational Geometry Reading Seminar** --- *Reading seminar on the paper of Birkar, Cascini, Hacon and McKernan on the finite generation of the canonical ring* --- 3866 EH

3:10-4:00pm **Applied and Interdisciplinary Mathematics Seminar** --- Jorge Balbas (UM) *Central Schemes for Shallow Water Flows along Channels with Irregular Geometry* ---1084 EH

3:10-4:00pm **Student Geometry/Topology** --- Jose Manuel Gomez-Guerra (UM) *An introduction to operads* --- 3096 EH

4:10-5:00pm **Combinatorics** --- John Stembridge (UM) *Irreducible circuits and Coxeter arrangements* --- 3866 EH

EVENTS THIS WEEK:

Dr. Marjorie Lee Browne Colloquium
As part of the University of Michigan's Rev. Dr. Martin Luther King, Jr. Symposium
Monday, January 15, 4:00-5:00 pm
1360 EH
William Massey (Princeton)
The Legacy of the Black Scientific Renaissance at Bell Laboratories in the 70's, 80's and 90's

An inventor of the modern-day microphone.
A founder of Silicon Graphics, Inc.
A President of Rensselaer Polytechnic Institute.
A Chair of the Mechanical Engineering Department of Cornell University.
A winner of "The Apprentice."
What do these people have in common?

The three decades of the 1970's, 1980's and 1990's at Bell Laboratories were to Black scientists what the Harlem Renaissance of the 1920's was to Black artists. This was a time when Bell Labs had attained a critical mass of Black researchers in the engineering, mathematical and physical sciences. Many of these individuals made significant contributions as scientists. They also acquired major technical leadership roles in the fields of science, business and education. Most important however, was that they leveraged the success in their scientific fields to open up opportunities for the next generation of Black scientists. This will be a discussion of who some of these people are, the significance of their technical research and the lasting impact of their mentorship on the next generation of Black scientists.

UPCOMING EVENTS:

Graduate Program Recruiting Weekend
March 9th & 10th

ABSTRACTS FOR THE WEEK OF JAN. 15 – JAN. 21, 2007

Geometry & Physics (Non-Standard Day, Time & Room)
Tuesday, January 16, 2:10-4:00pm
2866 EH
James Sparks (Harvard)
Sasaki-Einstein geometry

Sasakian geometry is the odd-dimensional, and less well-known, cousin of Kahler geometry. An important conjecture in string theory, known as the AdS/CFT correspondence, relates Sasaki-Einstein geometry to superconformal field theory; this has led to new interest, and some remarkable new results, in Sasakian geometry. In this talk I shall summarise some of my results in geometrical terms: constructions of infinite families of so-called irregular and quasi-regular Sasaki-Einstein manifolds; toric Sasakian geometry; a variational problem that determines the characteristic vector field for, and in particular the volume of, a Sasaki-Einstein manifold; and finally, obstructions to the existence of Sasaki-Einstein metrics. Some of these results also provide new insights into Kahler geometry, and in particular new obstructions to the existence of Kahler-Einstein metrics on Fano orbifolds.

Colloquium
Tuesday, January 16, 4:10-5:00
1360 EH
Yongbin Ruan (UM)
Search the quantum symmetry in topology

There are many examples where the mathematics from the same root seems to be far apart from each other. I will illustrate such a phenomenon using three examples: flop, McKay correspondence and singularities/Calabi-Yau correspondence. On the other hand, there is a general principal from physics that the quantum world should be more uniform than classical world. It surjects that they may be connected after a quantization process. In the talk, I will demonstrate such a "quantum symmetry" for quantum cohomology.

Several Complex Variables Seminar (Non-Standard Day & Room)
Wednesday, January 17, 4:10-5:00pm
4088 EH
Kyounghee Kim (Florida State U)
Dynamics of Rational Surface Automorphisms

We discuss a family of holomorphic automorphisms of a rational surface with positive entropy. We describe in detail which of these automorphisms have invariant curves; and we show that some do not. For those with invariant curves, we have a dichotomy: either (i) a mapping has a rotation domain centered at a fixed point or (ii) the mapping is real, and its restriction to the real plane has maximal entropy.

Study Seminar
Thursday, January 18, 3:10-5:00pm
2866 EH
Mario Bonk (UM)
Manifolds that are homeomorphic, but not diffeomorphic

In a landmark paper published in 1956, John Milnor proved that there are smooth manifolds homeomorphic to the 7-sphere that are not diffeomorphic. This work would later earn Milnor the Fields Medal. In the Study Seminar a sequence of lectures will be devoted to understanding Milnor's work. An introduction into relevant topics such as vector bundles, connections, characteristic classes, and Morse theory will be given. The talks will be accessible to everyone with a basic knowledge of the theory of manifolds.

Differential Equations
Thursday, January 18, 4:10-5:00pm
4096 EH
Joel Smoller (UM)
Finite Mass Cosmology and Inflation

Inflation is an epoch of explosive increase in scale incorporated into the standard model of cosmology due to the physicist Alan Guth. The inflationary universe is a modification of the standard big-bang model motivated by several flaws that emerge when the standard model is extrapolated backwards to very early times. The inflationary model agrees with the standard model after (10)^(-30) seconds after the big-bang so all the successes of the standard model are preserved after this time. The fact that there was a period of rapid expansion early on in the universe is compelling in light of the fact that the microwave background radiation coming from different directions is at the same temperature even though, in the standard model radiation from opposite directions was some seventy or more horizon distances (1 horizon distance=distance light traveled since the big-bang) apart at the time the radiation was emitted. We consider how the finite mass shock wave cosmology introduced by Temple and Smoller could connect up with Guth's original theory of inflation.

Math Club
Thursday, January 18, 4:10-5:00pm
2nd Floor Nesbitt Room
Marty Weissman (U of CA at Santa Cruz)
Describing Real Numbers

Unfortunately, there are far more real numbers than ways of describing them. Even worse, there are far, far more sets of real numbers than ways of describing them. So should we care about indescribable numbers?
We will approach real numbers from a constructivist point of view. Can we prove more, if we restrict our attention to describable things? This talk will provide an introduction to work of Tarski, and a recent conjecture of Kontsevich and Zagier.

Student Combinatorics
Thursday, January 18, 5:10-6:00pm
3866 EH
Florian Block (UM)
Oriented Matroids, Bergman Complexes and Nested Sets

Matroids are the underlying structures of many discrete objects (families of hyperplanes, for example). Oriented objects (families of oriented hyperplanes, for example) give rise to oriented matroids. We will define matroids and oriented matroids in detail.
To an (oriented) matroid we can associate several simplizial complexes (order complex, Bergman Komplex). We will look at a triangulation result by Ardila and Klivans (2003) and a generalization of it using nested sets (Feichtner und Sturmfels, 2004) . Using the orientation of a matroid we find positive analogues of these results.

Applied and Interdisciplinary Mathematics Seminar
Friday, January 19, 3:10-4:00pm
1084 EH
Jorge Balbas (UM)
Central Schemes for Shallow Water Flows along Channels with Irregular Geometry

We present a new high-resolution, non-oscillatory semi-discrete central scheme for one-dimensional shallow water flows along channels with non-uniform rectangular cross sections and bottom topography. The scheme extends an existing central semi-discrete formulation for hyperbolic conservation laws and it enjoys two properties crucial for the accurate simulation of shallow water flows: it preserves the positivity of the water height, and it is well balanced, {\it i.e.}, the source terms arising from the geometry of the channel are discretized so as to balance the non-linear hyperbolic fluxes --a condition necessary to correctly approximate steady-state solutions. Along with a detailed description of the scheme and its properties, we present several numerical experiments --including the approximation of exact equilibrium solutions-- that demonstrate the robustness --and simplicity-- of the numerical algorithm.

Student Geometry/Topology
Friday, January 19, 3:10-4:00pm
3096 EH
Jose Manuel Gomez-Guerra (UM)
An introduction to operads

The idea of this talk is to give an intoduction of Operads. Basically I will talk about Stasheff's work on A_{\infty} spaces. From that, one can see the motivation behind operads. If time allows, I will explain how these are used in modern algebraic topology.

Combinatorics
Friday, January 19, 4:10-5:00pm
3866 EH
John Stembridge (UM)
Irreducible circuits and Coxeter arrangements

In this talk we will introduce the concept of irreducible circuits. In a (real) vector arrangement A, these are pairs (v,I) such that I is an independent subset of A, v is a vector in A in the positive linear span of I, and no proper subset of I has any member of A-I in its positive linear span. It is not hard to show that the irreducible circuits of any centrally symmetric vector arrangement determine the associated oriented matroid, and in many cases of interest, in a more efficient and useful way. The latter point will be illustrated by the classification of irreducible circuits in root systems.