

Winter 2008
University of Michigan-Department of Mathematics
<http://www.math.lsa.umich.edu/seminars/index.shtml>
Ann Arbor, MI 48109-1043
January 7th – January 13th

Monday, January 7

- 3:10-4:00pm **Student Analysis Seminar** --- TBA --- 3866 EH
3:10-4:00pm **Topics in Algebraic Geometry Seminar** --- TBA --- 2866 EH
3:10-5:00pm **Number Theory and Representation Theory Seminar** --- Jon Hanke (Duke)
Representing integers by ternary quadratic forms --- 4096 EH
4:10-5:00pm **Several Complex Variables Seminar** --- Han Peters (U of Wisconsin) *Time averages of polynomials* --- 3096 EH
4:10-6:00pm **Geometry & Physics** --- TBA --- 4088 EH
5:15-6:30pm **Teaching Mathematics** --- TBA --- 3088 EH

Tuesday, January 8

- 2:10-3:00pm **"What is ... " Seminar** --- TBA --- 3096 EH
3:10-4:00pm **Geometry Seminar** --- Organizational Meeting --- 4088 EH
3:10-4:00pm **Algebra Seminar** --- TBA --- 3088 EH
3:10-4:00pm **Student Algebraic Geometry Seminar** --- Organizational Meeting --- 3088 EH
3:10-4:00pm **Student Representation Theory/Lie Theory Seminar** --- TBA --- 4096 EH
4:10-5:00pm **Colloquium** --- TBA --- 1360 EH

Wednesday, January 9

- 3:10-4:00pm **Geometric Function Theory Seminar** --- TBA --- 4096 EH
3:10-4:00pm **Student Arithmetic Seminar** --- TBA --- 3866 EH
3:10-4:00pm **Student AIM Seminar** --- Organizational Meeting --- Room TBA
4:10-5:30pm **Working Seminar in Several Complex Variables and Complex Dynamics** --- Han Peters (U of Wisconsin) *Iterated monodromy groups and time averages* --- 4088 EH
4:10-6:00pm **Algebraic Geometry Seminar** --- TBA --- 3088 EH

Thursday, January 10

- 2:10-3:00pm **Topology Seminar (Special Seminar)** --- Wee Liang Gan (U of CA at Riverside) --- *Koszul duality for dioperads* --- 3096 EH
3:10-4:00pm **Financial/Actuarial Mathematics Seminar** --- Jussi Keppo (UM) *Optimal Consumption and Portfolio Decisions with Partially Observed Real Prices* --- 3088 EH
3:10-4:00pm **Commutative Algebra Seminar** --- Mel Hochster (UM) *Phantom homology* --- 3096 EH
3:10-4:00pm **Topology Seminar** --- Bertrand Guillou (U Chicago) --- *Higher Steinberg Relations* --- 4096 EH
4:10-5:00pm **Differential Equations** --- Joel Smoller (UM) *Nonlinear Dynamical Stability of Rotating White Dwarfs and Supermassive Stars* --- 4088 EH
4:10-5:00pm **Math Club** --- Brian Conrad (UM) *Fermat's Last Theorem and elliptic curves* --- 2nd floor Nesbitt Common Room
4:10-5:00pm **Student Combinatorics** --- Planning and Cookies --- Room TBA

Friday, January 11

- 10:50-12:00pm **EECS Theory Seminar** --- TBA --- CSE 3941
3:10-4:00pm **Applied and Interdisciplinary Mathematics Seminar** --- Paul Federbush (UM) *New Asymptotics for the Dimer Problem* --- 1084 EH
3:10-4:00pm **Student Geometry/Topology** --- TBA --- 3096 EH
4:10-5:00pm **Combinatorics** --- Nantel Bergeron (York) *Combinatorial Hopf algebras and towers of algebras* --- 3866 EH
4:10-5:00pm **Complex Analysis Seminar** --- Not meeting this week --- Room TBA

UPCOMING EVENTS

**Rainich Lecture
Jan. 15-17, 2008
Speaker: Gang Tian**

**Ziwet Lecture
Feb. 5, 2008
Speaker: Curtis McMullen**

ABSTRACTS FOR THE WEEK OF JAN. 7 – JAN. 13, 2008

**Several Complex Variables Seminar
Monday, January 7, 4:10-5:00pm
3096 EH
Han Peters (U of Wisconsin)
*Time averages of polynomials***

I will discuss how the notion of time averages arises from the study of polynomial automorphisms, and prove some results that I did not prove in December.

**Student AIM Seminar
Wednesday, January 9, 3:10-4:00pm
Room TBA
*Organizational Meeting***

At this week's meeting the results of the survey will be announced, and we will solicit people to speak at the seminar's meetings this semester.

**Working Seminar in Several Complex Variables and Complex Dynamics
Wednesday, January 9, 4:10-5:30pm
4088 EH
Han Peters (U of Wisconsin)
*Iterated monodromy groups and time averages***

I will discuss monodromy groups in more detail. In particular I will outline how I hope to prove that a polynomial has a time average near a point z if and only if z lies in a Siegel disc.

Topology Seminar (Special Seminar)
Thursday, January 10, 2:10-3:00pm
3096 EH
Wee Liang Gan (U of CA at Riverside)
Koszul duality for dioperads

The notion of dioperad is intermediate between operad and PROP. I will speak on their theory of Koszul duality and the example of Lie bialgebra dioperad whose Koszul dual is closely related to commutative Frobenius algebras.

Financial/Actuarial Mathematics Seminar
Thursday, January 10, 3:10-4:00pm
3088 EH
Jussi Keppo (UM)
Optimal Consumption and Portfolio Decisions with Partially Observed Real Prices

We consider optimal consumption and portfolio investment problems of an investor who is interested in maximizing his utilities from consumption and terminal wealth subject to a random inflation in the consumption basket price over time. We consider two cases: (i) when the investor observes the basket price and (ii) when he receives only noisy observations on the basket price. We derive the optimal policies and show that a modified Mutual Fund Theorem consisting of three funds holds in both cases. The compositions of the funds in the two cases are the same, but in general the investor's allocations of his wealth into these funds will differ. However, in the particular case when the investor has CRRA utility, his optimal investment allocations into these funds are also the same in both cases. This is joint work with Alain Bensoussan and Suresh Sethi (UT Dallas).

Commutative Algebra Seminar
Thursday, January 10, 3:10-4:00pm
3096 EH
Mel Hochster (UM)
Phantom homology

This is the first of several lectures that will deal with phantom homology. The idea is that one may have a complex such that the cycles are in the tight closure of boundaries. The homology at that spot is said to be "phantom." If one makes a base change to a ring, such as a regular ring, in which submodules are always tightly closed, the image of the homology of the complex vanishes. This technique leads to deep theorems that are difficult or, so far as we know, impossible to prove by other methods.

Familiarity with the basic notions of tight closure theory will be assumed.

Topology Seminar
Thursday, January 10, 3:10-4:00pm
4096 EH
Bertrand Guillou (U Chicago)
Higher Steinberg Relations

We will discuss, following a suggestion of S. Bloch, the construction of certain motives associated to the projective line minus the points 0, 1, and infinity. In the end, this will reduce to the question of producing a cellular approximation of a certain dg-module over a dga, and we will see that the construction of this cell module is controlled by Massey products in the motivic cohomology of the ground field. The vanishing of these Massey products would give higher Steinberg relations in motivic cohomology and algebraic K-theory.

No prior knowledge of the theory of motives will be assumed!

Differential Equations
Thursday, January 10, 4:10-5:00pm
4088 EH
Joel Smoller (UM)
Nonlinear Dynamical Stability of Rotating White Dwarfs and Supermassive Stars

We prove nonlinear stability and existence theorems for rotating star solutions which are axi-symmetric steady-state solutions of the compressible isentropic Euler-Poisson equations in 3 spatial dimensions. We apply our results to rotating and non-rotating white dwarf, and rotating supermassive (extreme relativistic) stars, stars which are in convective equilibrium and have uniform chemical composition. (This is joint work with Tao Luo.)

Math Club
Thursday, January 10, 4:10-5:00pm
2nd floor Nesbitt Common Room
Brian Conrad (UM)
Fermat's Last Theorem and elliptic curves

When Andrew Wiles solved Fermat's Last Theorem (FLT) in 1993, he deduced it from a general theorem that he proved about a class of algebraic curves called elliptic curves. Curiously, there is an entirely different (and more elementary!) way in which elliptic curves relate to FLT, by giving a conceptual explanation for what is going on in Fermat's proof of his "Last Theorem" for exponent 4 (the only case he proved, by clever algebraic manipulations).

We will briefly explain what elliptic curves are (not ellipses!) and where they come from, and then use them to re-interpret some of the early mysterious proofs of special cases of FLT in more conceptual terms.

Applied and Interdisciplinary Mathematics Seminar
Friday, January 11, 3:10-4:00pm
1084 EH
Paul Federbush (UM)
New Asymptotics for the Dimer Problem

The dimer problem arose in a thermodynamic study of diatomic molecules, and was abstracted into one of the most basic and natural problems in both statistical mechanics and combinatoric mathematics. Given a rectangular lattice of volume V in d dimensions, the dimer problem loosely speaking is to count the number of different ways dimers (dominoes) may be layed down on the lattice to completely cover it. It is known that the number of such coverings is roughly $\exp(\lambda_d V)$ for some number λ_d . The first terms in the expansion of λ_d have been known for about thirty years $\lambda_d \sim (1/2)\ln(2d) - 1/2$. We will present a mathematical argument for the next two terms in the expansion to be given as in $\lambda_d \sim (1/2)\ln(2d) - 1/2 + (1/8)/d + (7/48)/d^2$. Although this is an expansion designed for large d , even at $d=2$ it is remarkably accurate, in error by about .3%.

Combinatorics
Friday, January 11, 4:10-5:00pm
3866 EH
Nantel Bergeron (York)
Combinatorial Hopf algebras and towers of algebras

Bergeron and Li have introduced a set of axioms which guarantee that the Grothendieck groups of a tower of algebras can be endowed with the structure of graded dual Hopf algebras. Hivert and Nzeutchap, and independently Lam and Shimozono constructed dual graded graphs from primitive elements in Hopf algebras. In joint work with Thomas Lam and Huilan Li, we apply the composition of these constructions to show that if the algebras A_0, A_1, A_2, \dots form a tower satisfying the aforementioned axioms, then $\dim(A_n) = \dim(A_1)^n n!$.