MATHEMATICS DEPARTMENT SEMINAR SCHEDULE
August 26 – August 30, 2002

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, August 26, 2002

Topology
2:30 p.m., Room 326
Speaker: Gordana Matic, University of Georgia
Title of talk: *An introduction to Ozsvath-Szabo invariants of 3-manifolds*

Group Representation and Cohomology
2:30 p.m., Room 410
Speaker: Graham Matthews, University of Georgia
Title of talk: *On the Indecomposable Representations of a Finite Group, by J.A.Green*

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea and Cookies

Numerical Analysis
3:30 p.m., Room 410
Speaker: Ming-Jun Lai, University of Georgia
Title of talk: *Iterative methods by space decomposition and subspace corrections*
Abstract: We will discuss iterative methods for linear system Ax=b by using space decomposition and subspace corrections which unify many iterative methods.

Analysis
3:30 p.m., Room 222
Speaker: Akos Magyar, University of Georgia
Title of talk: *Organizational Meeting*

CATS
4:40p.m., Room 306
Speaker: Bob Robinson, Computer Science Dept.
Title of talk: **"***Generating Feynman Diagrams"*
Abstract: Feynman graph expansions are used in quantum physics to express the energy of a system of particles, such as free electrons in a crystal. For this and more general systems of fermions, the graphs (or diagrams) of order n can be viewed as a matching on 2n vertices (edges in the matching are undirected and are called V-lines) along with a permutation of the 2n vertices (represented by directed edges called G-lines). One of the G-lines is designated as representing the external momentum. Most Feynman expansions employ only connected diagrams.

In principle the Feynman expansion should be carried out over all diagrams of order n >= 1, but in practice for any calculation there is some maximum value n-max which is an upper bound for the orders considered. One approximation scheme is to include all of the diagrams of order at most n-max. This requires that those diagrams be generated.

For computer representation we take the vertex set to be {0, 1, 2, ..., 2n-1} and the V-lines to be {0, 1}, {2, 3}, ..., {2n-2, 2n-1}. Each diagram is considered rooted at the G-line leaving vertex 1 (this will be the external momentum line). With these conventions a diagram is defined by its order n and an array of size n giving the G-lines. In general a diagram will be isomorphic to a number of others, and it turns out that we wish to only generate one diagram from each isomorphism class. We define a canonical diagram for each isomorphism class by applying a depth-first search (DFS).

Generation of canonical connected Feynman diagrams of given order n is achieved by DFS of an implicit tree of partial diagrams in which a child is reached by adding a new G-line and completed diagrams are leaves.

Note: The research reported is being carried out for the NSF project "ITR/ACS: Stochastic summation of high-order Feynman graph expansions", led by Prof. H.-B. Schuttler of the UGA Physics Dept. (PI) with the speaker and others as co-PIs.

TUESDAY, August 27, 2002

VIGRE
2:00 p.m-3:15 p.m., Room 304
Speaker: Valery Alexeev**,** University of Georgia
Title of talk: "*Birational Algebraic Geometry"*
Abstract: Birational algebraic geometry is one of the most important directions in algebraic geometry. Many classical results, including a complete classification in dimension 2 is due to the great Italian school of about a hundred years ago. The field saw a major explosion of new results during the last twenty years with the development of Minimal Model Program (Mori theory). The aim of the group will be to understand some of these results, starting with the more classical two-dimensional case (but from a modern point of view). There will be plenty of problems on the way, many with a computational/combinatorial flavor. As a basis, we will use selected parts of M.Reid's "Chapters on Algebraic Surfaces", freely available at
http://front.math.ucdavis.edu/alg-geom/9602006

Algebraic Geometry Seminar
3:30 p.m., Room 326
Speaker: Valery Alexeev, University of Georgia
Title: *"Advanced 14th Hilbert's Problem (after S. Mukai)"*
Abstract: A famous 14th Hilbert's Problem asks whether a subring of invariants for an action of a linear group on a polynomial algebra C[x_1, ... x_n] is finitely generated. A counterexample to this problem was given by Nagata in 1958. In fact, he introduced a series of examples E(p,q,r) and proved that some special triples (p,q,r) give counterexamples. In a recent work, Mukai proved that the ring is finitely generated <=> 1/p + 1/q + 1/r > 1, which is equivalent to finiteness of root system T_pqr, which is in turn equivalent to finiteness of the corresponding group generated by reflections. The proof is a beautiful combination of algebra, representation theory and algebraic geometry (including Mori theory, Cox total ring and Fano varieties).

Student Number Theory
3:30 p.m., Room 303
Speaker: Stephen Donnelly, University of Georgia
Title of talk: *"Congruent Numbers"*

WEDNESDAY, August 28, 2002

Wavelet Analysis
10:10 – 11:00 a.m., Room 410
Speaker: Haipeng Liu, University of Georgia
Title of talk: *"Sobolev Wavelets"*
This talk is based on a paper appeared in 1997 on the construction of orthonormal wavelets in Sobolev spaces.

Graduate Teaching Seminar
2:30 p.m., Room 303

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea, Cookies

Lie Theory
3:30 p.m., Room 302
Speaker: Joe Fu, University of Georgia
Title of talk: *"Translation- and unitary-invariant convex valuations on C^2 (after S. Alesker)"*
Abstract: A convex valuation on R^n is essentially a finitely additive measure on the family of convex subsets of R^n, continuous with respect to the natural (Hausdorff) metric. One example is a constant function; another is the volume. A classical theorem of Hadwiger states that the vector space of convex valuations that are invariant under the

group of euclidean motions has dimension n+1. Recently Alesker has characterized the space of convex valuations that are invariant under the translation group, or (if $R^n = R^{\{2m\}} = C^m$) under the group of holomorphic euclidean motions (i.e. the subgroup generated by the translation group and the unitary group). I will sketch the proof in the case of real dimension 4. The strategy is to view the space of valuations as a representation of SO(4), using the theory of convexity to reduce the problem to the classical representation theory of this group.

Number Theory
3:30 p.m., Room 304
Speaker: Matthew Baker, University of Georgia
Title of talk: *"Modularity for curves of genus >= 2"*
Abstract: Let X be a curve of genus g defined over Q such that X(Q) is nonempty. It is known that if g ≤1, then X is modular, in the sense that there exists a surjective map from the modular curve $X_{1(N)}$ to X for some integer N. On the other hand, we conjecture that for a fixed genus g ≥2, there are only finitely many modular curves of genus g. In this talk, we will discuss some partial results toward a proof of this conjecture. This is joint work with Bjorn Poonen, Josep Gonzalaz, and Enrique Gonzalez.

FRIDAY, August 30, 2002

Geometry
2:30 p.m., Room 322
Speaker: Jason Cantarella, University of Georgia
Title of talk: *"Organizational Meeting"*