MATHEMATICS DEPARTMENT SEMINAR SCHEDULE
November 11 – November 15, 2002

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, November 11, 2002

Group Representation & Cohomology
2:30 p.m., Room 410
Speaker: Leonard Chastkofsky, University of Georgia
Title of talk: *"Lusztig's Conjecture"*

Topology
2:30 p.m., Room 326
Speaker: Eiko Kin
Title of talk: *"Flowlines transverse to fibred knots and links"*
Abstract: It is known that the figure-eight knot has the property that any vector field transverse to the fibration of the knot complement contains all knots/links as closed orbits. In this talk, we show that large family of fibred knots/links share this property, including all fibred non-torus 2-bridge knots.

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

Cats
4:40 p.m., Room 306
Speaker: Qun Wang, Graduate student in Computer Science
Title of talk: *"Constant average time generation of canonical Feynman diagrams with G-loop count"*
Abstract: A Feynman diagram of order n is a rooted mixed graph on 2n vertices consisting of a perfect matching of undirected edges (called V-lines) and a permutation formed by directed edges (call G-lines).

The contribution of a diagram to the summation of physical interest includes a factor which depends on the number m of cycles of G-lines (called G-loops). For instance, the factor is (-2)^(m-1) for systems of electrons which are not spin-polarized.

A constant average time algorithm for generating canonical Feynman diagrams is presented. This algorithm was developed by Dr. Robinson. It generates a canonical diagram for each isomorphism class by applying a depth-first search (DFS) for any order of Feynman diagram while counting G-loops at the same time. A proof of correctness of the algorithm is also given.

TUESDAY, November 12, 2002

VIGRE
2:00 p.m-3:15 p.m., Room 304
Speaker: Daniel Nakano, University of Georgia
Title of talk: *"Old and new results for nilpotent matrices"*
Abstract: It is well-known that any n by n nilpotent matrix over the complex numbers can be conjugated into a certain Jordan Canonical Form. Therefore, the matrices in Jordan Canonical Form provide orbit representatives for the general linear group acting on the set of nilpotent matrices. Over the past thirty years, people have used this basic example in the study of conjugacy classes for arbitrary reductive groups. I will survey some of the known results in the area for nilpotent matrices in semisimple Lie algebras (both old and new). I will also provide some open problems which are very accessible to a general audience.

Algebraic Geometry
3:30 p.m., Room 326
Speaker: Robert Varley, University of Georgia
Title of talk: *"Secant maps of space curves"*
Abstract: The "secant map" for a curve in projective n-space is defined by associating to n points on the curve, the hyperplane spanned by the points. I will survey some results and problems about the structure of the secant map.

Student Number Theory
3:30 p.m., Room 303
Speaker: Xander Faber, University of Georgia
Title of talk: "*Percy MacMahon's Omega operator: it gives partition identities without breaking a sweat!"*
Abstract: Shortly after the turn of the last century, Percy MacMahon developed an amazing tool, the Omega operator, which can solve hard combinatorics problems in an algorithmic fashion. It proves theorems almost by magic! [Disclaimer: There will be no actual magic performed during my talk.]

WEDNESDAY, November 13, 2002

Wavelet Analysis
10:10 - 11:00 a.m., Room 410
Speaker: Okkyung Cho, University of Georgia
Title of talk: *Biorthogonal box spline wavelets*
Abstract: We study the regularity of the biorthogonal box spline wavelets.

Graduate Teaching Seminar
2:30 p.m., Room 303
No Meeting this week

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

Numerical Analysis
3:30pm, Room 410
Speaker: Ming-Jun Lai, University of Georgia
Title of talk: *"Hierarchical basis"*
Abstract: We continue the discussion of the subspace decomposition and correction methods. We show that the condition number of the linear system associated with an hierarchical basis is bounded.

Lie Theory
3:30 p.m., Room 302
Speaker: K. Johnson, University of Georgia
Title: *"The Structure of Harish-Chandra Groups"*
Abstract: A real reductive group G is called a Harish-Chandra group if it has finitely many components and it is contained in a connected complex group G(C) where the Lie algebra of G(C) is the complexification of the Lie algebra of G. We exhibit a compact group F such that G is contained in F*G[o] where G[o] is the connected component of the identity of G. When G is semisimple F is finite.

Number Theory
3:30 p.m., Room 304
Speaker: Matt Baker, University of Georgia
Title of talk: *"Canonical heights attached to dynamical systems"*
Subtitle: *"Drawing fractals using number theory"*
Abstract: We will discuss the canonical height function of Call and Silverman in the context of polynomial iteration. We will also discuss transfinite diameters, equilibrium measures, p-adic Julia sets, how to draw fractals, and a generalization of Bilu's equidistribution theorem.

THURSDAY, November 14, 2002

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

Colloquium
3:30 p.m., Room 304
Speaker: Mate Wierdl, University of Tennessee, Memphis
Title of talk: *"Subsequence ergodic theorems"*
Abstract: Ergodic theory grew out of statistical mechanics, the statistical description of matter. This latter means, for example, that instead of describing the behavior of each individual water-molecule in a cup of water, one is satisfied with finding the average speed, energy etc. of the molecules. But then the fundamental question arises: how can we measure the average speed or energy.

It is clearly impossible to measure the speed of each individual molecule and then take the mean of the data. The ergodic theorem says that it is enough to select a single molecule, measure its speed in each second, and if we make enough measurements and take the average of the data, the number will be basically the average speed of all the molecules in the cup of water.

This amazing theorem has one drawback: it requires that the measurements are taken exactly at every second. But in practice, the measurements might be made at, say, 1, 3, 4, 6, 11, ... seconds or, even worse, at 1.1, 2.4, 2.9, 4.3, ... seconds instead of at 1, 2, 3 ... seconds. Obviously, we would like to know whether we still can compute accurately the average speed from the measured data.

This question might have been the original motivation to examine the ergodic theorem along subsequences --- the topic of our talk. We will see that the question also has connections to the theory of uniform distribution mod 1.

FRIDAY, November 15, 2002

Geometry
2:30 p.m., Room 322
Speaker: Jason Cantarella, University of Georgia
Title of talk: *"3rd order link integrals, or "Why are the Borromean rings linked?"*
Abstract: The Borromean rings are a collection of 3 unknots, which are pairwise unlinked. However, as a 3-component link, everyone "knows" that the Borromean rings are inseperable.

How do you prove this? The answer depends on constructing a version of the linking number which operates on 3-component links whose pairwise linking numbers are zero. This is a good first example of a lifting construction in algebraic topology.

We'll show that this "Massey product" construction has a natural interpretation in terms of a version of the Gauss integral. (Despite all this terminology, this expository talk will be appropriate for first-year grad students.)

Special Analysis Seminar
3:30p.m., Room 304
Speaker: Mate Wierdl, University of Tennessee, Memphis
Title of talk: *"Martingales and differentiation"*
Abstract: There is an inequality which shows that many kinds of convergence and oscillatory theorems for martingales and differentiation are equivalent.

No background in probability is required, since the martingale we are going to talk about is the dyadic martingale (which will be explained, nevertheless).

Quite a few unsolved problems will be mentioned.