

MATHEMATICS DEPARTMENT SEMINAR SCHEDULE

January 27 – January 31, 2003

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, January 27, 2003

Group Representation and Cohomology

2:30p.m., Room 302

Speaker: Jon Carlson, University of Georgia

Title of talk: *Modules over group algebras and stable categories*

Topology

2:30p.m. Room 326

Speaker: Clint McCrory

Title of talk: *Virtual Betti numbers of real algebraic varieties*

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Analysis

3:30p.m., Room 222

Organizational Meeting

CATS

4:40 p.m., Room 306 Boyd Graduate Studies

Speaker: Bob Robinson, Computer Science Dept.

Title of talk: *Counting Feynman Diagrams*

Abstract: A Feynman diagram D of the type considered has a vertex set U of cardinality $2n$ for some $n > 0$, along with n undirected V -lines forming a perfect matching on U and $2n$ directed G -lines forming a permutation on U . Here n is called the order of D . One of the G -lines is designated as the root of D . If D is connected and cannot be disconnected by removing some two G -lines it is called irreducible.

The number $C(n)$ of nonisomorphic connected Feynman diagrams of order n has been known under various guises for at least 50 years. However the number $I(n)$ of those which are irreducible appears to be new. The study of $C(n)$ and $I(n)$ is motivated by research which aims to combine Monte Carlo summation techniques with self-consistent high-order Feynman diagram expansions to computationally solve interacting fermion models in quantum physics.

A recently simplified approach to calculating the exact numbers $C(n)$ and $I(n)$ is presented. As time permits related results on the asymptotic behavior of $C(n)$ and $I(n)$ will be discussed, along with methods for generating canonical Feynman diagrams.

The main part of the talk will be an expanded version of a presentation at the ALICE '03 workshop; a detailed abstract is available in PostScript or PDF form at { HYPERLINK <http://www.cs.uga.edu/~rwr/alice03abst.ps> } or { HYPERLINK ["http://www.cs.uga.edu/~rwr/alice03abst.pdf"](http://www.cs.uga.edu/~rwr/alice03abst.pdf) }, respectively. See { HYPERLINK ["http://www.siam.org/meetings/da03/alice.htm"](http://www.siam.org/meetings/da03/alice.htm) } for ALICE '03.

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, January 28, 2003

VIGRE

2:00-3:15 p.m., Room 304

Speaker: Jim Solazzo, University of Georgia

Title: *Nevanlinna-Pick Interpolation*

Abstract: The original Pick problem is to determine, given N points z_1, \dots, z_N in the unit disk and N complex numbers w_1, \dots, w_N , whether there exists an analytic function ϕ from the disk to the disk which interpolates the data, i.e. satisfies

$$\phi(z_i) = w_i \text{ for } i=1, \dots, N.$$

In this talk we will state Pick's Theorem which provides necessary and sufficient conditions for the existence of such a function. We will also discuss some consequences of Pick's Theorem along with alternate ways to view interpolation problems.

Student Number Theory

3:30 p.m., Room 303

Speaker: Charles Pooh, University of Georgia

Title of talk: *It's as easy as abc (Part II)*

WEDNESDAY, January 29, 2003

Wavelet Analysis

10:10-11:10 a.m., Room 542

Speaker: Haipeng Liu, University of Georgia

Title of talk: *Regular compactly supported wavelets in sobolev spaces, continued*

Graduate Student Seminar

2:30 p.m., Room 302

No Meeting this week

Algebraic Geometry

2:30 p.m., Room 303

Speaker: TBA

Title of talk: TBA

Problem Solving Group

2:30 p.m., Room 322

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Numerical Analysis

3:30 p.m., Room 410

Speaker: Paul Wenston, University of Georgia

Title of talk: *The Numerical approximation the Thin Film P.D.E*

Lie Theory

3:30 p.m., Room 303

No Meeting this week

Arithmetic Geometry/Number Theory

3:30 p.m., Room 304

Speaker: Mark Dickinson, University of Michigan

Title: *Modularity of icosahedral Artin representations*

Abstract: In the 1920s, Emil Artin showed how to attach an L-function to a finite-dimensional complex representation of the absolute Galois group of a number field. This L-function is a meromorphic function on the complex plane, which naturally encodes arithmetic properties of the Galois representation. Artin further conjectured that these L-functions should be holomorphic away from 1.

One important special case of Artin's conjecture can be reformulated as describing a correspondence between weight one cuspidal modular forms which are eigenforms for the Hecke operators, and two-dimensional odd irreducible complex representations of the absolute Galois group of the rationals. In this form the conjecture, often known as the 'Strong Artin conjecture', stands as one of a few notable classical cases of the Langlands conjectures for number fields; the modularity of elliptic curves over the rationals is another prominent example.

I will describe recent progress on the Strong Artin conjecture, and indicate some possible future directions towards a complete proof of the conjecture.

THURSDAY, January 30, 2003**Faculty and Graduate Social**

3:00 p.m., Room 409

Coffee, Tea, Cookies

Colloquium

3:30 p.m., Room 304

Speaker: Mark Dickinson, University of Michigan

Title of talk: *Elliptic curves, modular forms and icosahedral Galois representations*

Abstract: In June 2000 a group of four mathematicians---Breuil, Conrad, Diamond and Taylor---building on methods due to Andrew Wiles, made the spectacular and long-awaited announcement: 'Every elliptic curve over the rationals is modular!' Meanwhile, in a 1997 article Taylor noted that it might be possible to adapt Wiles' methods to prove another long-standing conjecture; the conjecture, due to Emil Artin in the 1920s, predicts that there should be a natural correspondence between certain weight one modular forms and irreducible, 'odd' two-dimensional complex representations of the Galois group of an algebraic closure of the rationals.

I'll review some of the ideas that went into the elliptic modularity proof, and show how these ideas can be adapted to prove a portion of Artin's conjecture in the troublesome case of 'icosahedral' representations. I'll also describe the connections between the elliptic modularity result and Artin's conjecture, and explain how both results fit into a general philosophy that can be summed up as 'modularity is everywhere!'.

FRIDAY, January 31, 2003

Geometry

2:30 p.m., Room 322

Speaker: Ted Ashton, UGA

Title: *The ropelength minimal clasp*

Upcoming Events

THURSDAY, February 6, 2003

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

Colloquium

3:30 p.m., Room 304

Speaker: Professor Alex Patukhov, University of South Carolina:

Title of talk: *Wavelet frames and their applications*

Abstract: We begin with a short introduction to general and wavelet frames. The theoretical part of the talk includes the discussion of the methods for constructing wavelet frames with the given properties. Some ideas of applications of frames to data representation (including compression, resilience to the errors of transmission) will be

given. Frame-based algorithms for the recovery of corrupted data (images) with the results of numerical modelling will be presented.

FRIDAY, February 7, 2003

Faculty and Graduate Social

3:00 p.m., Room 409
Coffee, Tea, Cookies

Colloquium

3:30 p.m., Room 304

Speaker: Professor Misha Kapovich, University of Utah

Title of talk: TBA

Abstract: TBA

THURSDAY, February 13, 2003

Faculty and Graduate Social

3:00 p.m., Room 409
Coffee, Tea, Cookies

Colloquium

3:30 p.m., Room 304

Speaker: Dr. Xin Guo, IBM, New York

Title of talk: TBA

Abstract: TBA