

MATHEMATICS DEPARTMENT SEMINAR SCHEDULE

April 21– April 25, 2003

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, April 21, 2003

Group Representation and Cohomology

2:30p.m., Room 410

Speaker: Dave Benson, University of Georgia

Title of talk: *TBA*

Topology

2:30p.m. Room 326

Speaker: Aaron Abrams, University of Georgia

Title: *Very hard elementary problems in low-dimensional topology*

Abstract: I will describe and state the Andrews-Curtis conjecture, the Poincaré conjecture, and some others. I will not prove or disprove any of them.

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Tea, Cookies

C A T S

Combinatorics, Algorithms, and Theoretical Computer Science Seminar

4:40 PM, 306 Boyd Graduate Studies

Speaker: Congzhou He, Graduate student, UGA Computer Science Dept.

Title of talk: Memory-efficient pseudoknot prediction with stochastic grammar modeling

Abstract: The prediction of RNA pseudoknotted structure is computationally intractable due to the structural complexity of crossing nucleotide base pairs. Almost all existing prediction algorithms entail $O(n^4)$ memory space, making it unrealistic to predict pseudoknots for RNA molecules of even moderate length. We use techniques that reduce the resource requirements significantly to $O(n^2)$ in memory space without substantial sacrifice in running time, and which avoid an exhaustive search for crossing helices in pseudoknots. Experiments conducted on bacterial tmRNA demonstrate that the improved algorithm with $O(n^2)$ space requirement achieves the same prediction accuracy as the optimal prediction algorithm with $O(n^4)$ space requirement.

TUESDAY, April 22, 2003

VIGRE

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

Speaker: Melinda Harvey, University of Georgia

Title of talk: A New Time Scale- ArcLength

Abstract: This is a more in-depth discussion of the time scale topics covered during Bree Ettinger's VIGRE seminar talk. This talk will include the new time scale scheme, ArcLength, created by the group and error approximations will be touched upon. Also, the opportunities for future research will be discussed.

Student Number Theory

3:30 p.m., Room 222

Speaker: TBA

Title of talk: *TBA*

WEDNESDAY, April 23, 2003

Wavelet Analysis

10:10-11:10 a.m., Room 524

Speaker: Kyunglim Nam, University of Georgia

Title of talk: *Preliminary lemmas to construct tight frames.*

Graduate Student Teaching Seminar

2:30 p.m., Room 302

No Meeting this week

Algebraic Geometry

2:30 p.m., Room 303

Speaker: Valery Alexeev, University of Georgia

Title of talk: *Mixed Hodge structures, 1-motifs and degenerations of abelian varieties, continued*

Abstract. I will review the connection between these three subjects and give a description of Mumford's toroidal compactifications of A_g as moduli of 1-motifs and MHSs.

Problem Solving Group

2:30 p.m., Room 322

Faculty and Graduate Social

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

Analysis

3:30, Room 323

Speaker: Akos Magyar, University of Georgia

Title of talk: *On a two dimensional variant of Roth' theorem*

Abstract: In 1955 K. F. Roth proved that if a subset of the first N integers has density at least $1/\log\log N$ then it contains an arithmetic progression of length 3. We discuss a two dimensional analogue of this result; namely subsets of the N by N lattice contain an isosceles right angle triangle if their density is not too small, as well as possible generalizations along the lines of the more recent results of T. Gowers.

These results are part of geometric Ramsey theory, which is to show that subsets of lattices of positive density contain regular substructures.

Numerical Analysis

3:30 p.m., Room 410

TBA

Lie Theory

3:30 p.m., Room 303

No Meeting this week

Arithmetic Geometry/Number Theory

3:30 p.m., Room 304

Speaker: William Stein (Harvard University)

Title: *Possibilities for Shafarevich-Tate Groups of Modular Abelian Varieties*

Abstract: I will sketch a proof that for every prime $p < 25000$ there is an abelian variety over \mathbb{Q} with Shafarevich-Tate group of order p times a perfect square. The proof involves restriction of scalars, visibility, exact sequences of Neron models, and etale cohomology.

VIGRE Research Group

4:30 p.m., Room 410

Speaker: Ivan Cheltsov, University of Georgia

Title of talk: *"Birational geometry of 3-folds"*

THURSDAY, April 24, 2003

Faculty and Graduate Social

3:00 p.m., Room 409

Coffee, Cookies, Tea

Vigre Seminar/Colloquium Talk

3:30p.m., Room 304

Speaker: William Stein (Harvard University)

Title: *Possibilities for Shafarevich-Tate Groups of Modular Abelian Varieties*

Abstract: Abelian varieties are higher-dimensional analogues of elliptic curves. It was long thought that Shafarevich-Tate groups of abelian varieties should have order a perfect square. In the late 1990s Bjorn Poonen and Michael Stoll found examples in which the order of the Shafarevich-Tate group is twice a square. I subsequently found examples in which the order is p times a perfect square for any prime p less than 25000. In this profusely illustrated and fun talk I'll review some basic facts about modular abelian varieties and hint at how I constructed examples of Shafarevich-Tate groups of surprising orders.

Math Club Talk

3:30 p.m., Room 302

Speaker: Dr. David Hemmer, University of Georgia

Title of talk: *"The Rubik's cube, twenty-five years later."*

Abstract: Invented in 1974, and first marketed in 1978, the Rubik's cube became a worldwide sensation in the early 1980's. The first and only world championship was held in 1982. But by 1983 the cube was no longer in production. Now a new generation is taking up cubing, and this August a second world championship will be held in Toronto. "Just like bellbottoms, the cube is staging a comeback," say the organizers on their website. Over the last 25 years, more than three dozen mathematical papers have been published about the cube, as well as dozens of books. Although group theory is most prominent, the cube also has connections with probability and computer science. The cube itself is a remarkable engineering achievement. In honor of the 25th anniversary of the cube's unveiling, we will discuss some of the interesting mathematics surrounding the cube, including problems which are still unsolved. Anyone owning a cube is encouraged to bring it along.

FRIDAY, April 25, 2003

Geometry

2:30 p.m., Room 322

Speaker: Jim Solazzo, University of Georgia

Title of talk: *Uniform algebras and interpolation bodies, continued*

Abstract: Given a uniform algebra $A \subseteqq C(X)$ and k -fixed points x_1, \dots, x_k in X , there is corresponding set contained in \mathbb{C}^k called an interpolation body. Each interpolation body is the unit ball of the Banach algebra \mathbb{C}^k with respect to some norm on \mathbb{C}^k . These so-called interpolation bodies have a natural "dual" object, which we refer to as Schur ideals, contained in the cone of positive semi-definite $k \times k$ matrices. In this talk, will focus on the bidisk algebra, the set of all analytic functions on the bidisk which have a continuous extension to the boundary of the bidisk. We will discuss two different notions of computability with respect to these interpolation bodies as well as prove Agler's bidisk interpolation formula using some elementary facts about dual cones.