

# MATHEMATICS DEPARTMENT SEMINAR SCHEDULE

## April 14 – April 18, 2003

*All seminars are held in Boyd Graduate Studies unless otherwise noted*

### MONDAY, April 14, 2003

#### **Group Representation and Cohomology**

2:30p.m., Room 410

**Speaker:** Jon Carlson, University of Georgia

**Title of talk:** *Shifted subgroups and the cohomology of elementary abelian groups*

#### **Topology**

2:30p.m. Room 326

**Speaker:** Will Kazez, University of Georgia

**Title of talk:** *Building tight contact structures - an overview*

#### **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:** Jizhen Zhao, Graduate student, UGA Computer Science Dept.

**Title of talk:** Parameter estimation for stochastic grammar modeling of RNA pseudoknots\*

**Abstract:** Stochastic grammar models of RNA pseudoknots have been introduced to automate RNA pseudoknot prediction. However, the accurate estimation of the probability parameters of such grammar models from training sequences is difficult because of the inherent context-sensitivity in these grammars. In particular, existing algorithms for parameter estimation, such as Inside-outside, are applicable only to stochastic context-free grammar (SCFG) models for RNA stem-loop structures.

We introduce a new parameter estimation algorithm Upward-downward for the stochastic grammar model of RNA pseudoknots developed recently. The algorithm generalizes inside and outside probabilities for pseudoknot substructures by propagating probabilities of crossing double helices upward and downward in the derivation tree to accomplish the computation of inside and outside probabilities. The algorithm is a non-trivial extension of Inside-outside to RNA pseudoknot models which was heretofore not available.

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\*This is joint research with Drs. Liming Cai and Russell Malmberg. The paper is at:  
<http://www.cs.uga.edu/~jizhen/rna.htm>

## **TUESDAY, April 15, 2003**

### **VIGRE**

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

**Speaker:** Caroline Wright, University of Georgia

**Title of talk:** TBA

**Abstract:** TBA

### **Faculty and Graduate Social**

3:00 p.m., Room 409

Coffee, Cookies, Tea

### **Colloquium**

3:30p.m., Room 304

**Speaker:** Juping Wang, visiting Harvard University from Fudan University.

**Title of talk:** *Converse Theorem of Jacobi Forms*

**Abstract:** For every Jacobi form of index  $m$  and weight  $k$  with Shimura type, an associated system of L-functions is given. These functions can be analytically continued to the whole complex plane and satisfy a kind of functional equation. As a consequence, Hecke's converse theorem on modular forms can be extended to this context.

### **Student Number Theory**

3:30 p.m., Room 222

**Speaker:** Jim Blair, University of Georgia

**Title of talk:** *Embedding Triangles into Integer Lattices*

## **WEDNESDAY, April 16, 2003**

### **Wavelet Analysis**

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

**Speaker:** Kyunglim Nam, University of Georgia

**Title:** *The preliminary three Lemmas for tight frames construction.*

### **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*

**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. Growers.

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

*No Meeting this week*

**Lie Theory**

3:30 p.m., Room 303

*No Meeting this week*

**Arithmetic Geometry/Number Theory**

3:30 p.m., Room 304

*No Meeting this week*

**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 17, 2003****Faculty and Graduate Social**

3:00 p.m., Room 409

Coffee, Cookies, Tea

**Colloquium**

3:30p.m., Room 304

**Speaker:** Dieter Kotschick (University of Munich)

**Title of talk:** *Commutator lengths and signatures of surface bundles*

**Abstract:** The geometry of four-manifolds which are surface bundles over surfaces, or more general Lefschetz fibrations, is closely related to the algebraic structure of the diffeomorphism group of the fiber. We shall discuss this relationship, with special emphasis on the commutator length on some perfect groups of diffeomorphisms.

If the genus of the fiber is at least 3, then it is known that its mapping class group is perfect, as is the identity component of the diffeomorphism group, and the subgroup of Hamiltonian diffeomorphisms with respect to any area form. In a perfect group every element can be written as a product of commutators, and it is interesting to ask how many commutators a given element requires, e.g. whether there is a universal bound that works for all elements. It turns out that symplectic structures and foliations on the total spaces of fibered four-manifolds shed light on such questions and relate to the bounded cohomology of these groups.

**FRIDAY, April 18, 2003****Geometry**

2:30 p.m., Room 322

**Speaker:** Jim Solazzo, University of Georgia

**Title of talk:** *Uniform algebras and interpolation bodies.*