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# A f t e r m a t h

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## Welcome

We'd like to extend a warm welcome to those who are new in the department this year.

Our new faculty members are Alla Borisyuk (Math Biology/Applied Math), Tommaso de Fernex (Algebraic Geometry), Firas Rassoul-Agha (Probability Theory), Anurag Singh (Commutative Algebra), Jared Tanner (Numerical Analysis), and Jason Behrstock (Geometric Group Theory). New postdocs and research appointments are Jonathan Forde (Math Biology), David Goulet (Math Biology), Hsiang-Ping Huang ( $C^*$ -algebras), and Samuel Isaacson (Math Biology).

Our new funded graduate students are: Yael Algom-Kfir, Teresa Cawley, Julian Chan, Yimen Chen, Noelle Conforti, Allen Dickson, Trung Dinh, Amanda Ellis, Charlotte Erickson, Brooke Ernest, Ryan Hafen, Elisha Hughes, Casey Johnson, Karim Khader, Zachary Kilpatrick, Sean Laverty, William Malone, Dane Maxfield, Anna Moore, David Novom, Jeremy Pecharich, Lauritz Petersen, Michael Purcell, Shang-Yuan Shiu, Blerta Shtylla, and Hsien-Yueh Wu.

We also have several visitors this year. This fall Istvan Berkes and Florian Koelbl are visiting with Lajos Horvath and Hsungrow Chan is visiting with Andrejs Treibergs. In the spring Esbin Hlaverson will be visiting with Paul Roberts, and Cristina Popovici will be visiting the entire year.



Please don't hesitate to ask the Aftermath staff if you wonder how things work around here or what to do. We may not know ourselves, but we can point you in the right direction.

## A Short Message from the New Chair

Aaron Bertram



After three weeks on the job (July and August didn't count!), I've learned quite a bit about my colleagues. You like short faculty meetings and socials at the Alta Lodge. You can be very generous

with contributions to the tea fund when nudged in the proper way, and you all have lots of ideas about how the department can be improved. (Some of my favorite ideas include "urinal cakes" in the men's room and that I remind you that the last one out of each classroom should turn off the lights. I'm working on the first, and have just taken care of the second.)

Seriously, though, this job is a lot of work, but it has been really comforting to see how many of you are willing to step up and share the burden. Thank you!

I prepared a "mission statement" that I thought I'd share with you. This will probably seem quaint after three years.

### *My mission:*

- To encourage faculty and students in their mathematical endeavors.
- To ensure that our teaching is excellent and serves the students' needs.
- To work with the staff to improve the infrastructure of our department.
- To represent our department, and to advocate for our needs.
- To pester you:
  - To apply for grants to support innovations in research and teaching,
  - To seek out promising potential new students, staff, and faculty, and
  - To help run the place!

# Conference Reports

## Summer School in Commutative Algebra by Kazuma Shimomoto

The Snowbird conference (held jointly with summer school) was a big event with lots of food and lots of hot newcomers in mathematics. The first 10 days is focused on the summer school for young people to study new and old ideas around commutative algebra. The last 4 days was a conference with 10 main speakers. Meanwhile, we enjoyed hiking, climbing and other social activities. Utah's great surroundings stimulated and enhanced the mathematics. Most participants hope to come back to this place sometime in the winter.

## Math Biology Conference by John Zobitz

June 16-19, 2005 the IGERT program hosted a workshop featuring Dr. Michael Reed of Duke University. Dr. Reed is a math biologist who has interests in applying mathematical models to medicine and physiology. He recently published an article in the March 2004 Notices of the AMS titled "Why is Mathematical Biology So Hard?"

Third-year IGERT students Will Nesse, Aaron McDonald, and John Zobitz organized the workshop. The workshop was geared toward introductory math biology students. While he was here, Dr. Reed met with math biology students and faculty and gave two well-attended research seminars which provided a foundation for the student workshop on the third day. Students paired up into groups and selected a mini-project developed by Dr. Reed. All of the projects contained aspects of his two seminars and gave students a deeper understanding of the mathematical and biological questions involved. In the afternoon, each student group presented the results of their mini-project.

The workshop concluded with a cookout at Dr. Jim Keener's cabin. Suffice it to say, all participants involved had a great time. Information on the workshop can be found at [http://www.math.utah.edu/research/mathbio/IGERTWorkshop\\_2005.html](http://www.math.utah.edu/research/mathbio/IGERTWorkshop_2005.html). Funding for the workshop was provided by the IGERT program. The workshop organizers would especially like to thank all the participants for their effort.

# Personality!



Amber Smith is a graduate student in Mathematical Biology, in particular mathematical epidemiology. She is interested in the ecology and evolution of infectious diseases.

Most of Amber's family lives in Colorado. She has four parents (mom, dad, stepmom, stepdad) and five siblings (one older sister (26), two younger sisters (14 and 7), and two younger brothers (15 and 2 1/2)). She also has a niece who is 6.

Amber's summer obsessions are wakeboarding and wakesurfing. She plays golf, volleyball and basketball, and loves watching football (an avid Denver Broncos fan), hockey (the Colorado Avalanche), college basketball, volleyball and gymnastics. She also does a bit of skiing, snowboarding, snowshoeing and hiking. Amber loves to go the movies, hang out with friends and travel. She's particularly enjoyed visiting Southeast Asia (where she had the opportunity to visit an orphanage in Saigon, Vietnam to deliver much needed supplies and toys, which is one of the coolest things she's ever done) and the Caribbean, but for staying closer to home her favorite place to visit is Lake Powell. She's also an adrenaline junkie. She skydives (!) and would someday like to bungee jump, base jump, and cliff dive.

# Summer Reports

## VIGRE Minicourse on Nonconvex Variational Problems

A minicourse on nonconvex variational problems and their applications, organized by Andrej Cherkaev and Elena Cherkaev, was held May 16-27 in the department. Andrea Braides, University of Rome Tor Vergata, who spoke on "From Discrete Systems to Continuous Variational Problems" and Georg Dolzmann, Maryland, who spoke about "Macroscopic Models for Phase Transforming Materials" each gave a series of ten lectures. Marian Bocea ran tutorials on convexity in variational problems and Young measures. Visiting lecturers V.Smyshlyaev, Bath, and Y. Grabovsky, Temple, spoke about their recent work.

Local faculty also presented two-hour talks. Andrej Cherkaev lectured on irregular problems

and on polyconvexity. Klaus Schmitt discussed variational inequalities. David Dobson discussed an application to the strength of pillars. Graeme Milton gave lectures on thermodynamics. Elena Cherkaev discussed image reconstruction. Andrejs Treibergs discussed elastic rods and harmonic maps.

Students attending from outside Utah were J. Lee, Courant, T. Mengesha, Temple, D. Onofrei, Worcester Polytechnic, and C. Popovici, Carnegie Mellon. Nathan Albin, Carlos Bonifasi-Lista, An Le, Seubpong Leelavanichkul, Lyubima Simeonova, Dali Zhang, and Yuan Zhang attended from the University of Utah.

Besides math, participants joined their fellows from the minicourse on Arc Spaces and Motivic Integration mountain biking in Millcreek Canyon and picnicking on Antelope Island.

#### **VIGRE Minicourse on Motivic Integration**

A minicourse on “Arc Spaces and Motivic Integration,” organized by Aaron Bertram and Chris Hacon, was held here May 16-27. The main speakers were Manuel Blickle (Essen), Tommaso de Fernex (Michigan and Utah), Julia Gordon (Toronto) and Wim Veys (Leuven). Students participating from Utah were Renzo Cavalieri, Erin Chamberlin, Ken Chu, Sarah Kitchen, Fumi Sato, and Kazuma Shimomoto. Other participants were L. Ojala (Helsinki), P. Petrov (Georgia), M. Rose (Wisconsin), Z. Treisman (Washington) and C. Yuen (University of Michigan). Various post-docs and regular faculty also attended the mini-course.

The topics covered included a detailed introduction to the theory of geometric motivic integration for smooth complex varieties with applications to the study of invariants in birational geometry.

The course seemed to be very successful. In a relatively short period of time, the students were introduced to this very interesting and active field of research. The speakers provided lectures that ranged from a gentle introduction to the subject to current research topics. Participants joined those attending the minicourse on Nonconvex Variational Problems for outings to Antelope Island and mountain biking.

#### **VIGRE REU: Games of Chance**

The Summer 2005 VIGRE REU Program, “Mathematics of Games of Chance,” was held at

the University of Utah during the six-week period June 6 to July 15, 2005.

Lectures were given in the mornings by Stewart Ethier and David Levin based on the text Ethier is writing. Robert Hannum of the University of Denver gave an additional four lectures on poker.

Graduate students Berton Earnshaw and Lars Louder ran afternoon computer labs and problem sessions. Students participating from the University of Utah were Spencer Bagley, Joseph Houpt, Polina Milyavskaya, Matthew Reimherr and Mark Thomas. Five came from across the country: K. Bowen (Cornell), D. Das (MIT), D. Ferris (Duquesne), G. Kim (Rutgers) and S. Vanniasagaram (Berkeley).

Lectures covered a variety of topics including game theory, the house advantage and gambler's ruin, betting systems, and analysis of games such as roulette, keno and craps. Students met one-on-one weekly with the instructors to discuss their class projects. Some students found new results in their research. One student's project report was submitted to a professional game theory journal.

In addition to working, participants hiked Grandeur Peak and picnicked at Mirror Lake, despite up to three feet of snow in mid June.

#### **Summer Mathematics Program for High School Students**

Jim Carlson returned from Cambridge, Massachusetts in June to direct the Summer Mathematics Program for High School Students, now in its sixth year. Three graduate assistants, Matt Clay, Russ Richins, and Maria Scott, and one undergraduate assistant, Tim Simmons, an alumnus of the program, assisted him. Sixteen students participated, twelve from the Wasatch Front area and four from out of state (Arizona, Florida, Pennsylvania, and Texas).

Students worked on number theory, learning about Diophantine Equations, modular arithmetic, properties of the primes, continued fractions, etc. They also learned to program in Python.

There was a daily colloquium given by various faculty members whose topics ranged widely: Ken Golden, “Sea Ice”; Klaus Schmitt, “Fractals”; Fred Adler, “Cicadas”; Peter Alfeld, “Hotel Infinity”; Stewart Ethier, “How Slot Machines Work”; Jim Carlson, “The Mathematics of Google”; Fletcher Gross, “How Did Archimedes

Do It?"; David Dobson, "Smelborp Esrevni" (Inverse Problems); Davar Khoshnevisan, "The Marriage Problem." Graduate assistants Russ Richins and Matt Clay each gave one of the afternoon talks as well. The students enjoyed the talks, learned a lot, and were inspired (which is what this program is all about).

The program ended with a mathematical game show in the tradition of "Jeopardy," covering topics discussed during the program. The game show was followed by a viewing of the Nova documentary, "The Proof," the story of Andrew Wiles' proof of Fermat's Last Theorem.

## Dept. Social at Alta

The department of mathematics Fall Social took place Saturday, Aug. 24 at the Alta Lodge. One hundred fifty mathematicians and family members enjoyed a warm evening social hour mingling on the patio amidst an alpine panorama and supping in the cozy dining room. "It was a great chance to meet everyone," said first year graduate student Lauritz Petersen, who came with his wife Michelle. First year grad student Casey Johnson, who came with his wife Kristin, appreciated the chance to meet faculty and said, "It was nice that it was a non-math setting." Several faculty stayed overnight enjoying Alta Lodge's hot tub, nearby hiking to Red Pine Lake and Sunday brunch.



David Dobson, Christopher Hacon, Peter Trapa, and Ken Bromberg on the patio at Alta Lodge. Photo courtesy of Cyndi Bestvina.

## A Little Laugh

There are 10 kinds of people: those who understand binary and those who don't!

Many times you cannot see mistakes when proof-reading a manuscript. Count the F's in the following sentence, then see below for the answer:

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

## Colloquia

The Undergraduate Colloquium is held on Tuesdays at 12:55 in LCB 215.

The Graduate Colloquium is held on Tuesdays at 4:35 in JWB 335.

The Department Colloquium is held on Thursdays at 4:15 in JWB 335. A colloquium tea is held at 3:45 in JWB 228 prior to the talk.

All members of our mathematics community are welcome at these colloquia.

## The Answer

There are six F's in the sentence. A person of average intelligence finds three of them. If you spotted four, you're above average. If you got five, you can turn your nose at most anybody. If you caught six, you are a genius.

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[www.math.utah.edu/newsletter](http://www.math.utah.edu/newsletter)

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