

DEPARTMENT OF MATHEMATICS NEWSLETTER

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SPECIAL  
RECOGNITION

Outstanding  
Professor in  
Graduate  
Instruction  
2006-2007

*Alexander Hulpke*

Outstanding  
Graduate  
Teaching  
Assistant  
2006-2007

*Alan Von Herrmann*

NEW FACES IN MATHEMATICS

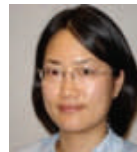
We welcomed two new faculty members this fall, Jeff Achter and Mi Kyoung Lim. Both were hired as tenure track assistant professors.



Jeff Achter

Jeff received his PhD at the University of Pennsylvania, Philadelphia. His postdoctoral experience was at Columbia University, New York and the University of Massachusetts, Amherst. Jeff's research is in the area of number theory and arithmetic geometry.

Mi Kyoung Lim received her PhD from Seoul National University in Korea. She spent the last 4 years in Paris at the Centre de Mathematiques Appliquees at Ecole Polytechnique as a post-



Mi Kyoung Lim

doctoral fellow. Mi Kyoung's research speciality is inverse problems.

Our postdoctoral program continues to prosper. Victor Ginting and Mrinal Roychoudhury have taken tenure track jobs at U. Wyoming and U. North Texas respectively. After one year of postdoc at CSU and one year at UCSD, Axel Malqvist has accepted a four year position as Assistant Professor position at Upsalla University in Sweden.

Two new postdoctoral fellows joined our department this fall semester. Andrew Dykstra received his PhD from Univer-

sity of Maryland, College Park. He is currently working with Professor Daniel Rudolph as a Yates Endowment Chair Postdoctoral Fellow.



Andrew Dykstra



Du Pham

Du Pham received his PhD from Indiana University, at Bloomington. He is currently working with Professor Don Estep on a DOE funded project with TechX company in Boulder to study fundamental computational issues arising in the study of fusion power generation.

FUN AND DISCOVER SUMMER SCHOOL 2007



Vakhtang Putkaradze

Department Professors Vakhtang Putkaradze and Dan Rudolph organized "Fun and Discovery" summer school for local high school teachers and students.



Dan Rudolph

The goal of the school was to demonstrate the importance of mathematics in nature and the attractiveness of mathematics as a career. Topics discussed included: motion of sand dunes, rivers and lakes of sand, sand and air including

quicksand and craters, and earthquakes and avalanches.



During four weeks of study, students and teachers learned about intricacies of sand and granular motion. They also conducted research projects making quicksand in laboratory and sinking objects in it. Guest visitors lectured about various topics, including lasers built from silica, the shape of the Eiffel tower and the theory of numbers.

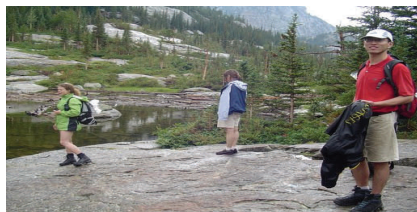


The summer school was partially supported by the Department of Mathematics, CSMATE and the College of Natural Sciences, and is part of the department's outreach efforts to local high schools.



## INVERSE PROBLEMS CONFERENCE

The Department of Mathematics hosted a Graduate Student Summer Workshop on Inverse Problems and Applications the week of July 30 through August 3, 2007.



The workshop was funded by the National Science Foundation, the Yates Chair Foundation and the College of Natural Sciences. The organizers were Jennifer Mueller, Oleg Emanouilov, and Samuli Siltanen, of Tampere University



of Technology, Finland.

The workshop was attended by 35 graduate students from around the world as well as CSU and the Front Range. The lectures and interaction sessions gave students the opportunity to learn about cutting-edge research in both theoretical and computational aspects of inverse problems, a field of mathematics with applications in engineering, biology,

geophysics, medicine, finance and chemistry. The workshop was comprised of five mini-courses and an evening lecture on electrical impedance tomography by Samuli Siltanen. The topics of the mini-courses included inverse transport equations and imaging in cluttered media, electromagnetic cloaking, statistical inversion of tomographic data, Fourier analysis in imaging, and inverse problems in vision. More information can be found at the workshop website:

[http://www.math.colostate.edu/~mueller/graduate\\_workshop](http://www.math.colostate.edu/~mueller/graduate_workshop)

The keynote speakers were:

Guillaume Bal, Columbia University, New York City; Allan Greenleaf, University of Rochester, Rochester, New York; Ville Kolehmainen, University of Kuopio, Finland; Sarah Patch, University of Wisconsin, Milwaukee; Curt Vogel, Montana State University, Bozeman.

## ROCKY MOUNTAIN DISCRETE MATHEMATICS DAYS

The Department of Mathematics at Colorado State University hosted the 10th annual Rocky Mountain Discrete Mathematics Days on August 2-3, 2007. The keynote speakers were: Vera Pless (University of Illinois-Chicago), Richard Green (University of Colorado) and Qing Xiang (University of Delaware).

The goal of these annual meetings is to bring together students and researchers working in the broad area of Discrete Mathematics to discuss their recent work and establish collaborations.

The meeting was attended by approxi-

mately 40 participants from a variety of institutions from the Front Range. A large number of participants were graduate students from the universities of Wyoming, Colorado at Boulder and at Denver, Regis University as well as CSU. A notable surprise was the large number of contributed talks by graduate students.

For more information go to:

<http://www.math.colostate.edu/~betten/rmdmd07.html>

Contributing talks from CSU Department of Mathematics included:

*Jeff Achter, Rachel Pries, Cayla McBee, Soley Jonsdottir, Tim Penttila, Ross McConnell, and Anton Betten.*

## 2007 ARNE MAGNUS LECTURE SERIES



Efim I. Zelmanov

The 2007 Arne Magnus Lecturer was 1994 Field's Medalist, Dr. Efim Zelmanov, who is the Rita L. Atkinson Professor of Mathematics at the University of California, San Diego. His lectures included Algebra in the 20th Century, Profinite Groups, and some Open Problems Concerning Infinite-Dimensional Algebras.

This lecture series is given annually in honor of Dr. Arne Magnus, our friend and colleague for 25 years. These lectures would not be possible without the support from alumni and friends of the Mathematics Department.

## CIMS-CENTER FOR INTERDISCIPLINARY MATHEMATICS AND STATISTICS



Donald Estep

On May 31<sup>st</sup> and June 1<sup>st</sup>, approximately 60 participants from Cornell, The Scripps Research Institute, Tulane University, The Berkeley National Laboratory, Los Alamos National Laboratory, Oak Ridge National Laboratory, Colorado State University, The University of Wyoming, and The University of Colorado at Denver, met for a CIMS-sponsored workshop entitled Small Angle X-ray scattering (SAXS) in Biological Sciences on the CSU campus. The organizers were Don Estep (Mathematics and Statistics), Mark van der Woerd, and

Karolin Luger (both Biochemistry and Molecular Biology). The workshop focus was to inform all participants on the progress in experimental SAXS capabilities and how this technique can be applied to biological sciences.

This workshop had two major goals: first, to define requirements for the development of better software for evaluation of SAXS and SANS data and second, to establish criteria for successful application and interpretation of small angle scattering data. The underlying motivation is the widely held dissatisfaction with the current state of SAXS software. The workshop concluded with a round-table discussion between experts in multiple disciplines

how to best approach the development of new methods and new software to interpret SAXS data.

The response from this meeting was extremely positive, and is leading to a major CSU multidisciplinary initiative in SAXS.

### Professor Don Estep Recipient of 2006-07 CNS Teaching Award

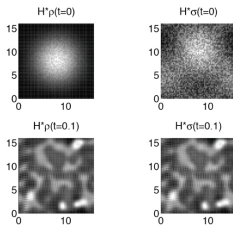
Mathematics Professor Donald Estep was the recipient of the 2006-2007 College of Natural Science Excellence in Graduate Student Education and Mentoring Award.

## IN THE NEWS



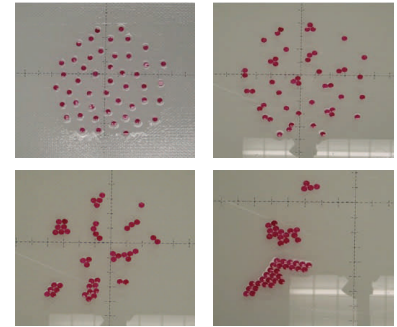
Vakhtang Putkaradze (Engineering, UC Boulder) appeared in the June 2007 edition of the DOE Science web page.

This work aims to develop mathematical tools necessary to build tiny (nano-meter size) sensors using self-assembly from nano-scale elements. The inspiration for this process is the attraction of floating



particles, sometimes called the "Cheerios Effect". Indeed, cheerios floating on the surface of milk self-assemble into irregular shape. The surface tension driven nano-scale self-assembly obeys essentially the same laws of physics as cheerios in spite of the nano-particles' much smaller size, so it is hard to control the shape of resulting aggregates. On the other hand, floating toothpicks (stars, squares) on the surface of water assemble into relatively nice line structures. The idea of this research is to control the self-assembly at nano-scales using particles of different shapes. Our mathematical theory is based on a geometric generalization of the simple physical assumption 'Force is

proportional to the velocity' for non-round particles. The mathematical theory developed in this work opens the way for possible industrial applications such as sensors.



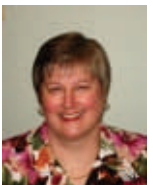
The "Cheerios Effect"

## PACe (Paced Algebra to Calculus Electronically) Center

Recognition and Awards

Paul Kennedy

Dr. Paul Kennedy, Professor of Mathematics and Co-Director of the PACe Program, received the 2006-2007 College of Natural Sciences Excellence in Teaching Innovation Award.



Lois Samer

Ms. Lois Samer, Co-Director of the PACe Program, received the Waterpik Excellence in Education Award from the CSU Department of Athletics, February 2007.

During the annual Department meeting on August 15, Simon Tavener, chair of the Department of Mathematics, also acknowledged Lois Samer for her tireless and invaluable efforts to ensure the smooth transition from the IMP to the PACe Center.

Ms Samer's plaque read "*Compensation is what you give people for doing the job you hired them to do, Recognition celebrates efforts beyond the call of duty*".

New PACe Center 2005-2007

Best-practices research for online mathematics instruction has influenced the design of the PACe Program. All PACe mini-courses are designed from an assessment-up perspective; frequent assessment is a key component of the instructional design. In addition, instruction focuses on both concept and skill using a multiple representations approach. Numerical, Verbal, Graphical, and Symbolic representations are emphasized throughout this program. Key elements of the PACe Program were unveiled on a limited scale in Fall 2005, and fully implemented in Fall 2006.

In the transformation of the Individualized Mathematics Program (IMP) into the PACe (Paced Algebra to Calculus electronically) Program took place over several steps. During the Summer of 2005 the Testing Center (WB 138) of the former Individualized Mathematics Program was completely remodeled. New carpet, paint, and mini-blinds were installed. In addition, all new furniture was purchased and 98 computers were installed to transform the Testing Center into a fully online testing area.

During the Summer, 2006 the Resource, Tutoring, Office, and Development areas of the former Individualized Mathematics

Program were completely remodeled (west end, first floor of Weber). The facilities were equipped to transform the IMP into the fully online PACe Program as follows:

IMP Resource Center: transformed into a 20 seat classroom equipped with personal computers for students, and a smart tablet and projection system for the instructor.

IMP Tutoring Center: new carpet, paint, mini-blinds and 36 personal computers were installed to create an online instructional/tutoring center.

IMP Office: converted into a development center to house equipment and personnel needed to produce instructional video-clips, assessment items, and enhancement of the online platform that supports the PACe Program.

IMP Development area: walls were moved and an integrated office complex was created. Included within the complex are a central office area, two director offices, a conference room, a quiet testing room, and a staff break room.



PACe Testing Center