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School of
Mathematical Sciences

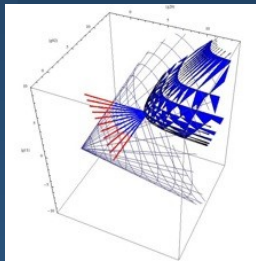
newsletter

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Cross-Disciplinary Research in the SMS

SMS and Cataract Research



The cataract is the leading cause of blindness worldwide. Concentrated mixtures of eye lens proteins can undergo liquid-liquid phase separation and can also aggregate so as to scatter light. This results in clouding the lens and degradation of vision. Chemical inhibition of the responsible interprotein interactions can, in principle, delay visual impairment from cataract. To make an informed search for cataract inhibitors, it is important to understand the molecular basis of eye lens protein solution phenomena.

This cross-disciplinary research project, which involves physics, mathematics, chemistry, biology and computer science, aims to help develop the basic understanding of concentrated fluid

mixtures of eye lens proteins, including their phase transitions, equations of state, light scattering, and aggregation kinetics. RIT School of Mathematical Sciences is involved in several of these research endeavors as an essential player.

One subproject is to reconstruct the Gibbs free energy of liquid mixtures from light scattering efficiency measurements. This involves the solution of a fully nonlinear partial differential equation and the analysis of the influence of experimental uncertainties. It is being undertaken as a collaboration involving Drs. Carl Lutzer, David Ross and Chris Wahle (SMS), George Thurston and Vern Lindberg (Physics), Andreas Langner (Chemistry), and RIT

senior physics student Oscar Marcelino.

Another subproject is to understand the electrostatic portion of the interactions between eye lens proteins with full consideration of their fluctuating charge distributions. This involves parallel solutions of partial differential or other types of equations and is conducted by Drs. David Ross, Anthony Harkin, Dawn Hollenbeck, George Thurston, Edward Nelson, Andreas Langner and John Hamilton in conjunction with current RIT physics student Elias Putzig and former RIT physics student Michael Martini, although more collaborators are joining the effort.

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SMS Newsletter

Contributors: Shelly Cicero, Patricia Diute, Joshua Faber, Akhtar Khan, Douglas Meadows

Guest Contributor: Kara Leonard

Designer & Editor: Shelly Cicero

Editor-in-Chief: Douglas Meadows

CCRG Cross-Disciplinary Research

It has been a very busy summer and fall for the Center for Computational Relativity and Gravitation (CCRG) and all the researchers who contribute to it. SMS Associate Professor Carlos Lousto and Assistant Professor Yosef Zlochower managed to achieve a computational feat many people thought would be impossible for years to come: simulating the merger of two black holes where one is

100 times more massive than its companion. This groundbreaking research, submitted to the journal *Physical Review Letters* and picked up widely by the popular science press in the US and worldwide, has long been considered one of the most difficult challenges in the field of numerical relativity, and it opens up the prospect of bringing together the fields of numerical and analytical relativity

for fruitful new research possibilities.

SMS Associate professor Manuela Campanelli, the Director of the CCRG, was the Principal Investigator on a large project the NSF funded to study the light given off by accretion disks around merging black holes. The \$2 million award to RIT and Johns Hopkins

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New Faces in SMS



Dr. Elizabeth Cherry

Elizabeth Cherry obtained her Ph.D. in Computer Science from Duke University and most recently spent five years as a research faculty member at Cornell University before joining RIT as an assistant professor in the School of Mathematical Sciences.

Dr. Cherry has spent more than a decade using computational approaches to studying cardiac electrophysiology. Her research interests include mathematical physiology, nonlinear dynamics, and computational methods for partial differential equations. Presently she is working on

several projects including low-energy defibrillation, bifurcations in the electrical response of cardiac tissue, and anatomical and electrophysiological modeling of the cardiac Purkinje network.

Welcome to the SMS, Elizabeth!



Dr. Baasansuren Jadamba

Baasansuren (Basca) Jadamba joins RIT as a lecturer. She received her M. Tech. in Industrial Mathematics from Technical University of Kaiserslautern and obtained her Ph.D. from University of Erlangen-Nuremberg (both in Germany). In her dissertation she investigated finite element methods for

phase field models of solidification and dendritic growth.

Previously Dr. Jadamba taught at Michigan Technological University for one year and at RIT for two years as an adjunct faculty. Her research interest includes numerical analysis of PDE's, phase field models, in-

verse problems, computational optimization and elasticity imaging.

Welcome to the SMS, Basca!



Prof. Carrie Lahnovych

Prof. Carrie Nixon Lahnovych received her B.S./M.S from RIT last year and her thesis was on analysis and computation of a quadratic matrix polynomial and applications to the Barbov-Tenne Model of statistical mechanics. She worked on her the-

sis as a part of the cataract research team with David Ross and George Thurston (physics) and others from various departments in the College of Science at RIT.

She met her husband, Andrew, while both were study-

ing at RIT and got married in September of 2009.

Prof. Lahnovych joins RIT as a lecturer.

We are delighted to have Carrie back!

Prof. Birgit Coffey



Birgit Coffey joins the

School of Mathematical Sciences as a Lecturer. She is originally from the Rochester area and attended SUNY Oswego where she studied German and Math. She earned a Master's Degree from the University of

Rochester in 1996 and began working as a high school math teacher, first at Fairport High School (96-99) and later at Marcus Whitman High School (99-04). During this time, she worked as an adjunct for numerous area colleges.

Prof. Coffey took a position in RIT's Academic Support Center and worked as a math instructor from 2004 through 2010. In 2009, she was awarded the RIT Student Affairs Excellence in Service Award.

She teaches online math classes for the Center for Multidisciplinary Studies

and enjoys learning about new technology to assist teaching. Prof. Coffey is currently piloting a portable scanner (www.theovercam.com) for use with teaching and online office hours.

Prof. Coffey has been married for 14 years to Michael Coffey and lives in Ionia (a hamlet of West Bloomfield) with their daughters, Erica (10) and Allison (8). She enjoys hiking and riding bikes with her kids.

The SMS is happy to have Prof. Coffey as a member of our school.

CCRG Cross-Disciplinary Research, con't. from p. 1

University (JHU) is the largest received to date by a PI from the School of Mathematical Sciences and will provide funding for the Center for years to come to continue with its groundbreaking research. The work will be done in collaboration with a team of well known astrophysicists from JHU and it will support the salaries for one research scientist and multiple graduate students plus purchase computing equipment.

SMS Assistant Professor Joshua Faber, along with Associate Research Scientist Scott Noble and Postdoctoral Research Assistant Bruno Mundim, recently released a public version of a newly developed general

relativistic magnetohydrodynamics code as part of the Einstein Toolkit, a community project designed to make a modern, efficient numerical relativity code available to researchers worldwide to aid in their work. The RIT contribution will allow scientists everywhere to study how black holes interact with magnetic fields and may help unlock the secrets of gamma-ray bursts, relativistic jets and other mysterious high-energy events we observe on a regular basis.

SMS Associate Professor John Whelan and his colleagues in the LIGO Scientific Collaboration (LSC) recently observed a very important milestone as

LIGO, the Laser Interferometer Gravitational-Wave Observatory, concluded its sixth science run (July 2009-October 2010) and shut down for a planned 4-year upgrade to convert into "advanced LIGO". Initially, LIGO was sensitive to binary black hole mergers as far away as 160 megaparsecs (500 million light years), while advanced LIGO will be able to see them as far away as 2 gigaparsecs (7 billion light years). With over 1000 times the volume of space available to it, advanced LIGO is expected to regularly observe gravitational waves from these extremely rare events, launching the field of gravitational wave astronomy.

Alumni Corner:

Emma Hinke earned her BS in Applied Mathematics in 2007. After her graduation she joined Johns Hopkins University as a Development Research Analyst in the Office of Development and Alumni Relations. Her research involves data mining to identify potential financial contributors that may benefit Johns Hopkins. This has been a role that has been traditionally held by librarians, however this role is growing into more of a science. With her experience in using statistics, Emma develops models to identify any potential revenue sources to target viable fund raisers that historically have a good portfolio. Parameters include prior donations, behaviors and prior financial impact for the institute.

Emma also received a minor in Science Writing. She feels this has been so useful for communicating to a fund raising customer. As an example the Engineering School may need a model to create a prioritized list of potential donor prospects. The customer will also require products to track and determine success metrics. Emma is excited about the opportunity to attend conferences and to network with other organizations that support fund raising.

Richard Dirmyer, a native of the Rochester area, earned his BS/MS in Applied Statistics in 2008. Just three months prior to graduation he found full time employment as a higher educational consultant for Scannell & Kurz, a Pittsford NY based consultant firm. Richard gained practical industry experience while his background in statistics allowed him to make useful and substantial contributions to the company. He built logistic models and used simulations to predict enrollment for the client universities. These models predicted revenue and considered parameters such as grant aid and diversity to determine the impact on enrollment.

Richard joined the faculty of SMS as an adjunct professor in March 2009 and since then has taught Data Analysis. In July 2009, he accepted the position of Senior Institutional Researcher in the Office of the President for NTID at RIT. His work involves analyses related to decisions made at the institute level, such as salary equity studies. He sits on various university committees and authors the NTID Annual Report.

We look forward to hearing about all our alumni accomplishments. Feel free to contact us at MathAsst@rit.edu if you have info to share!

Hire a Tiger!!

Alumni, faculty, and staff, do you work for or have connections with an organization interested in hiring our SMS students or alumni for co-op or permanent employment? If so, I can help!

Not only do I assist SMS students and alumni find jobs, I also work directly with employers to support their recruiting initiatives, including:

- posting co-op and permanent positions on our job database
- scheduling on-campus interviews
- arranging on-campus presentations to students and alumni
- planning attendance at our career fairs
- and more customized to the employers' requests!

Co-op at RIT is defined as full-time, paid employment, which lasts

at least 10 weeks and is directly related to a student's major. Over 3,500 RIT students go on co-op annually with over 2,000 employers from around the world!

Employers enjoy many benefits from hiring co-op students including:

- Experiencing immediate and valuable results at relatively low cost
- Employees, with the help of co-ops, can take on new tasks and assignments
- Building a pipeline of promising students to recruit to full-time assignments upon graduation

Visit our employer website at www.rit.edu/recruit to learn more about the co-op program and how the Office of Co-op and Career Services can help organizations meet their hiring needs. If you work for

or have connections with an organization interested in recruiting from RIT, please contact me at:

Kara Leonard,
Assistant Director
Office of Co-op & Career Services
kmloce@rit.edu
(585) 475-7413

Some Employers Hiring SMS Co-op and Graduating Students:

Blue Cross/Blue Shield, Cognigen Corp., Global Crossing Telecommunications Inc., Harris Interactive Inc., Institute for Defense Analyses, Liberty Mutual Insurance Co., LMI, Mayo Clinic, NASA, National Geospatial-Intelligence Agency, National Security Agency, Novum Pharmaceutical Research Services, Ortho-Clinical Diagnostics, Paychex, Pfizer Inc., U.S. Census Bureau, Xerox Corp.

Career Fair Recruiter Speaking with Potential Co-op Hire

