SCHOOL OF MATHEMATICS
PROOFREADER

FOR ALUMNI AND FRIENDS

Georgia Tech

WELCOME FROM THE CHAIR

In this edition of
The *ProofReader*

We welcome the opportunity to connect with you once again through the 2019 Proofreader.

A number of the articles in this edition highlight exciting progress as we **advance the School of Mathematics as a national and international hub** for activities across the mathematical sciences.

RESEARCH CENTERS

Contributing to this hub are recent funding initiatives, which bring researchers at all levels to spend time at the School of Math. The Research Training Grant in Geometry and Topology allows us to expand our recruitment of postdocs and graduates students in the School (Pg. 3), as well as supporting broader training activities that benefit junior researchers across the country. The Southeast Center in Mathematical Biology is a national center that links together math, biology, and a number of universities across the Southeast. And the recent award of an NSF-REU program in the School of Math supports 25+ students to come to the School of Mathematics to work with faculty and postdocs on research projects during the summer. This fund complements other undergraduate research projects that the SoM and College of Science support during both the summer and through the academic year. *(For a story featuring the REU's from 2018 see Pg. 13-16)*

CONFERENCES AND WORKSHOPS

There has also been a sharp increase in the number of conferences and workshops led by SoM's faculty over the last few years. These have brought an impressive number of visitors to the School and Georgia Tech. The School's faculty has been attracting substantial funding for these, with more than 25 events run over the last two years. These range from large conferences with hundreds of participants, run in cooperation with mathematic professional organizations, to research-area focused workshops attracting researchers nationally and internationally, to regional conferences primarily involving researchers from the Southeast (Pg. 29-30). These events include training activities supported through faculty-held NSF-CAREER grants or the research centers mentioned above.

OUTREACH

One of our major regional events is the High School Math Competition, running annually every April or May. This past April we again welcomed over 300 participants, as well as their coaches, teachers, and parents for another action-packed day where students could compete as individuals and in teams, learn about careers in mathematics, and visit the Georgia Tech campus (Pg. 8). Complementing these activities, we have a large - and growing - distance learning program where high school students can take university level courses. We see many of these students later applying to attend Georgia Tech.

VISITORS AND RECRUITMENT

Finally, the School continues with an active visitor program, averaging between 30-40 long term visitors per year, and around 70 short term visitors, more than half of whom give seminars. Our recruitment of postdocs and graduate students continues on a strong positive trajectory, both in terms of the quality and quantity of applications, as well as in the strength and diversity of the postdoctoral and graduate student cohorts that join us in SoM.

PARTICIPATE!

We are working hard on getting the word out about the many opportunities in SoM. And we hope you will have the opportunity to visit us and experience yourself the activities at this hub of mathematics!

OUR NEW WEBSITE

Finally we have a new website which gives visitors an excellent view of what is going on in the School, as well as recent news about School members and activities. An extensive archive of these events is also available, together with updated webpages for many of our programs. Please check in with us there – and in person! – to see how we realize our goals for the future.

The *ProofReader* (Volume 11, 2019)

Stories by
Sal Barone
Maureen Rouhi
and the
CoS Communications Team

Featured Article "Mysteries of Floating"
by John McCuan
and edited by Sal Barone

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Georgia Institute of Technology
School of Mathematics

Check out our website for News and Events, and much more!
https://math.gatech.edu

GEORGIA TECH GEOMETRY AND TOPOLOGY GROUP WINS $2.1 MILLION NSF GRANT

July 5, 2018

Why Study Topology And Geometry

Prof. John Etnyre answers this question. He explains:

"Topology is the study of spaces. They can be the space we live in or configurations of mechanical systems. Mathematicians also consider spaces of solutions to algebraic equations and partial differential equations, as well as even more abstract space.

"More specifically topology is the study of spaces where some notion of continuity makes sense. What are these spaces? How can we distinguish one space from another? What interesting properties do specific spaces have? These are the basics questions in topology, whose language pervades much of mathematics, science, and engineering.

"Geometry is, loosely speaking, the study of some kind of structure on a space. Riemannian geometry involves spaces on which you can measure lengths of vectors and the angles in between. Symplectic geometry allows one to study dynamical systems akin to classical mechanics on a space.

"Topology and geometry underlie a great deal of science and engineering. Whether trying to understand general relativity and the structure of the universe, design robust sensor networks, unravel DNA recombination, develop string theory, or countless other endeavors, the underlying language and ideas are likely to be that of geometry and topology."

Five-Year Award Will Help Educate the Next Generation Of Mathematicians

The National Science Foundation (NSF) has awarded a Research Training Groups (RTG) grant to the Georgia Tech Geometry and Topology (GTGT) group. GTGT will use the $2.1 million grant over five years to train undergraduates, graduate students, and postdoctoral fellows. The GTGT project supports NSF's long-range goal to increase the number of U.S. citizens, nationals, and permanent residents pursuing careers in mathematics.

Expected Outcomes

Over its five-year run, the grant will enable the training of 60 undergraduate students, 22 graduate students, and 14 postdoctoral fellows. Supplementary funding from the College of Sciences will ensure three years of support for all postdoctoral fellows.

Etnyre says GTGT will leverage its access to Georgia Tech's engineering programs to spark collaborations between engineers and mathematicians. Similarly, GTGT will use its proximity to institutions serving groups underrepresented in mathematics to help increase the representation of minorities and women in advanced mathematics.

Ultimately, Etnyre says, "we aim to develop students and postdoctoral fellows who are well-rounded scholars, accomplished teachers, and valuable members of the mathematics community."

> *"Topology and geometry underlie a great deal of science and engineering. Whether trying to understand general relativity and the structure of the universe, design robust sensor networks, unravel DNA recombination, develop string theory, or countless other endeavors, the underlying language and ideas are likely to be that of geometry and topology."*
>
> *- John Etnyre*


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Areas of Expertise

- Algebraic Topology: Kirsten Wickelgren[1]
- Contact and Symplectic Topology: John Etnyre[2]
- Geometric Group Theory: Igor Belegradek[3] and Dan Margalit[4]
- Global Riemannian and Differential Geometry: Igor Belegradek, John Etnyre, and Mohammad Ghomi[5]
- Heegard-Floer Theory: John Etnyre and Jennifer Hom[7]
- Low-Dimensional Topology: John Etnyre, Stavros Garoufalidis[6], Jennifer Hom, Thang Le[8], and Dan Margalit
- Quantum Topology: Stavros Garoufalidis and Thang Le
- Riemannian Geometry of Submaniforlds: Mohammad Ghomi

- **$2.1 million over 5 years**
- **Will benefit 60 undergraduates, 22 graduate students, and 14 postdoctoral fellows**
- **Three years of support for postdocs guaranteed by supplementary funding from CoS**
- **GTGT will also help increase the representation of minorities and women in advanced mathematics**
- **Ultimately the aim is to develop students and postdoctoral fellows who are well-rounded scholars, accomplished teachers, and valuable members of the mathematical community**

> *"GTGT will leverage its access to Georgia Tech's engineering programs to spark collaborations between engineers and mathematicians, and will use its proximity to institutions serving groups underrepresented in mathematics to help increase the representation of minorities and women in advanced mathematics."*

The grant enables the GTGT group to embark on several major activities:

- **Expand** the group by supporting graduate and postdoctoral fellowships
- **Enhance** educational opportunities for all students through new courses, expanded seminars and REU (Research Experiences for Undergraduates) opportunities, and a direct-reading program for undergraduates
- Firmly establish the annual **Georgia Tech Topology Conference** and the biennial Topology Students Workshop, continue the Southeastern Undergraduate Mathematics Workshop, and initiate the Georgia Tech Topology Summer School
- Strengthen **professional development** components of graduate and postdoctoral training
- Increase interaction with colleges and universities serving groups that are **underrepresented in mathematics and expand outreach to precollege students**
- Create a website to serve as repository of resources

TEACHING AWARDS TO FACULTY

2018 Class of 1940 Course Survey Effectiveness Award Winners

Congratulations go to **Klara Grodzinsky**, **Enid Steinhart**, and **Lutz Warnke**, who are all winners of the 2018 Class of 1940 Course Survey Effectiveness Award. These awards recognize faculty members with exceptional scores and response rates in the Course-Instructor Opinion Survey (CIOS).

The criteria for selection includes a rating of at least 4.9 in the category "Overall, this instructor is an effective teacher" and a CIOS response rate of at least 85%.

The William A. "gus" Baird Faculty Teaching Award

This award for Associate and Full Professors, which goes to Prof. Prasad Tetali this year, is named after "gus" Baird. He was known as gus with a small "g". He had many memorable sayings that his students called, "gus-isms". Nominees should possess qualities that make them stand out just as "gus" Baird had.

Prasad has won several institute awards since 2011, including the College of Sciences Faculty Mentor Award, the Outstanding Senior Research Faculty Award, and served as Interim Chair of the School of Mathematics.

Prasad Tetali

2018 CTL/BP Junior Faculty Teaching Excellence Award

Because many undergraduates take the fundamental mathematics courses he teaches, Joe Rabinoff has had a broad impact on Georgia Tech undergraduates.

Students say Rabinoff makes mathematics relevant and engaging, especially the introductory classes he teaches. For his part, Rabinoff seeks to ensure that all students, whatever their majors, understand and appreciate the material.

Rabinoff was heavily involved in developing the curriculum and course materials for Math 1553, Introduction to Linear Algebra. This is an engineering core course that is taken by thousands of Georgia Tech students every year. He created lecture slides, interactive demonstrations, and a free online interactive textbook together with Dan Margalit.

Beyond the classroom, Rabinoff spearheaded the creation of the School of Mathematics' course repository and has been the main contributor to its infrastructure and content. The repository contains up-to-date curated materials that a new teacher can just pick up and use.

"The students are the most exciting part about being at Georgia Tech", Rabinoff said in a 2016 Q&A. "Some students are extremely hard-working and talented. I derive a lot of pleasure from interactions in class and office hours," he said.

In turn, students praise Rabinoff for his enthusiasm, engaging lectures, friendliness, accessibility, and, yes, his "super" "Rabinoffice" hours, which one students says "are fantastic during exam weeks."

"It is an honor to be recognized with this award," Rabinoff says. "The students I see every week in class and in office hours are great kids, and all of the effort is for them. Pedagogy is special in this way: The reward is not abstract; it is visible every time I see in a student's face that a light went on in their head. I'm very fortunate to have the opportunity to teach in a place like Georgia Tech."

Joe Rabinoff

Check out the free online interactive Math 1553 textbook at
https://textbooks.math.gatech.edu/ila/

2019 GEOFFREY G. EICHHOLZ FACULTY TEACHING AWARD

April 18, 2019

Plamen Iliev: A Highly Effective Mathematics Teacher at All Levels

Georgia Tech has selected Plamen Iliev as a recipient of the 2019 Geoffrey G. Eichholz Faculty Teaching Award, administered by the Center for Teaching and Learning. A professor in the School of Mathematics, Iliev has taught mathematics courses at all levels, from large lecture service courses to core graduate courses.

The award recognizes faculty who provide outstanding teaching to students in core and general undergraduate courses and help students establish a solid foundation for their education at Georgia Tech. Colleagues say he cares about his students, has high expectations of them, and is an effective and engaging teacher.

What Students are Saying

"Best math teacher I've ever had.... Ten thumbs up!"

"If I could have him as a teacher for all my courses, it would be great."

"He always made his expectations very clear and always announced what he planned to teach us next. He cared very much whether or not students learned material."

"He is very approachable and welcoming."

"He knows his stuff backwards and forward."

"He was very funny and kind and made the class interesting. He communicated well with students."

Among the large lecture classes Iliev has taught are Calculus I, II, and III; Differential Equations; and Multivariable Calculus.

In addition, he has taught Abstract Vector Spaces, Applied Combinatorics, Probability and Statistics, Real Analysis I and II, Complex Analysis, and Classical Mathematical Methods in Engineering.

Since joining Georgia Tech in 2003, Iliev has taught more than 3,000 students. His effective teaching has made a broad impact on undergraduate education and has provided solid foundational training for graduate students.

Plamen Iliev

"It has been a privilege to teach at Georgia Tech for the past 16 years," Iliev says. "We are fortunate to have very bright and hardworking students, which makes teaching every class an enjoyable and rewarding experience."

> *"An amazing lecturer. Comes to class with no notes and somehow delivers extremely relevant examples. I always leave class with a clear understanding of what I just learned."*

Professor Iliev is the 5th SoM professor to recieve this award. Previous winners were:

- Ronghua Pan, 2016,
- Doron Lubinsky, 2010,
- Evans Harrell, 2007,
- Michael Loss, 2006.

This award was established in 2005 through a gift from School of Mechanical Engineering's Regents' Professor Emeritus Geoffrey Eichholz. It was created to reward senior faculty members who made a long-term contribution to introductory undergraduate education and were outstanding teachers for students taking freshman and sophomore core courses. Recently, the award has broadened to recognize faculty at any point in their careers who excel in teaching core and general education courses, and who help students establish a solid foundation for their education at Georgia Tech.

OUTREACH BY STUDENTS AND ALUMNI

Math 2803 Number Theory and Cryptography

The MATH 2803 Number Theory and Cryptograpy is a video class run through the School of Mathematics for high school students. On Saturday, December 1, 2018, around 60 students participated by showing their final projects in the form of posters. The class was taught by Jonathan Paprocki, a graduate student.

Graduate Provides Opportunities for Underrepresented Students

Ryan Hynd, a graduate in the B.S. Applied Mathematics program at Georgia Tech, was in the news recently for his work with University of Pennsylvania's Bridge to Ph.D program.

"Penn's Bridge to Ph.D. program provides an opportunity for students from underrepresented backgrounds to earn master's degrees in mathematics while also preparing for a Ph.D. The program, now in its second year, is receiving positive feedback from the STEM community while enabling a diverse group of students to become the next generation of mathematicians."

TA Creates YouTube Channel for MATH 2552 Diff EQ

Sebastian Fernandez, an award-winning undergraduate TA for Georgia Tech's School of Math, thought that teaching MATH 2552 Differential Equations 4 times since the Fall of 2016 wasn't enough. Hoping to expand his reach, he created an online MATH 2552 Video Series tailored to Georgia Tech's curriculum with the goal of enhancing future 2552 sections while simultaneously allowing anyone in the world the opportunity to receive a quality differential equations education and to help them consider Georgia Tech for their post secondary education. *See our website for the link to the introductory video from the channel where all 37 videos can be found.*

HIGH SCHOOL MATH COMPETITION 2019

April 17, 2019

Every year, Georgia Tech welcomes students who compete at the Georgia Tech High School Math Competition. Accompanied by teachers, coaches, and parents, the participants represent high schools from around Georgia and nearby states. Around 40 volunteers from among the Georgia Tech faculty, staff and students helped with registration, proctoring, and grading.

Thanks to the hard work of everyone involved, the High School Mathematics competition was a huge success. In 2018, over 250 students from 37 high schools competed in this annual Georgia Tech tradition, dating back to 1958. This year, the 2019 competition challenged over 300 students from 43 high schools to complete the competition's four exams in such topics as algebra, geometry, combinatorics, number theory, and basic calculus.

The top 59 students from the free response exam were invited to take part in a proofs exam during the afternoon in order to determine the individual winners.

Sample question: At noon a clock's hands are in alignment. After how long is the next time that the hands are again aligned?

The 2019 individual winners were:

1rst Place: Holden Watson
(Fulton Science Academy Private School)

2nd Place: Russell Emerine (Walton High School)

3rd Place: Darren Key (Walton High School)

The 2019 winning teams were:

1rst Place: Walton High School Team A

2nd Place: Fulton Science Academy Team A

3rd Place: Chamblee Charter High School Team A, Northview High School Team A (TIE)

5th Place: Asheville Homeschool Team A, South Forsyth High School Team A (TIE)

To apply for next year please visit hsmc.gatech.edu

MEET THE GRADS

Bryson Kagy: B.S. in Mathematics and B.S. in Physics

"I initially was not that excited about Tech," Bryson says. "Growing up near the school made me think it wasn't as good as it really was. I thought I would not meet new people, because lots of people I know would be going here."

Bryson now acknowledges how wrong he was. "I love the academic environment and community at Georgia Tech," he says. "The people here are very nice and support and want to help each other. And there are so many research opportunities, academic talks, and professional opportunities."

What is the most important thing you learned at Georgia Tech?

I learned the importance of hard work. I didn't think would take as much work as it actually does to learn math.

I am blown away by how much the students want to help each other succeed here. I love how not competitive the environment here is and the sense of solidarity within small classes to try and get everyone to succeed.

What are your proudest achievements at Georgia Tech?

I am proud to have served as president of Club Math for two years. I love that club. I hope it continues to support math students for years to come.

I am proud to have posted two research papers to arXiv. It feels great to have a tangible finished product from your work.

I am proud to be part the team that created Mathapalooza and the Seven Bridges of Königsberg concert. Both are mathematics outreach projects that I helped create with a team and Dr. Evans Harrell. I loved showing the public a glimpse of higher mathematics.

Which professor(s) or class(es) made a big impact on you?

Dr. Michael Lacey made the biggest impact on me. I had him for Foundations of Mathematical Proof, which was my first exposure to higher mathematics. He was my research advisor for my first research project. We have since done a reading course together and planned a new course curriculum and materials. He has given me invaluable guidance both professionally and for life in general. His support and mentorship is what has made it possible for me to pursue my passion in mathematics.

I talked to Dr. Mohammad Ghomi almost daily during coffee and tea times. He made me feel welcome and boosted my confidence about approaching professors.

Dr. Enid Steinbart gave me lots of support and advice. She let me know about lots of opportunities and cared about my well-being.

What unique learning activities did you undertake?

I participated in two research experience for undergraduates (REU) programs, at Georgia Tech and at Carnegie Mellon. They cemented my love for mathematics research. I loved learning a specific topic deeply and being in an environment where I could just focus on research and immerse myself in math.

Bryson Kagy

I highly recommend anyone thinking about research to apply over the summer to REUs.

What advice would you give to incoming undergraduate students at Georgia Tech?

Work with other people. When I got here, I did the work for my classes all by myself, because I thought it would make me understand the material better. I have found the complete opposite to be true.

Where are you headed after graduation?

I will be pursuing a Ph.D. in Mathematics in Michigan State University.

Georgia Tech has prepared me with its rigorous classes, research experience, and opportunities to present my research at conferences. All of these will help me succeed in graduate school.

Hunter Vallejos: B.S. in Mathematics

It was during high school that Hunter Andres Vallejos first experienced pure mathematics, which involved building a program to generate the Mandelbrot set in Java. "If you have never seen it, just look it up," Hunter says. "It is remarkable how such beauty can come from complex numbers."

For Hunter, The strongest draw to Georgia Tech was the student body. "There was a real passion for learning and growth which I found lacking at other universities," Hunter says. "I honestly felt that the student body was genuinely interested in what they were learning – so much so that they would even spend spare time on projects for fun!

"Being able to make a joke about calculus and everyone on campus understand it is a very special thing – I will miss it."

What is the most important thing you learned at Georgia Tech?

I learned responsibility. I learned to balance a budget; file my taxes; balance my schoolwork, hobbies, and personal time; and build professional connections that will lead to future opportunities.

What are your proudest achievements at Georgia Tech?

I achieved many scholarly goals, such as being first author on a scientific publication, doing many research internships, getting all A's while taking four graduate math courses at a time.

But my proudest achievement was the opportunity to affect students as a teaching assistant in the School of Mathematics. Reading the anonymous reviews by students every semester always warms my heart.

My favorite part of teaching was when a student began to see the beauty and scope of mathematics in its entirety – the mysterious deep connections between algebra, geometry, and topology; the problems that arise when one wants to talk about infinity; and the insight that comes from generality.

Which professor(s) or class(es) made a big impact on you?

Professor John Etnyre and Dr. Caitlin Leverson had an enormous impact on me. The many topology and geometry classes I took from Professor Etnyre and Dr. Leverson's mentorship in my research activities at Georgia Tech have shaped me as a mathematician, thinker, and person. I am very thankful for their mentorship and good example.

How did Georgia Tech transform your life?

Georgia Tech has made me an independent and capable thinker. The rigor of Georgia Tech's academics creates some of the most sought-out talent by graduate and professional schools, as well as employers. I never felt held back at this university. It has enabled me to pursue my aspirations to their full potential.

What advice would you give to incoming undergraduate students at Georgia Tech?

Find and build a support group of friends, whether that be in clubs or intramurals. They will be there for you in times of need, and you need to be reminded that there are more important things in life than your career and grades.

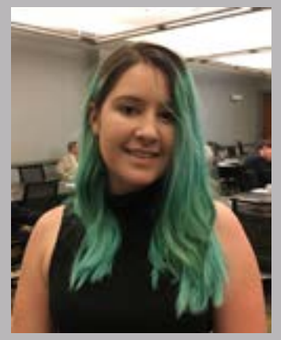
Hunter Vallejos

Do not cram! Even if you can pass the test after cramming, you will remember none of the material, and this will hamper your success in future classes that depend on what you learn now. Learn how to study every week by completing exercises or by going over lecture notes.

Where are you headed after graduation?

I am continuing my studies in the Math Ph. D. program at the University of Texas, Austin. Georgia Tech has developed in me the mathematical maturity necessary to thrive in a school like UT Austin. I don't think that such a great Ph. D. program would have been within my reach had I studied elsewhere.

COLLEGE OF SCIENCE AWARDS TO MATH MAJORS



Mathilda Avirett-Mackenzie is the recipient of the ***A. Joyce Nickelson and John C. Sutherland Prize***. The award goes to a top student studying at the intersection of physics and mathematics.

Growing up in Atlanta, Avirett-Mackenzie attended Atlanta Girls' School. She graduated from Georgia Tech in May 2019 with a B.S. in Physics and a B.S. in Mathematics.

What are your proudest achievements at Georgia Tech?

I'm the first author on a paper that is now in peer review in the journal Monthly Notices of the Royal Astronomical Society, which is amazing. Papers are a big deal for undergraduate researchers. It's great to see the payoff from the past three years of work.

The Roger M. Wartell, Ph.D., and Stephen E. Brosette, M.D., Ph.D. Award for Multidisciplinary Studies in Biology, Physics, and Mathematics goes to **Daniel Gurevich**, a third-year triple major in mathematics, physics, and industrial and systems engineering. A native of Marietta, Georgia, Gurevich was homeschooled. He is also an internationally ranked chess player.

This award is given to an undergraduate student with demonstrated accomplishments at the interface of biology and either physics or mathematics. It was established by a gift from alumnus Stephen Brosette in recognition of the contributions to Georgia Tech of biology professor Roger Wartell, who served as chair of the School of Biology from 1990 to 2004.

Steven Creech is the recipient of the ***Mehta Phingbodhipakkiya Undergraduate Memorial Scholarship***. Creech is a third-year mathematics major, with a concentration in pure mathematics. From Cumming, Georgia, he attended North Forsyth High School.

The scholarship was established by Maranee Phing to honor her father, his love for physics, and the great sacrifices he made to ensure that she would have the finest education. The award is given to a junior or senior in the College of Sciences, based on academic merit.

Which professor(s) or class(es) made a big impact on you?

My sophmore year I took the undergraduate sequence of Abstract Algebra with Christine Heitsch. Just seeing groups, rings, Galois theory, all of that, I just fell in love with it; Just learning about it all. Prof. Heitsch was a wonderful teacher, she really made sure we understood the material.

MATH GROUPS THAT ARE RUN BY STUDENTS IN SoM

May 2, 2019

Students in the School of Mathematics at Georgia Tech are known for their strong scientific background, motivation, hard work, academic potential, and for their love of organizing!

In Fall 2019 a new student run group, the Association for Women in Mathematics (AWM) Undergraduate Student Chapter will be coming to SoM for the first time. Here are some of the other math groups in SoM that are student run.

Club Math
Club Math is a social organization for students at Georgia Tech with an interest in mathematics. Meetings are weekly to discuss problems and puzzles, play games, and learn about interesting topics beyond the scope of what is taught in the classroom. Throughout the coming semester, the club plans on expanding their catalog of activities to include crafts such as mathematical knitting and origami, talks organized and presented by Club Math students, and occasional events such as movie nights.

SIAM Student Chapter
Student chapters of the Society for Industrial and Applied Mathematics (SIAM) are organized at colleges and universities to encourage the promotion of applied mathematics and computational science to young mathematicians. Student chapters provide opportunities to share ideas, learn about careers in applied and computational mathematics, and develop networks with faculty and fellow students.

The Georgia Tech chapter organizes a weekly student seminar and organizes/takes part in a yearly conference involving the other student chapters of the Southeast.

AMS Grad Student Chapter
American Mathematical Society's Graduate Student Chapters enhance opportunities for students to make contacts with students and faculty at their own or other institutions, interact with more established mathematicians, discover career opportunities, sponsor social functions for the mathematical community, find assistance for attending AMS meetings, and engage in outreach efforts to local middle and high schools.

Graduate Student Brainstorming Sessions
The brainstorming sessions were piloted in Fall 2017 and have continued ever since, offering graduate students to relate their research struggles within a relaxed and collegial atmosphere.

Going forward, graduate students will be working with the SIAM Student Chapter to organize these sessions, with the help of Molei Tao.

AWM Grad Student Chapter
The Association for Women in Mathematics chapter at Georgia Tech was chartered in 2016 by Samantha Petti and Cvetelina Hill. AWM programs inspire and empower individual students, faculty, and researchers and works to bring about institutional and societal change benefiting all. Membership is open to everyone.

Actuarial Club
The goal of the Actuarial Club at Georgia Tech is to assist prospective and practicing actuaries from the Georgia Tech community enabling them to come together to help one another find resources, give guidance, and make new contacts.

Student Run Seminars
There are also several active student run seminars.

- Student Algebraic Geometry Seminar
- ACO Student Seminar
- Geometry Topology Seminar
- Research Horizons Seminar
- Dynamical Systems Working Seminar

Find the original story and links to all the groups run by students on our website at https://math.gatech.edu/news/math-groups-are-run-students-som

SoM LEADS REU PROGRAMS IN SUMMER '18

June 14, 2018

Seven Professors Worked With 13 Undergrads in 2018 Summer Programs

All over campus, undergraduates are working with Georgia Tech researchers. Many programs are in full swing, modeled after the Research Experiences for Undergraduates (REU) program of the National Science Foundation (NSF).

Last summer, the School of Mathematics took the prize for the most number of programs by one unit: six. By summer's end, seven professors, three postdoctoral mentors, and five graduate students worked with 13 undergraduate students. The undergrads came from 11 colleges and universities, including three in Georgia: Agnes Scott College, Georgia Tech, and Spelman College.

Funding for the programs comes from various NSF grants as well as the School of Mathematics.

Igor Belegradek

"Undergraduates are fearless and creative, trying approaches that I might not think of. They might not understand every bit of background that goes into a problem. But we, as mentors, can airlift them to the front lines of the problem."

- Dan Margalit

Dan Margalit

Why REUs

REU programs play the same role for research careers as high school sports do for the NFL and NBA, says School of Mathematics Professor Igor Belegradek. Talent presenting early must be nurtured and honed as soon as possible.

Belegradek organized the summer 2018 REUs with colleague Dan Margalit.

"We have a rich history of undergraduate research in mathematics, as you can see on our website," Margalit says. "It's a testament to our faculty's intellectual creativity and dedication to undergraduate education."

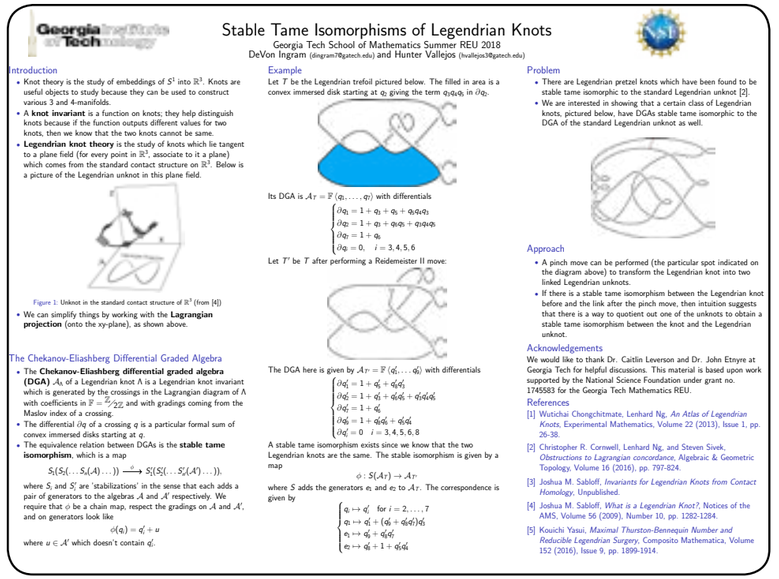
REUs have important benefits for students, faculty mentors, and the School of Mathematics.

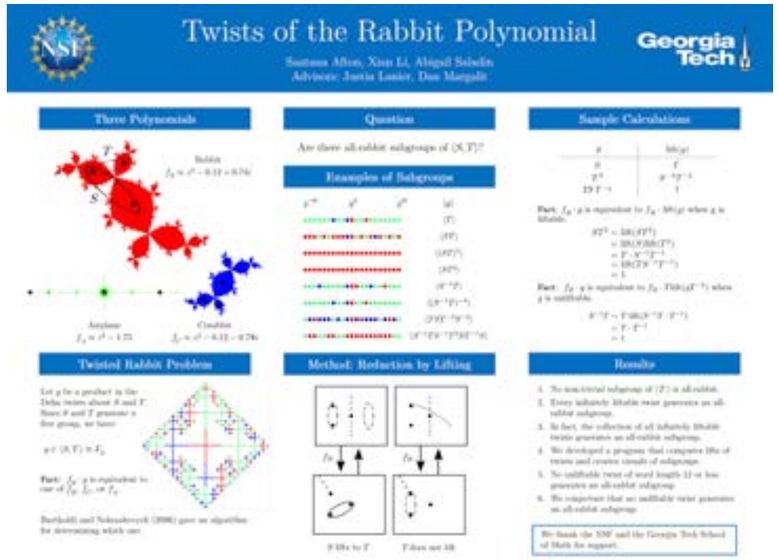
They help bring students to the School's graduate program. They enable members of underrepresented minorities get advanced training and positive experiences in math research.

REUs hep to advance the research of faculty as well. "We give students problems that we are genuinely interested in," says Margalit. "They are integral to our research programs."

For information on how to apply for next year's REU programs please visit math.gatech.edu/undergraduate-research

A sample of two posters that were made by undergraduates in summer 2018





It Goes Both Ways

REUs also provide mentoring experience to early-career researchers – graduate students and postdoctoral researchers – serving as mentors. "The training is valuable for them," Margalit says. "It helps give them confidence in their own research and make them marketable for job searches."

Undergraduates' ability to penetrate difficult problems inspires Margalit. "They are fearless and creative, trying approaches that I might not think of," he says. "They might not understand every bit of background that goes into a problem. But we, as mentors, can airlift them to the front lines of the problem."

REUs Planned for 2019

- **Mohammad Ghomi** Geometry of curves and surfaces.
- **Rachel Kuske** Dynamical modelling and stochastic optimization algorithms.
- **Yoav Len** Tropical geometry.
- **Wenjing Liao** and **Michael Lacey** Community detection techniques in data science.
- **Doron Lubinsky** Distribution of Eigenvalues of Toeplitz Matrices.
- **Dan Margalit** Braid groups.
- **Robin Thomas** Implementation in C of a 4-coloring algorithm for planar graphs.

REU'S 2018

June 14, 2018

Here are some of the REU's from 2018. See the full list, apply for an REU, and find more information at math.gatech.edu/undergraduate-research

The Shadow Problem - Mohammad Ghomi

Mohammad Ghomi has been working with Georgia Tech undergraduate Alexander Avery since May 21, 2018. From Ghomi's list of open problems in geometry of curves and surfaces, Avery chose the "shadow problem" for surfaces.

Ghomi explains the problem thus: Consider a convex object, such as a ball or an egg. When such object is illuminated from any direction, the dark region of the surface, called the shadow, forms a connected set. In other words, the shadow is one piece.

What about the converse? Suppose the shape of a surface is unknown. And suppose the shadow is one piece when illuminated from any direction. Does it follow that the surface is convex?

Ghomi published a solution in Annals of Mathematics in 2002. The answer is yes for surfaces similar to balls and eggs. But not for other shapes, such as donuts.

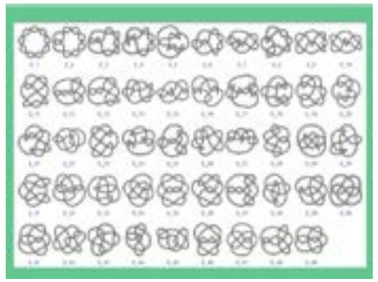
"Alex is working on the discrete version of this problem," Ghomi says. Avery is looking at surfaces that are not smooth – like balls and eggs – but instead are composed of polygons glued along their edges. "Alex has been making good progress. It looks like the polyhedral case will be similar to the smooth case."

Legendrian Knots - Caitlin Leverson

"In mathematics, knots can be thought of as pieces of string which are tied up and then have the ends glued together," says Caitlin Leverson, one of the postdoctoral mentors. "An interesting problem is to decide whether two knots are the same or different."

Legendrian knots satisfy additional conditions. Two Legendrian knots may look very different, but be the same. Invariants are methods of assigning values to knots so that two knots are assigned the same value if they are the same.

From May 29 to Aug. 10, Leverson worked with two Georgia Tech fourth-year mathematics majors: DeVon Ingram and Hunter Vallejos. Their goal was to find Legendrian knots that are different yet are assigned the same value by the invariant.



Since his second year as a mathematics major, Ingram has done research with different professors, including outside the School of Mathematics. For example, he worked on computational complexity theory with Lance Fortnow, professor and chair, School of Computer Science.

Ingram appreciates the beauty of differential geometry and its relation to physics. He sees correspondence between knot invariants and topological quantum field theories. Because of these interests, "I am naturally drawn to a knot theory problem," he says.

Legendrian Knots (cont.)

Vallejos has been doing research since he was in Oak Ridge High School, in Oak Ridge, Tennessee, just 10 miles from Oak Ridge National Laboratory (ORNL). One outcome of his stints at ORNL is a 2017 paper in the Journal of Economic Interaction and Coordination, of which Vallejos was the first author.

"I love when algebra, geometry, and topology intersect," Vallejos says. "Legendrian knot theory blends these three distinct fields, which makes it a rich subject to study."

Caitlin Leverson

Devon Ingram

Hunter Vallejos

Hunter Vallejos was also interviewed for the Spring Graduates profile, see the full story on our website.

Visiting Students

Several of the undergraduate researchers this summer come from outside Georgia Tech. Among them are Johannes Hosle and Andrew Sack.

Andrew Sack hails from Gainesville, Florida. He is a fourth-year mathematics major from the University of Florida. A published author in the International Journal of Mathematics and Computer Science, he is one of two students who have been working with John Etnyre and Sudipta Kolay since May 30.

Andrew Sack

"I'm interested in this research because, after taking two years of topology, I find it fascinating," Sack says. "Previous research I've done centered on graph coloring. I can use some of the intuition I built around graph coloring to help better understand knot coloring."

- Andrew Sack

Etnyre also studies how to tell knots apart. In his approach, a knot is represented by a diagram of a loop on a paper. The loop can cross over itself as many times. "But each time the loop crosses over itself, you have to specify which of the two strands is on top of the other," Etnyre says.

A coloring of a knot is a labeling of the strands by a method that has consistency at the crossings. The coloring can tell two knots apart. "The work is related to research trying to figure out how three-dimensional spaces can be put inside a five-dimensional space."

Johannes Hosle hails from South Bend, Indiana. He is a third-year math major in the University of California, Los Angeles. His major interests are analysis and number theory. Starting on June 18, he will work with Galyna Livshyts and Michael Lacey.

"The general area of my problem will be in harmonic analysis in convex geometry," Hosle says. "My interest stems from a general interest in analysis. The types of problems in this branch of mathematics seem to resonate most with me."

DONOR AWARDS


Bob Price

Bob Price Travel Award

This award has been made possible by a gift from Robert M. Price who obtained an MS degree from the School of Math in 1958.

2018 Awardees: Marc Haerkoenen, Sudipta Kolay, Sergio Mayorga, Stephen McKean, Youngho Yoo, Xiaofan Yuan.

Stelson Lecture Series

Thomas Stelson endowed the School's Stelson lectures in 1988 in honor of his father, Hugh Stelson, who was a mathematician. Last year, Jill Pipher discussed some of the history of cryptography and some of the latest ideas in "lattice" cryptography. Pipher is Vice President for Research and Elisha Benjamin Andrews Professor of Mathematics at Brown University.


Jill Pipher


Dan Margalit and Joe Rabinoff

Herman K Fulmer Faculty Teaching Award

Howard Woodham (Georgia Tech alumnus, Engineering '48) created this award in memory of Professor Herman Fulmer, his former mathematics professor. This year Prof. Dan Margalit and Prof. Joe Rabinoff each were granted the award, which comes with a cash prize of $500 each, for the major roles they have played in development of curriculum and resources including the Interactive Linear Algebra textbook (See Pg. 5). *Read the full story on our website - https://math.gatech.edu.*

FESTA Fellowship

Funded by a gift from John R. Festa, this award recognizes graduate students who exhibit superior academic and leadership skills. This year's award goes to Stephen McKean, a second year PhD student who works in algebraic geometry and number theory, and who has excelled as a TA and contributes to the school in a myriad of ways including designing the t-shirts for the HSMC and the SoM official t-shirt.


Stephen McKean

PHD PROGRAM

PhD Program Firsts

It was a year of firsts for the SoM graduate recruiting. There were 330 applications in the 2019 application year, a huge record for the School of Mathematics, up from a then record of 260 the previous year. There were also a record number of domestic and female applicants. The SoM made only 73 offers, or to only 22% of candidates which makes the class the most selective admission year on record. For the first time ever application fee waivers were issued to any domestic students who requested it on the basis of being a member of an underrepresented group in mathematics or due to financial hardship. SoM issued the waiver to a total of 34 students, including 26 females.

The application fee waivers were paid for by using a grant from the provost ($10,000) called "Provost's Fund for Excellence in Graduate Studies", an initiative of the Director of Graduate Studies, Mohammad Ghomi.

Of the 73 offers made, 14 incoming students are confirmed and 6 of these are female, leading to another record of 43% of an incoming class being female - at least in part due to the fee waiver program.

A year of firsts

- **330 applications in 2019 - beating last years previous all time high of 260 applications**
- **22% recieved offers - most selective year ever**
- **Fee waivers issued to underrepresented groups in mathematics for the first time in SoM history**
- **43% of incoming class is female - another school record - at least in part due to the fee waiver program**

PhD Program Requirements

All PhD programs in the School have three basic requirements: course work (including a minor concentration), comprehensive exams, and a dissertation.

During this period all students also work with the School's coordinator for all TAs, Klara Grodzinsky, who continues teaching the TA workshop throughout the first semester. At the same time, most of the international TAs also enroll in a class with Mo Burke to improve their language skills. The School takes pride in its TA training program, as our PhD students have won four extremely competitive annual Institute-wide teaching prizes since 2013.

Degrees Offered

- Algorithms, Combinatorics, and Optimization (ACO)
- Computational Sciences and Engineering (CSE)
- Bioinformatics
- Quantitative Biosciences (QBioS)
- Machine Learning (ML)

GRAD FELLOWSHIPS AND AWARDS

Bhanu Kumar

NASA Space Technology Research Fellowship

Math PhD student Bhanu Kumar has been offered a NASA Space Technology Research Fellowship (NSTRF18) with Rafael de la Llave as principal investigator. This highly prestigious fellowship provides selected students with financial support and gives them the opportunity to collaborate with researchers at NASA and other research laboratories. Bhanu is a 4th year who studies dynamical systems and mathematical astrodynamics. Bhanu was also admitted as a Georgia Tech Presiden'ts Fellow.

Chun-Hung Liu

Alumni Wins 2018 ACO Oustanding Student Prize For Two Major Discoveries

Chun-Hung Liu, now an assistant professor at Texas A&M University, and a graduate of the PhD program at Georgia Tech, was awarded the 2018 ACO Oustanding Student Prize.

Liu's selection is based on two major accomplishments. First, he did breakthrough research as a Ph.D. student by resolving the Robertson conjecture for topological minors, namely that graphs that do not have a Robertson chain of fixed length as a topological minor are well-quasi-ordered. Second, Liu developed and refined parts of the classical Robertson-Seymour theory, discovering entirely new methods alongside. In addition, he is honored for displaying an exemplary attitude toward research and scholarship.

School of Mathematics Professor Robin Thomas was Liu's supervisor at Georgia Tech. Thomas recalls Liu as "a very strong student," passing the comprehensive examination early and then writing four strong papers in quick succession. "I expect he will become a regular invitee to Graph Theory meetings in Oberwolfach, Banff, and elsewhere," Thomas says.

"I am very grateful to Prof. Thomas for his constant support and encouragement during my life at Georgia Tech. His professionalism, passion, and leadership undoubtedly shaped my development."

NSF Graduate Research Fellowships

Two SoM graduate students, Sarah (Sally) Collins a second year PhD student from Boston College who studies low-dimensional topology and geometry, and Michael Wigal a first-year PhD student in the ACO program, have been awarded the prestigious NSF GRFP (National Science Foundation Graduate Reasearch Fellowship Program) fellowships.

The fellowship offers a three-year annual stipend of $34,000 along with a $12,000 cost of education allowance, opportunities for international research and professional development, as well as the prestige from winning one of the most competitive fellowships one can get in the sciences.

Sally and Michael are two of the only three Georgia Tech College of Science graduate students to recieve an NSF GRFP fellowship this year.

STUDENT AWARDS

May 8, 2019

SoM Awards Best of 2019

During the 2019 Annual Student Award Ceremony several outstanding graduate and undergraduate students were recognized for their academic and scholastic excellence in the school, and additionally prestigious external awards given to current graduate students this year were recognized.

Graduate Students

- Top Graduate Student: Marcel Celaya,
- Best TA: Alex Hoyer,
- Best PhD Thesis: Chi Ho Yuen,
- FESTA Fellowship: Stephen McKean,
- NSF Graduate Research Fellowship: Sally Collins and Michael Wigal.
- SIAM Students Chapter Certificate of Recognition: Jiaqi Yang

Outstanding TAs

- Outstanding Undergraduate TA: Talha Khawaja and Wilson Ly
- Outstanding Math Lab Tutor: Marc Harkoenen and Jorge Viquez
- Outstanding Student Evaluations: *For Spring 2018* - James Anderson, Catherine Chen, Sally Collins, Kisun Lee, and Shu Liu.

  For Fall 2018 - Diego Granizo, Jarad Hosking, Stephen McKean, Jack Olinde, and Jad Salem.

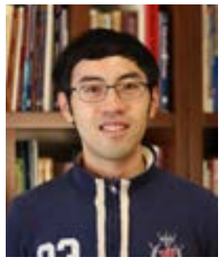
Marcel Celaya

Alex Hoyer

Stephen McKean

Sally Collins

Marc Harkoenen



Hangfan (Frank) Li

The CTL Awards 2019

Each year, The Center for Teaching and Learning (CTL) celebrates the contributions to teaching excellence at Georgia Tech made by our graduate and undergraduate teaching assistants.

This year, the institute-wide teaching award went to Sebastian Fernandez, one of SoM's UTA's (Undergraduate Teaching Assistants). Sebastian was also featured in a news article for his online MATH 2552 Video Series on YouTube (See Pg. 7).

Sebastian Fernandez

The CTL Awards 2019 Winners

- SoM Graduate Student Instructor of the Year: Marcel Celaya
- SoM Graduate Teaching Assistant of the Year: Hangfan (Frank) Li
- CTL and SoM Undergraduate Teaching Assistant of the Year: Sebastian Fernandez

MATTHEW BAKER NAMED ASSOCIATE DEAN FOR FACULTY DEVELOPMENT

April 3, 2018

School Of Mathematics Professor Is First Holder Of New Leadership Role

The College of Sciences has selected Matthew Baker as the inaugural Associate Dean for Faculty Development. The position was created to complement the positions of Associate Dean for Academic Programs and Associate Dean for Research. Baker is a professor in the School of Mathematics. He will begin his new role on July 1, 2018.

The Associate Dean for Faculty Development in the College of Sciences is responsible for developing, implementing, and assessing programs that enhance the instructional, research, and career opportunities for faculty. Key areas of responsibility include faculty hiring; mentoring of faculty; faculty retention, promotion, and tenure; and diversity, equity, and inclusion at the faculty level.

"I'm delighted that Matt is willing to be the first holder of this important leadership position," College of Sciences Dean and Sutherland Chair Paul Goldbart says. "As a **mathematician of global renown**, an **educator celebrated for the clarity of his lectures**, and a faculty member with **demonstrated accomplishments in service** to Georgia Tech and the worldwide mathematics community, Matt is well positioned to advance our deep commitment to the professional development of faculty members as thriving, fulfilled researcher-educators who have extraordinary impact."

Baker joined Georgia Tech in 2004 as an assistant professor of mathematics and was promoted to full professor in 2011. As a pure mathematician, he is treasured by the international mathematics community for the **depth, power, and creativity of his research** in some of the most demanding aspects of pure mathematics, such as algebraic and arithmetic geometry. His accomplishments have been recognized by numerous awards, including his election as a Fellow of the American Mathematical Society in 2012 and selection for the Simons Fellowship in Mathematics in 2017.

As an educator, Baker is deeply committed to enhancing students' experience, even in the most challenging mathematics courses. This has brought him **awards for teaching excellence** from both Georgia Tech and the University System of Georgia. Baker is also a thoughtful and effective leader, as he demonstrated during his service as Director of Undergraduate Studies in the School of Mathematics.

"I'm honored to have been selected, and I look forward to being part of the College of Sciences leadership team," Baker says. "I am eager to build upon the faculty-mentoring activities that Associate Dean for Research Julia Kubanek has introduced in recent years. I hope that my unique perspective as a mathematician is helpful in addressing issues of diversity, equity, and inclusion – and of fairness and transparency in hiring, promotion, retention, and salary considerations. I look forward to supporting the needs of our diverse, accomplished, and ambitious faculty."

Georgia Tech College of Sciences

PUBLICATIONS AND SPECIAL ISSUES

New book by Larry Rolen

Prof. Larry Rolen has a new book, titled Harmonic Maass Forms and Mock Modular Forms: Theory and Applications which is available at the AMS bookstore.

Larry Rolen was a Visiting Assistant Professor in SoM from 2017-18, whose research interests lie in number theory and more specifically modular forms, harmonic Maass forms, and quantum modular forms.

Prof. Rolen also taught a special topics course on Modular Forms last Spring 2018.

Special issue of journal dedicated to Prof. Rafael de la Llave.

The issue 38-12 of the journal Discrete and Continuos Dynamical Systems-A contains the proceedings of the international conference LLAVEFEST, which was celebrated June, 2017 in Barcelona. The conference was devoted to the interface of dynamics and partial differential equations and applications.

The main goal of the conference was bringing together many researchers from different disciplines, who presented high level talks. The conference also served as a celebration of Prof. de la Llave on the occasion of his 60th birthday.

Kirsten Wickelgren Featured in AMS Notices Spring Sectional Sampler

Kirsten Wickelgren is an associate professor in the School of Mathematics whose interests lie in homotoy thoery and arithmetic geometry; especially Grothendieck's anabelian program.

Kirsten was recently featuerd in AMS Notices Spring Sectional Sampler, where she provided an introduction to her invited address to the AMS Spring Southeastern Sectional Meeting along with several other top mathematicians in their respective fields.

MYSTERIES OF FLOATING

November 7, 2018

We are used to seeing a light object, like a beach ball, float on the surface of water while a heavy one, like a solid silver ball, sinks to the bottom (Fig.1-Fig.2 opposite page). Over two-thousand years ago, based on similar observations, Archimedes proposed a simple and beautiful rule to determine which objects float, which objects sink, and how much liquid will be displaced by a floating object. He asserted that everything should be determined by relative densities.

Archimedes might be surprised to see this green plastic ball (Fig. 3-Fig. 5 opposite page) which sinks to the bottom if pushed below the surface but also floats on the surface of the water if it is gently released there. The framework needed to understand the behavior of a "heavy" floating ball like this one was introduced by the mathematician Carl Friedrich Gauss in 1830. He applied his ideas about minimizing energy to the geometrical and analytical concepts of surface tension and contact angle introduced by Thomas Young and Pierre Simone Laplace in 1805 and 1806.

Carl Friedrich Gauss

Nevertheless, theoretical verification of the possibility of a heavy floating object like the green ball was first obtained by Rajat Bhatnagar and Robert Finn of Stanford University in 2006. To obtain their result various simplifications were made. One of those simplifications was to assume the liquid bath was infinite in extent with the walls of the container infinitely far away. John McCuan of the School of Mathematics has been interested in floating objects in laterally bounded containers since about the same time. In 2013 he was able, along with Ray Treinen of Texas State University, to analyze the energy landscape for problems that include the green ball floating in a finite cylindrical container as in the figure. They showed, in particular, that if such a ball, floating on the surface of the water is pushed downward, the energy of the system will increase at first, eventually reaching a single maximum, at which point, as the ball moves lower, the energy of the system decreases and eventually the ball slips below the surface and sinks.

While relaxing the assumption of an infinite sea on which the ball floats, McCuan and Treinen introduced an additional symmetry assumption, effectively requiring the ball to be constrained to a frictionless vertical wire through its center keeping the ball in the middle of a circular cylindrical container. The characterization of parameters (density, surface tension versus gravity, the size of the ball relative to that of the container, and adhesion properties) for which a floating ball will remain in the center without the guide-wire is still a major open problem.

Buoyed up by some success, McCuan and Treinen attempted to characterize the equilibrium configurations (maxima and minima of the Gauss energy) for balls like the beach ball with density lower than that of the liquid. They were able to obtain a number of results, but they were also in for a big surprise. The natural expectation would be that for the light ball there is a unique equilibrium (energy minimum) with the energy increasing monotonically as the ball is pushed downward (and constrained to the center) in a cylindrical container. This is true for a beach ball in, say, a swimming pool. Sometimes, however, for certain collections of parameters, the energy will, in fact, increase but then decrease to another local minimum before increasing as the ball is submerged. (Fig. 6 on right)

Continued on next page...

Fig.1 - Fig. 2

We are used to seeing a light object, like a beach ball, float on the surface of water while a heavy one, like a solid silver ball, sinks to the bottom. Over two-thousand years ago, based on similar observations, Archimedes asserted that everything should be determined by relative densities.

Archimedes might be surprised to see this green plastic ball which sinks to the bottom if pushed below the surface but also floats on the surface of the water if it is gently released there.

Fig.3 - Fig. 5

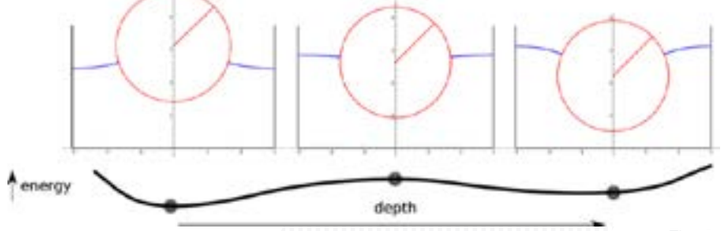


Fig. 6

Note: For purposes of illustration the figure is neither to scale nor accurately proportioned.

Sometimes however, for certain collections of parameters, the energy will in fact increase but then decrease to another local minimum before increasing as the ball is submerged.

Other "Fun" Facts

1

It was about 200 years between the time a mathematical framework describing floating objects (including capillarity and adhesion energies) was proposed and the time it was actually used with any success to describe floating objects.

Part of the groundwork for this kind of application of the theory was laid in McCuan's 2007 paper which adapts the framework of Gauss to situations which allow floating. Previous to this, force phenomena such as buoyancy were viewed as separate from capillary equilibrium theory. McCuan showed all conditions for equilibrium (including various generalized force equations) follow from the basic approach of Gauss.

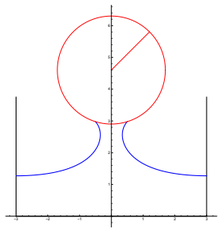


Fig. 7

2

An essential difference between the analysis of floating objects (say balls) based on Archimedes' principle and that based on capillarity is that in the former the liquid surface is assumed to be a flat plane, while in the latter the geometric shape of the liquid surface can be curved and plays a central role. Sometimes the liquid surface surrounding a floating ball can be so far from a plane that it bends back over itself as suggested by the exaggerated figure (Fig 7. on left). Several results in the paper of McCuan and Treinen (2013) give conditions under which this cannot happen. They show, for example, that if the ball is too heavy (dense) or the ball is too small, then such "folding over" is not possible. Also, if the ball is too light and the adhesion of the liquid with the ball is too small (resulting in an angle between the liquid and the ball measured within the liquid which is too big), then, again, folding over is not possible.

More "Fun" Facts

3 Another factor in the recent progress on problems like this (in spite of interest in them from antiquity) is the new capability to numerically analyze the model equations.

4 One approach (and perhaps the only approach) to understanding when a floating ball will remain centered in the container (rather than move to the side) requires an extension of McCuan's 2007 first variation formula to the second variation of energy. In some instances (experimentally) when the outer edge of the liquid interface is higher than the edge on the ball, and the ball is heavy, the ball will stay in the center. Similarly, when the outer edge is lower than the inner edge, then a heavy ball will tend to the side. These observations can be reversed for a light ball. These experimentally observed conditions are (first of all) far from a mathematical analysis; it is very unlikely that they capture the entire range of possibilities.

5 Most of the known results are for a system which is simplified in dimension. Mathematically, we are really considering (in the drawings on the previous page for example) a two dimensional problem which can be viewed as treating an infinite log (extending directly out of the paper) floating in a trough. It seems likely that all equilibria for this simplified problem can be identified/classified within the next decade. A similar time frame applies to the spherical ball in a cylindrical container as indicated in the photographs. Some fundamental advance, like obtaining a second variational formula for energy as mentioned in the previous point will be necessary for understanding and classifying the conditions characterizing central floating versus moving to the side.

Continued from previous page

There are several consequences of this 2018 discovery. One is that a ball floating in a cylinder need not have a unique floating height; the ball may rest at equilibrium in two different positions. If, for example, the ball is positioned in the first equilibrium state, it will remain there, but if the ball is manually moved to the second, it will also float in position there. Such a ball in a cylinder might be used as a two position switch. Furthermore, the phenomenon first encountered with the heavy green ball is not isolated to the heavy floating ball. Even with a light floating ball, the observed floating configuration can depend on where one positions the ball initially. The only known instances of this behavior for a light ball occur when the ball fits within the cylinder leaving only a small gap (several one hundredths of a millimeter) between the ball and the wall, so the phenomenon would likely never have been discovered without considering the case of laterally bounded containers.

References:

- 250 B.C. Archimedes, *On floating bodies*
- 1805 Thomas Young, *An essay on the cohesion of fluids*, Philos. Trans. R. Soc. Lond. 95[PP]
- 1806 Pierre Simone Laplace, *Mécanique céleste*
- 2006 Raj Bhatnagar and Robert Finn, *Equilibrium configurations of an infinite cylinder in an unbounded fluid*. Phys. Fluids 18 no. 4
- 2007 John McCuan, *A variational formula for floating bodies*, Pac. J. Math. 231 no. 1
- 2009 John McCuan, *Archimedes' principle revisited*, Milan J. Math. 77
- 2013 John McCuan and Ray Treinen, *Capillarity and Archimedes' principle of flotation*, Pacific J. Math. 265 no 1
- 2018 John McCuan and Ray Treinen, *On floating equilibria in a laterally finite container*, SIAM J. Appl. Math. 78 no. 1

KONSTANTIN TIKHOMIROV AWARDED SLOAN FELLOWSHIP

March 5, 2019

Konstantin Tikhomirov

"Sloan Research Fellows are the best young scientists working today," says Adam F. Falk, president of the Sloan Foundation. "To be a Sloan Fellow is to be in the vanguard of 21st-century science."

Previous SoM Sloan Fellowship Awards

- *1989 Jeff Xia*
- *1994 Oscar Bruno*
- *2001 Dana Randall*
- *2003 Saugata Basu*
- *2004 Chongchun Zeng*
- *2009 Dan Margalit*
- *2010 Maria Westdickenberg*
- *2011 Silas Alben*
- *2012 Greg Blekherman*
- *2015 Jennifer Hom*
- *2016 Zaher Hani*
- *2018 Lutz Warnke*

Konstantin Tikhomirov is an assistant professor in the School of Mathematics whose work is at the intersection of asymptotic geometric analysis and random matrix theory. He studies the geometry of high-dimensional convex sets with the help of probabilistic tools and using random linear operators, and the spectral distribution of random matrices by applying methods from discrete geometry. He holds a Ph.D. in mathematics from the University of Alberta.

His research directions have multiple connections with applied science, in particular, for numerical analysis of large systems of linear equations, modeling communication networks and studying certain physical systems with large numbers of particles.

Valued not only for their prestige, Sloan Research Fellowships are a highly flexible source of research support. Funds may be spent in any way a fellow deems will best advance his or her work. Winners receive a two-year, $70,000 fellowship to further their research.

The fellowships, awarded yearly since 1955, honor early-career scholars whose achievements mark them as among the most promising researchers in their fields.

CHRISTINE HEITSCH RECEIVES PETIT INSTITUTE "ABOVE AND BEYOND" AWARD

December 14, 2018

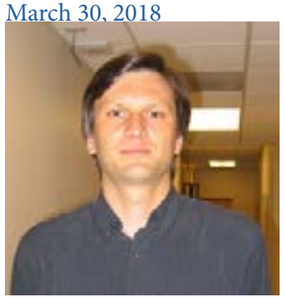
Dr. Heitsch is Professor of Mathematics at Georgia Tech, and is also Director of the new Southeast Center for Mathematics and Biology (SCMB), an NSF-Simons MathBioSys Research Center, and finishing her tenure directing the GT Interdisciplinary Mathematics Preparation and Career Training (IMPACT) Postdoctoral Program.

Heitsch's research interests lie at the interface between discrete mathematics and molecular biology, specifically combinatorial problems "as motivated by" and "with applications to" fundamental biomedical questions like RNA folding.

Christine Heitsch

ROBIN THOMAS AWARDED COVETED SIAM FELLOWSHIP

March 30, 2018



Robin Thomas

> *"Robin has a remarkable record as a teacher and a mentor. His tireless efforts to challenge and encourage young talents at critical early stages of their careers has had a profound impact on the lives of a large number of PhD students and postdocs."*
> *-Former interim chair Prasad Tetali*

Prof Robin Thomas has long been an exemplary example for research excellence and dedication to mentoring PhD students and postdocs. Robin is a world leader in graph theory and has published over 100 research papers appearing in top journals (including the Annals of Mathematics and the Journal of the AMS). His extraordinary research record includes a number of major results any one of which would be considered as a lifetime highlight. Robin was awarded the prestigious Fulkerson prize twice and the Neuron Award for Lifetime Achievement in Mathematics (Czech Republic).

Among Robin's many notable achievements, perhaps none is more astounding than his work on the Four Color Theorem. The Four Color Theorem (4CT) was first proved in 1976 by Appel and Haken, using a computer. However, this computer proof cannot be verified by hand, and even the part that is supposedly hand-checkable is complicated/tedious. To dispel doubts about the Appel-Haken proof, Robin, along with Robertson, Sanders, and Seymour, published a new and much simpler proof in 1997. As a possible generalization of the Four Color Conjecture (now a theorem), Hadwiger conjectured in 1943 that every graph with no K t+1-minor is t-colorable. It is easy to prove the Hadwiger conjecture for t≤3, but the case t=4 is difficult and equivalent to 4CT. In 1993, Robin, along with Roberston and Seymour, proved that the case t=5 can be reduced to the 4CT, by showing that a smallest counterexample to the Hadwiger conjecture for t=5 must be an apex graph. The proof is a tour de force, which is computer-free. This work was awarded the Fulkerson prize.Robin was again awarded the Fulkerson prize for his work on the proof of Berge's conjecture, which consumes 179 pages in the Annals of Mathematics.

Additionally, Robin, again with Robertson and Seymour, characterized those bipartite graphs with Pfaffian orientations, hence solving many problems of interest such as a permanent problem of Polya, the even directed cycle problem, and the sign-nonsingular matrix problem for square matrices.

PhD Students and Postdocs of Robin Thomas include:

- *Zdenek Dvorak (Charles University, Czech),*
- *Bertrand Guenin (University of Waterloo, Canada),*
- *Daniel Kral (University of Warwick, UK),*
- *Chun-Hung Liu (Princeton University),*
- *Sergey Norine (McGill University, Canada),*
- *Dhruv Mubayi (University of Illinois at Chicago),*
- *Sang-il Oum (Korea Advanced Institute of Science and Technology),*
- *Luke Postle (University of Waterloo, Canada), and*
- *Xingxing Yu (Georgia Institute of Technology).*

CULLEN-PECK SCHOLAR AWARD

Associate School of Math Professor Jen Hom has been selected to receive a 2018 College of Sciences Cullen-Peck Scholar Award in recognition of her innovative research. Jen has made fundamental contributions to the study of knots and the development of powerful new tools in topology, in particular innovative contributions to Heegaard-Floer theory.

Jen Hom

MOST PRESTIGIOUS NSF AWARD GOES TO THREE SoM FACULTY

March 4, 2019

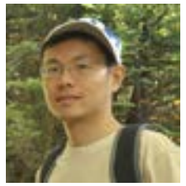
The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.

This year, three more SoM professors have been granted this coveted award, increasing the number CAREER awards to SoM professors to 22 awards since the creation of the award in 1997.

Professor Shahaf Nitzan

Professor Nitzan is an Assistant Professor in SoM and works in harmonic analysis, an area of mathematics that is of much interest in natural sciences and engineering, including in sound and image processing, wireless communications and data transmission, methods in quantum mechanics and quantum computing, and the analysis of signals in geophysics and medicine.

Professor Molei Tao



Assistant Professor Molei Tao's research is primarily concerned with control systems characterized by multiple scales, geometric structures, and randomness. Prof. Tao's group addresses both scientific curiosity and engineering practicality, from studying extrasolar and Solar planetary dynamics, the engineering problems of energy transfer and harvest, rare events quantification, the resonant control of microscopic systems, to the interplay between dynamics and machine learning.

Professor Yao Yao

Professor Yao is an Assistant Professor in SoM, whose interests include mathematical analysis of nonlinear PDEs arising from fluid mechanics and mathematical biology, who has also been involved with research experiences for undergraduates (REU) programs.

Previous NSF CAREER Award Winners in SoM

- *1997 Dana Randall*
- *2002 Robert Ghrist*
- *2003 John Etnyre*
- *2003 Mohammad Ghomi*
- *2006 Chongchun Zeng*
- *2007 Hao-Min Zhou*
- *2008 Yuri Bakhtin*
- *2010 Brett Wick*
- *2010 Dan Margalit*
- *2010 Maria Westdickenberg*
- *2012 Anton Leykin*
- *2014 Greg Blekherman*
- *2015 Karim Lounici*
- *2016 Esther Ezra*
- *2016 Jen Hom*
- *2016 Kirsten Wickelgren*
- *2016 Michael Damron*
- *2017 Zaher Hani*
- *2018 Galyna Livshyts*

TWO FACULTY NAMED AMS FELLOWS

Fellows in the AMS are members are reconized for their outstanding contributions to the creation, exposition, advancement, communication, and utilization of mathematics.

Dan Margalit is recognized for contributions to low-dimensional topology and geometric group theory, exposition, and mentoring. Chongchun Zeng is recognized for his contributions to the areas of partial differential equations and dynamical systems.

Chongchun Zeng

Dan Margalit

CONFERENCES

34th Southeastern Analysis Meeting (SEAM) conference, March 23-25, 2018

Organized by Michael Lacey, Wing Li, Galyna Livshyts, Shahaf Nitzan.

The Southeastern Analysis Meetings has established a strong tradition in the US as one of the prime venues to bring together seasoned and novel researchers, including graduate students, to exchange recent progress and advances in various areas of Analysis. These areas include, in particular, the subfields of Harmonic Analysis, Convex Analysis, Complex Analysis, Operator Theory and Probability, as well as many others.

Conference on Nonlinear Waves - Stability vs Turbulence: May 7-10, 2018

Organized by Zaher Hani and Chongchun Zeng

This is a school and conference on nonlinear dispersive and wave PDE. It featured two three-hour mini-courses and several conference talks by leading experts in the field. Part of the aim was to celebrate the contributions of Jalal Shatah to nonlinear dispersive and wave PDE on the occasion of his 60th birthday.

2018 Meeting on Applied Algebraic Geometry: April 7, 2018

Organized by Anton Leykin, Dan Bates (Colorado State), Jon Hauenstein (Notre Dame)

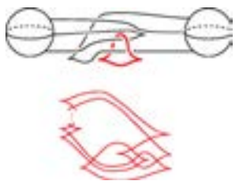
MAAG is a regional gathering that attracts participants primarily from the Southeast of the USA, and seeks to foster collaboration and disseminate recent results in computational AG.

- Dan Bates (Colorado State)
- Florian Enescu (Georgia State)
- Jon Hauenstein (Notre Dame)
- Kaie Kubjas (MIT/Aalto)
- Vicki Powers (Emory)
- Seth Sullivant (North Carolina State)
- Dan Bates (Colorado State)
- Jon Hauenstein (Notre Dame)
- Anton Leykin (Georgia Tech)

Georgia Tech @ The Topology and Geometry of Low Dimensional Manifolds Conference: July 12-15, 2018

Organized by John Etnyre, Laura Starkston (Stanford), Jeremy Van Horn-Morris (U of Arkansas), and Jonathan Williams (Binghamton)

The conference brought mathematicians together to discuss recent developments in smooth and symplectic low-dimensional topology and geometry. The conference was held at the University of Texas, Austin, to celebrate the 60th birthday of UT Austin's Jane and Roland Blumberg Centennial Professor in Mathematics, Bob Gompf.

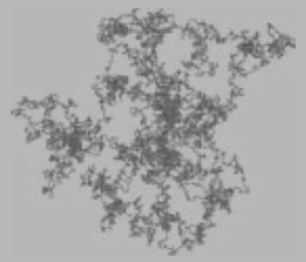


Recent Trends in Continuous and Discrete Probability Conference: June 18-21, 2018

Organized by Michael Damron and Christian Houdré

The aim of the conference was to bring together researchers from around the country to present and discuss work at the front of research in probability theory. Two minicourses by Marek Biskup, UCLA and Jonathan Mattingly, Duke University were also given.

- Louis-Pierre Arguin (CUNY)
- Rodrigo Bañuelos (Purdue University)
- Fabrice Baudoin (University of Connecticut)
- Gerandy Brito (Georgia Tech)
- Shirshendu Ganguly (UC Berkeley)
- Jack Hanson (CUNY)
- David Herzog (Iowa State University)
- Jessica Lin (McGill University)
- Firas Rassoul-Agha (University of Utah)
- Philippe Sosoe (Cornell University)



Tech Topology Conference 2018: December 7-9, 2018

Organized by Etnyre, Hom, Kordek, Lambert-Cole, Leverson, Margalit, Park, and Strenner

This was the eighth annual Tech Topology Conference. It brought established and beginning researchers from around the country for a weekend of mathematics in Atlanta.

- Tara Brendle (University of Glasgow)
- Juanita Pinzon Caicedo (NC St University)
- Kevin Kordek (Georgia Tech)
- Gordana Matic (University of Georgia)
- Allison Miller (Rice University)
- Andrew Putman (Notre Dame)
- Sucharit Sarkar (UCLA)

Southeast Center for Mathematics and Biology (SCMB) Annual Symposium: Jan 28-29, 2019

The SCMB Annual Symposium is a forum to exchange ideas between the broader mathematics and biosystems communities. The overall goal of the SCMB Symposium was to create a vibrant community advancing the mathematics of complex biological systems.

- Laura Landweber (Columbia)
- Konstantin Mischaikow (Rutgers)
- Caroline Uhler (MIT)
- Lisa Fauci (Tulane)
- Alexander Anderson (Moffitt Cancer Centr)
- Clayton Shonkwiler (Colorado State)
- Amy Shaub Maddox (UNC Chapel Hill)
- Jo Ellis-Monaghan (St. Michael's College)

2019 Georgia Scientific Computing Symposium: February 16, 2019

The Georgia Scientific Computing Symposium is a forum for professors, postdocs, graduate students and other researchers in Georgia to meet in an informal setting, to exchange ideas, and to highlight local scientific computing research. The symposium has been held every year since 2009 and is open to the entire research community.

- Luca Dieci (Georgia Tech, SoM)
- Jun Kong (Georgia State University)
- Ming-Jun Lai (University of Georgia)
- Richard Peng (Georgia Tech, SoCS)
- Yuanzhe Xi (Emory University)

GeorgiA Tech Tropical, Arithmetic and Combinatorial Algebraic-geometry: March 30-31, 2019

Organized by Matt Baker, Philipp Jell, Yoav Len, Padma Srinivasan.

The conference aims to connect those at the leading edge of research in tropical, arithmetic, and combinatorial algebraic geometry to share ideas and foster collaboration.

- Jennifer Balakrishnan (Boston University)
- Sam Payne (UT Austin)
- Eric Larson (Stanford University)
- Rohini Ramadas (Brown University)
- Angelica Cueto (Ohio State)

2019 Meeting on Applied Algebraic Geometry: April 13-14, 2019

Numerical AG day organized by Jon Hauenstein Anton Leykin, Jose Rodriguez, Frank Sottile.

The Meeting on Applied Algebraic Geometry (MAAG 2019) met in Atlanta on the campus of Georgia Tech for the second year in a row. Previous meetings took place at Georgia Tech in 2015 and 2018, and at Clemson in 2016.

- Mireille Boutin (Purdue)
- Tianran Chen (Auburn-Montgomery)
- Kathlen Kohn (ICERM and Oslo)
- Lek-Heng Lim (Chicago)
- Pablo Parrilo (MIT)
- Ngoc Tran (Texas)
- Cynthia Vinzant (NC State)

FRONTIERS IN SCIENCE LECTURES

Mathematical Mysteries of the Periodic Table

John Baez is a professor of mathematics at the University of California, Riverside, who also works at the Centre for Quantum Technologies, in Singapore. His Internet column "This Week's Finds" dates back to 1993 and is sometimes called the world's first blog.

Baez used to work on quantum gravity and pure mathematics. In 2010, concerned about climate change and the future of the planet, he switched to working on a general theory of networks that appear in human-engineered and biological systems.

Why do atoms behave the way they do? Why do electrons form "shells," as seen in the periodic table?

Why does the first shell hold 2 electrons, the second 8, and the third 18: twice the square numbers 1, 4, and 9?

It took many years to solve these mysteries, and a lot of detective work in chemistry, physics, and ultimately – once the relevant laws of physics were known – mathematics.

Other mysteries remain unsolved, like the mass of the heaviest possible element. This talk gave a quick tour of these puzzles and some of the answers.

John Baez

In Conversation with Ernő Rubik

In a rare public appearance, Ernő Rubik gave a public lecture, discussing a wide range of topics including design and architecture, the role of curiosity in the human condition, and his perspective on more than four decades of the Rubik's Cube.

Ernő Rubik is an architect and designer. He lives in Budapest, Hungary, where he invented Rubik's Cube in 1974.

Rubik co-founded the Hungarian Academy of Engineering; the Palace of Wonders, a science center in Budapest; and the Aquincum Institute of Technology. He has served as juror for the European Inventor Awards and as Ambassador for Creativity and Innovation of the European Commission.

Among numerous national and international distinctions, Rubik is the recipient of Liberty Science Center's Genius Prize; the USA Science & Engineering Festival Medal; and Hungary's highest state distinction, the Order of St. Stephen.

Ernő Rubik

This talk was sponsored by the College of Science, the School of Mathematics, and the Gathering 4 Gardner Foundation.

IBM Research "Ponder This" Puzzlemaster Comes to Tech

IBM Research runs a mathematical challenge site, called "Ponder This." Every month the site posts a new challenge and reveals the solution for the previous month's riddle. Oded Margalit has been the puzzlemaster since 2005.

In the talk Oded surveyed some of the riddles over the years and told some anecdotes about the challenges and the solvers, for example: what is the probability that a game of backgammon ends with a double Fisher Foul?

Oded Margalit

THE MATHEMATICS OF … DONUTS? SCIENCEMATTERS EPISODE 9, STARRING DAN MARGALIT

October 16, 2018

Dan Margalit is a professor in the School of Mathematics, and the star of Episode 9 of the College of Sciences ***Science Matters*** Podcast.

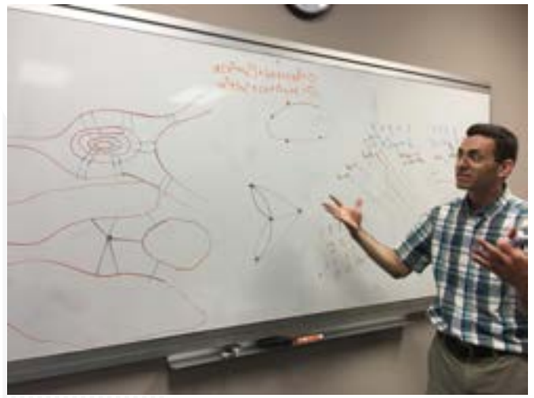
Margalit's research area is topology. He studies the properties of shapes that persist even when the shapes are stretched or bent.

For example, two metal rings that are linked stay linked even if you bend or stretch the metal. A typical question in topology is the following: Someone hands you two rings made of metal; if you are allowed to bend and stretch the metal, can you pull the rings apart or not?

Most of Margalit's research in topology is about surfaces. The surface could be that of a ball or a donut. Surfaces are central in mathematics. They can describe the possible motions of a robot arm or all the possible solutions of a polynomial.

Margalit's particular research is on the symmetries of surfaces. Some symmetries of surfaces are easy to understand. But when bending and stretching are allowed, the symmetries are more challenging.

For Margalit, "mathematics is important because it describes the world in a beautiful and coherent way. Even the most far-fetched and abstract mathematical ideas can make their way into everyday life."



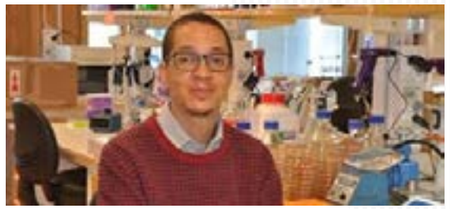
Dan Margalit gives a tutorial on the Seven Bridges of Königsberg problem

In Episode 9 of the new College of Science podcast ***Science Matters****, Prof. Dan Margalit talks about the beauty of mathematics and offers advice to overcome "math phobia."*

Take a listen at sciencematters.gatech.edu.

You can also find Dan Margalit's interview on science360Radio linked on our website

CYCLING ANTIBIOTICS TO TREAT INFECTIONS



Klas Udekwu

August 27, 2018

Simulations suggest a way to avoid microbial resistance

As microorganisms evolve to resist antibiotics, the world risks running out of drugs to treat bacterial infections. One way to slow this trend is to find new modes of using existing drugs, even those now ineffective because of microbial resistance.

One strategy is based on the phenomenon of collateral sensitivity: When some microbes develop resistance to one antibiotic, they become hypersensitive to another. For example, when an Escherichia coli strain became indifferent to chloramphenicol, it also became highly vulnerable to polymyxin B. For this strain, chloramphenicol and polymyxin B form a collaterally sensitive pair.

> *"This was a real team effort between a microbiologist and a biomathematician."*

It can also happen that the drug pair exhibits mutual collateral sensitivity (MCS) for a pathogen: The pathogen's evolution of resistance to drug A increases its sensitivity to drug B and vice versa.

Researchers have identified several MCS pairs for pathogens like E. coli and Pseudomonas aeruginosa. Some have proposed exploiting the phenomenon to treat infections by cycling through the drugs, A-B-A-B.

"This sounds very clever," says Georgia Tech biomathematician Howard "Howie" Weiss. "But what could prevent this scheme from working is the rapid emergence and ascent of a population of cells that are resistant to both antibiotics."

The prospect is exciting, but no experiments have yet been performed to test efficacy.

With Stockholm University microbiologist Klas Udekwu, Weiss has tested the plausibility of such schemes, using a mathematical model that considers factors affecting efficacy. Applying treatment protocols consisting of pairs MCS antibiotics, they examined how fast multiply-resistant mutants would emerge. They reported results in Drug Design, Development and Therapy.

They found some treatments that did not produce multiply-resistant mutants for several weeks, for several months, and even indefinitely. That means some combinations of an MCS pair prevented further development of the bacteria's resistance to either drug.

"This was a real team effort between a microbiologist and a biomathematician," Weiss says. "My job was to construct the model using a system of differential equations and very carefully simulate their solution using a computer."

The first experiment used low to moderate concentrations of antibiotics and daily cycling: drug A on day 1, drug B on day 2, drug A on day 3. At these drug levels, treatment failed. Resistant mutants rapidly developed and dominated.

Simulation results improved with higher drug concentrations. "We found that one-day cycling of certain antibiotics kept the double-resistant mutants in check for over two weeks, which would be sufficient to cure many infections," Weiss says.

The simulations also showed that three-day cycling of antibiotics that only inhibit bacterial growth – not kill – would never result in double-resistant mutants. "This was striking," Udekwu says, "but in line with ecological theory."

Udekwu is now conducting in-vitro cycling experiments. The next step would likely be experiments in mice. "It is far too early for clinicians to think about this strategy," he says, "other than to keep an ear out for it, perhaps in a Cochrane report someday."

DONATE TO SoM

Stay in Touch!

We look forward to future opportunities to stay in touch with you. We're very grateful for help in all forms, large and small, from our friends. Here are some ways you can stay involved with the School of Math, along with our Friends of the School of Math and our Alumni:

Give to the School of Math:

Your gift can have a large impact on the education and research efforts of the School of Mathematics. Below are some of the many ways this can happen.

Support the Bright Future of Mathematics

Undergraduate Scholarships: Everyone knows that college affordability is a serious issue for many families. Funds for undergraduate scholarships help support deserving students as they work toward a Math degree, a very valuable degree whose worth increases every day.

Graduate and Postdoctoral Fellowships

Our graduate students and postdoctoral researchers are the future of the discipline, integral to all of the efforts of the School—from teaching to research to outreach. Supporting them with fellowships, thesis/research prizes, travel-and professional-expense funds or other types of support has a large impact on their professional development, the School, and the discipline. The School's increased quality and quantity in postdoc and graduate recruitment illustrates how a named fellowship attracts and promotes top talent.

Connect with High Schools

The High School Mathematics Competition is an inspiring event where students gather with others interested in mathematics and compete for scholarships. It is run entirely by undergraduate and graduate student volunteers, with scholarships to bring these talented high school students to Georgia Tech. Contributions toward prize money or operating expenses ensures and expands the on-going inspiration and impact of this event (for registration and other details see http://hsmc.gatech.edu). The School also runs a large distance learning program for High School students, with potential for many areas of growth.

Recognize Teaching, Research, and Leadership in Mathematics

A central part of the mission of the School of Mathematics is teaching, with very talented and dedicated teaching faculty, as well as an extensive training program in teaching for our graduates and postdocs. Recognizing the best of them through awards for excellent teaching and mentoring underlines the importance of these efforts and encourages increased excellence. A named award would be a great way to remember an alumnus, former faculty member, or previous instructor who had a big impact on your life. Likewise, School members are leading research efforts, events, and training at Georgia Tech and around the world, so you may want to recognize their impact.

Create an Endowed Chair

Through an endowed professorship, a donor creates an enduring tribute that realizes their vision of mathematical excellence, provides exceptional opportunities for students and researchers at all levels, and promotes connections locally and globally.

Share your story

We ask all alumni, past visitors, and friends of the School to please update your contact information along with your news, with an email to comm@math.gatech.edu. More info on our webpage. We hope to hear from you soon!

Visit us!

Or even better, deliver your story in person by visiting the School. We especially welcome opportunities for visits from alumni to stop by and connect with our students and School members.

CREATING THE NEXT®

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