

MATH MATTERS

COLLEGE OF ARTS & SCIENCES, CORNELL UNIVERSITY

JANUARY 2019

LETTER FROM THE CHAIR - RAVI RAMAKRISHNA '88

Changes are afoot throughout the University and Mathematics will play a role in many of them. In October, The Arts & Sciences Faculty [voted in a new curriculum](#).

Starting in the fall of 2020, entering A&S Students will satisfy these new distribution requirements. A big change for us here in Math is that A&S students will no longer be required to take two Mathematical and Quantitative Reasoning classes, but rather one class in Symbolic & Mathematical Reasoning and one in Statistics & Data Science. Having served on the Curriculum Committee for the 2+ years during which it formed and revised the new curriculum as it sought input from all stakeholders, I am confident the new requirements will better serve all our graduates as they go forward in life after Cornell.

In a matter related to the new curriculum, A&S recently put out a call for proposals for new courses or revisions of old ones with an eye towards making our curriculum more data science intensive. Math Professors [Nussbaum](#), [Sosoe](#),

[Townsend](#) and [Wegkamp](#) have entered this competition with a proposal to develop data science content for three of Math's undergraduate classes. The aim



Math Majors build a snowman in front of Malott Hall

is to include more software-based demonstrations and homework in the first and second year classes (Statistical Theory & applications and Linear Algebra with applications) and to include theoretical data science topics in a junior level class, Stochastic Processes. These changes will impact about 200 students per year.

In the [Winter 2017 Math Matters](#) I mentioned our work on active learning. In the first stage this was centered on calculus

classes and one upper-level class, Prove it! We recently submitted a second proposal to create active learning materials for linear algebra classes. The key players in these

initiatives are Lecturers [Steve Bennoun](#) and [Marie B.Langlois](#), Senior Lecturer [Kelly Delp](#) and Professors [Tara Holm](#) and [Tim Riley](#).

Comings and Goings: Professor [Lou Billera](#) retired after exactly 50 years of outstanding scholarship, teaching and service at Cornell. We wish Lou well as he starts this next phase of life. Congratulations to [Xiaodong Cao](#) and [Jason Manning](#) on their promotions

to Full Professor. We look forward to working with them both for many years to come. This year we were joined by Lecturer [Marie B.Langlois](#) from Dalhousie University. Marie is a wonderful teacher and we look forward to working with her.

As always, we are grateful to you, our alumni and friends for your support and advice. Please drop by Malott the next time you're on the hill. We look forward to seeing you!

ED SWARTZ AWARDED THE ROBERT A. & DONNA B. PAUL ACADEMIC ADVISING AWARD

By Linda B. Glaser, Staff Writer, College of Arts & Sciences

[Edward Swartz](#) was awarded the 2018 [Robert A. and Donna B. Paul Academic Advising Award](#) in the College of Arts & Sciences.

Winners were honored at a May 26 trustee-faculty dinner recognizing university-wide teaching and advising and newly tenured

faculty.

"These awards celebrate faculty who have made outstanding contributions to the college and to our students," said Gretchen Ritter '83, the former Harold Tanner Dean of the College of Arts & Sciences. "We are grateful to the

Appels and the Pauls for their commitment to teaching and advising in the college, and their generous



Ed Swartz

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WELCOME MARIE B. LANGLOIS

Marie B. Langlois joins us as a Lecturer in Mathematics. Marie is French-Canadian, originally



Marie B. Langlois

from Québec. She completed her undergraduate degree at McGill, her master's at the University of Calgary, and earned her Ph.D. at Dalhousie University under advisement of number theorist,

[Keith Johnson](#). Marie

is excited to join the Mathematics Department at Cornell because of how friendly the department is, and there are so many people that seemed to care deeply about teaching. In her free time, Marie enjoys hiking near the falls, cooking, and attending classes at the ballet center.

CONGRATULATIONS STEVE GAARDER

Steve Gaarder retired in July 2018 after 14 years as systems administrator with the department. Steve plans on spending more time with his grandchildren, and traveling. He invites everyone to follow his retirement travels by reading his blog [found here](#).



Steve Gaarder

WELCOME RICH HUMPHREY

Rich Humphrey is the new department's Systems Administrator as of July 2018. Rich comes to us from Rosie Applications where he served as a Senior DevOps Engineer. Rich previously served in DevOps and Systems Administrator positions at Delivery.com, Livingly Media, and Squircle. He also has experience working in academia as a System



Rich Humphrey

Administrator at the Center for Computer Research in Music and Acoustics at Stanford University. He has studied Computer Science at New Mexico State University and Electrical Engineering at SUNY Buffalo. In his free time, Rich enjoys tinkering with robotics. He decided to come to the Math Department, because the people seemed nice, and he has a strong affinity for mathematics.



First-year graduate students team building at the Hoffman Challenge course

APPLIED MATHEMATICIANS IN ACTION

The majority of our undergraduate math majors and our graduate students from the [Center for Applied Mathematics](#) (CAM) at Cornell University choose to pursue technical roles in industry after graduation. To better prepare our students for their future careers, [Engaged Cornell](#) is generously supporting our efforts to involve industry and nonprofit partners in enhancing our core applied math curriculum. Throughout the academic year, we are hosting interactive

problem-solving sessions with our community partners, organizing a panel of alumni to discuss how their education translated into industry, and developing a new bank of realistic homework exercises to engage and challenge undergraduate and graduate students. In addition, through the Cornell Mathematical Contest in Modeling, an annual community-focused math competition for Cornell undergraduates, we are working with local partners to propose modeling problems on

which undergraduate teams will work. The winners of this competition will go on to represent Cornell University at the [International Mathematical Contest in Modeling](#) in January.

[Prof. S. Banerjee](#) (ORIE), [Prof. A. Townsend](#), [Prof. A. Vladimirovsky](#), and [Dr. E. Wesson](#) are the faculty members leading this effort. Any advice and input are welcome and can be sent to townsend@cornell.edu.

ALUMNI SPOTLIGHT

ED GEORGE '72 RECEIVES 2018 DISTINGUISHED ALUMNI AWARD

By Louis DiPietro, Communications Coordinator, Statistical Science

It's a wonderful time to be a statistician. Whether it's banking, journalism, or professional hockey, varied sectors now look to big data for insights. It's no surprise that data scientists are in very high demand.

Between strong job prospects in the field and perpetually increasing computing power that opens new doors into statistical inquiry,



Ed George (Math '72)

one could argue we're living in the golden age of statistics.

Not the golden age anymore, Dr. Ed George (Math '72) is quick to note. He would say that was 20 years ago. "I think it's now time to call it the platinum age," the University of Pennsylvania Statistics Professor said. "The future of statistics could not be brighter."

If experience in the field is any indication, take George's word for it. For more than 40 years now, the Bayesian statistician that pursued his interest in using hierarchical modeling, shrinkage estimation, and variable selection to extract information from data. To a layperson, George builds statistical models to help find hidden structures within mountains of data. These models are then applied to data sets with massive numbers of variables, helping researchers narrow their focus and bring order to messy, raw data. The accelerating advances in computing technology George cites have spurred new research questions and the need for newer approaches to address them.

"With the unrelenting technological revolution in information

technology, new research problems emerge with every increase in speed and power," he said. "The emergence of new methodology and new theory to meet these challenges is continuing at a rapid pace. The subject is being continuously refreshed with no end in sight."

Following in a line of celebrated Cornell statisticians, George was named the 2018 Distinguished Alumni award recipient. He was honored at the annual [Cornell Day of Statistics conference](#) which was held on Friday, Sept. 7. A fellow of the American Statistical Association and the Institute of Mathematical Statistics, and current Co-Editor of the *Annals of Statistics*, George also delivered the keynote talk.

"Ed is a leading researcher in the general area of Bayesian decision theory and has earned a reputation as an internationally recognized expert in modern model selection, shrinkage estimation, and ensemble learning for regression trees," said [Martin Wells](#), department chair and professor of Cornell Statistics. "We're excited to welcome him back to Cornell and honor him with this award."

"I have to say I was astonished to hear the wonderful news," George said. "As a student at Cornell who often found myself overwhelmed by the sheer talent around me, it was unimaginable that I would ever receive this kind of recognition."

Indeed, by his own admission, George was not exactly the star undergraduate mathematics major at Cornell. He struggled with the work and found himself regularly lost in the courses, the result of

what he says were poor study habits and a lack of focus.

Then he met the late [Jack Kiefer](#), the renowned statistician and longtime Cornell professor, who he credits with changing his life. "Jack Kiefer's effect on me was stunning. He convinced me of the mathematical depth and elegance that statistical decision theory had to offer. His effect on me was stunning. And I'll never forget him telling me at the end of a poor exam performance, 'If you want to be a mathematician like the rest of us, you're going to have to work like the rest of us'. Exactly the critical encouragement I needed."

A sharp word from his mentor had a profound impact. After completing his undergraduate work at Cornell, Kiefer sent George for master's studies at SUNY Stony Brook with a new determined focus and fresh confidence. And after deciding to pursue a Ph.D. in statistics, it was Kiefer again who would play an integral role in guiding his young mentee to Stanford, remaining a "genuine guardian angel" until his untimely death in 1981.

By then, George had accepted a professorship at the University of Chicago, where he would teach in the Graduate School of Business for the next decade before moving onto the University of Texas at Austin. But while his teaching and research career would take him further away from Ithaca, NY, his connections to Cornell University would remain strong. Summers brought him back to upstate New York, in particular for "Camp Casella", a sort of informal, work-play meeting of friends and statistical minds, led by George Casella,

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THREE MATHEMATICIANS AWARDED PRESTIGIOUS SIMONS FELLOWSHIPS

By Linda B. Glaser, A&S Communications

Cornell faculty have won three of the 40 coveted 2018 Simons Fellowships awarded throughout North America.

The [Simons Fellows Programs](#) in both Mathematics and Theoretical Physics provide funds to faculty for up to a semester long research leave from classroom teaching and administrative obligations. The program is intended to make sabbatical leaves more productive by extending them to a full academic year.



Marcelo Aguiar

[Marcelo Aguiar](#) Ph.D. 1997 specializes in algebra, combinatorics and category theory. His research interests

include topics in noncommutative algebra, category theory and algebraic combinatorics, with Hopf algebras and their generalizations appearing prominently. A goal of his past work

has been to build a conceptual framework for the study of Hopf algebraic structures in combinatorics and to clarify its significance to concrete applications. Part of his current work is devoted to enlarging the scope of classical Hopf-Lie theory. Aguiar used his fellowship to travel to Europe and Asia.



Lionel Levine

[Lionel Levine](#) focuses on probability and combinatorics in his work. The broad goal of his research is to understand how and why large-scale forms and complex patterns emerge from simple local rules. His approach is to analyze mathematical models that isolate just one or a few features of pattern formation. Recently he has been exploring abelian networks, a generalization of the Bak-Tang-Wiesenfeld abelian sandpile model. Levine is visiting

the Institute for Advanced Study in Princeton.



Alex Vladimirovsky

[Alex Vladimirovsky's](#) research is in numerical methods, dynamical systems, nonlinear PDEs and control theory. He studies the effects of anisotropy and inhomogeneity on analytic properties of differential equations and the computational efficiency of numerical methods. He is interested in a variety of discrete and continuous nonlinear problems that have some causal properties defining the direction of "information flow." Much of his work also exploits the often underutilized connections between computer science/operations research and "continuous" numerical analysis. Vladimirovsky is visiting Princeton University.

STROGATZ, BETHE RESEARCH PAPERS NAMED TO TOP-50 LIST

By Tom Fleischman

In 1893 in [Franklin Hall](#) (now Olive Tjaden Hall), the *Physical Review* debuted as the inaugural publication of the American Physical Society (APS).

The APS is celebrating the 125th anniversary of the *Physical Review* and has selected 50 "milestone" research papers spanning a wide range of important results. Fittingly, a few of those papers feature Cornell researchers.

[Steven Strogatz](#), the Jacob Gould Schurman Professor of Applied Mathematics in the College of Arts & Sciences, is on the list for his 2001 work on random

graph theory with postdoctoral researchers [Mark Newman](#) and [Duncan Watts](#), Ph.D. '97.

Random graph theory has been used for decades for mathematical purposes, but it's been employed extensively in modeling real-world networks of various types.

The paper led to a host of other work, but Strogatz admits he had no idea it would be as influential as it has been. "We were



Steven Strogatz

just having fun, working together on a nice spring afternoon while sitting on the porch of my house," he said. "Suddenly Mark Newman saw a neat way of approaching it, and the results just started pouring out of the three of us."

Also in the top 50: [Hans Bethe's](#) 1939 paper, "[Energy Production in Stars](#)," for which he won the 1967 Nobel Prize in physics; and a paper by the trio of Robert Richardson, David Lee and Douglas Osheroff, whose 1972 "[Evidence for a New Phase of Solid He3](#)" eventually earned them the 1996 physics Nobel.

SPUR - SUMMER PROGRAM FOR UNDERGRADUATE RESEARCH

This year, the Mathematics department hosted its largest ever undergraduate research program! Six students from Cornell and thirty other students from around the world spent several weeks working on research projects in four areas: 1. *Analysis on fractals*, directed by [Robert Strichartz](#) (with the assistance of graduate students, Abigail Turner and Shiping Cao, also with help from faculty member [Richard Rand](#)); 2. *Topological methods in discrete geometry* directed by H.C. Wang assistant professor [Florian Frick](#), now a tenure track assistant professor at Carnegie-Mellon University (with the assistance of graduate student Thomas Baath); 3. *Generating Sets of infinite groups*, directed by [Keith Dennis](#) (with the assistance of graduate students Avery St. Dizier and Tianhao Xian); 4. *Optimality and uncertainty*, directed by [Alex Vladimirsky](#) (with the assistance of graduate students Elliot Car-tee and Dongping Qi).

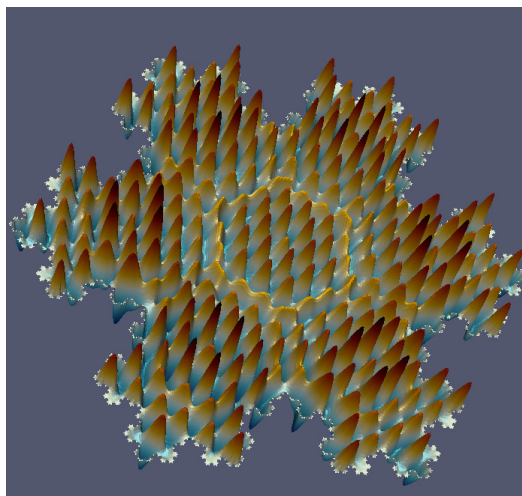
Projects 1-3 were part of the [Summer Program for Undergraduate Research \(SPUR\)](#) supported by the Math Department and a generous gift from David & Jeannette Rosenbloom (David was a summer research student here in the early 90's.) The fourth project was supported by the National Science Foundation as a component of the *Research Training Group* grant in applied mathematics.

The Cornell students that participated were Ely Sandine, Alex Black, Linus Setiabrata, Alexander Xue, Haolin Shi, and Shriya Nagpal.

The research accomplishments coming out of this year's program were very impressive.

A large number of papers are in preparation, and many of the students have given talks about their work at meetings and conferences.

The *Analysis on Fractals* group was following in the footsteps of students working on this topic since 1996. One of the notable accomplishments was finding a fractal variant of the classical Mathieu ordinary differential



One of Sam Wiese's eigenfunctions of the Laplacian on planar domain with fractal boundary, including snowflake domains.

equation that has been studied by engineers and applied mathematicians for over a century as a model of interactions of pendulums. (Richard Rand is an expert in the classical theory.) Not only was the group able to find a convincing analog in the context of fractals and explore its properties, but they were able to turn the tables and transfer some of the ideas developed to understand the fractal theory back to the classical setting, resulting in new and interesting results about the classical Mathieu equation. This is a wonderful illustration of the way that the simultaneous study of problems in both fractal and classical analysis can make contributions to both areas.

Another exciting outcome from the summer work was the creation

of [this website](#) by student Sam Wiese. This website contains beautiful color illustrations of eigenfunctions of the Laplacian on planar domain with fractal boundary, including snowflake domains (studied by [Michael Lapidus](#) of U.C. Riverside) and filled Julia sets (studied by Cornell's [John Hubbard](#).) Please have a look at these amazing images!

The students in the *Topological Methods in Discrete Geometry* group worked on six research projects ranging from topological approaches to dynamical systems on graphs and the interplay of higher-dimensional percolation and fixed point theorems to understanding the complexity of adding convex sets in Euclidean space. A first manuscript on 'Fair splittings by independent sets in sparse graphs' has already been submitted for publication. In this project, Alex Black, Umur Cetin, Alex Pacun, and Linus Setiabrata relate a combinatorial problem about partitioning the vertex set of a graph in a certain way to the geometric problem of embedding an associated simplicial complex into Euclidean space.

The students studying *Generating Sets of Finite Groups* worked on three research projects. One project used the computer algebra system GAP to analyze the replacement property for the projective special linear group of 2×2 matrices over the field of p elements, a group theoretic analogue of exchanging basis elements of a vector space. The second project focused on Fano plane $PSL(2,7)$ and the students successfully characterized its generating sets geometrically.

In the third project, students considered possible candidates

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WALKER WHITE, PH.D. '00 NAMED 2017 WEISS FELLOW



Walker White

Walker White, Ph.D. '00 under Richard Shore, was named Weiss Fellow in February 2017. Established in 1992, the Weiss Presidential

Fellowship was conceived by the late Stephen H. Weiss '57, former chairman of the board of trustees, as the University's highest recognition of faculty for teaching and mentoring of undergraduates. The awardees have sustained records of effective, inspiring and

distinguished teaching and contributions to undergraduate education. structural balance in social systems; and nonlinear dynamics and chaos in physics, engineering and biology.

White teaches in Cornell's Department of Computer Science, directs the Game Design Initiative at Cornell and is responsible for the undergraduate minor in game design, comprising several classes spread across multiple departments. He teaches two of its core courses, in game design and architecture. The selection committee cited his skill in managing a team of TAs to work well together and

give all students one-on-one attention. Students describe White's teaching as masterful, with clear, concise and interesting lectures. Colleagues praised his leadership in the Game Design Initiative, in outreach to local schools, and in collaboration with other faculty to incorporate communication instruction requiring students to "write and speak while they design and code." Walker joins math colleagues Richard Rand, Ravi Ramakrishna '88, and Steven Strogatz as Weiss Fellows.

JOHN HUBBARD AND BEVERLY WEST AWARDED 2018 DIGITIZATION GRANT

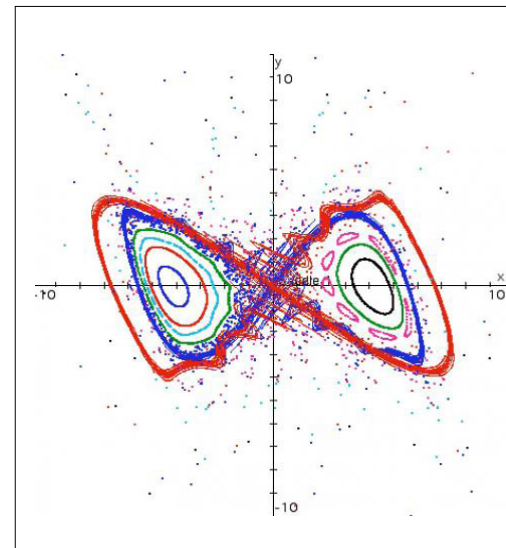
By Jose Beduya, Cornell Chronicle

Professor John Hubbard and Reitred Senior Lecturer Beverly West were awarded a grant for Digital Collections in Arts & Sciences for Dynamic Breakthroughs in 20th Century Mathematics. Arts & Sciences funded seven projects this year. Launched in 2010, the program supports faculty members and graduate students in creating online collections vital for their own and for general scholarship.

The program brings together the subject-matter savvy of grants recipients and the tech expertise

of Cornell University Library's Digital Consulting and Production Services (DCAPS).

The project will digitize materials related to dynamical systems from the collection of John Hubbard, in hopes of capturing a slice of university history and to expand online resources for teaching and research. These include many striking images of fractals. To read more about grant winning projects, or the full mathematics grant description, follow this link: <https://dcaps.library.cornell.edu/grants/as/awards>



2018 Ph.D. Class

Left top row: James Barnes, Drew Zemke, Balazs Elek, TaoRanChen, Tair Akhemjenov, Left bottom row: Prof. Bob Connelly, Aliaksandr Patotski, Jeffrey Bergfalk, My Huynh, Christine McMeekin, and Prof. Ravi Ramakrishna '88



GIVING DAY

2018

Math received 43 gifts
totalling over \$34,500

Thanks to our friends!

SPUR-SUMMER PROGRAM FOR UNDERGRADUATE RESEARCH

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for developing a K-theory of finite groups. The students are working on papers summarizing the results of the REU.

The *Optimality and Uncertainty* group worked on six problems at the interface of optimal control, game theory, convex optimization, and stochastic processes. One of the projects was concerned with finding Nash Equilibria (of *A Beautiful Mind* fame) in time-dependent Surveillance-Evasion games. Another problem was based on minimizing the energy used by a car approaching a red traffic light at an intersection (with the uncertainty based on the starting time and duration of the “red phase”). Two other projects dealt with piecewise-deterministic processes (computing the expected performance for each initial configuration,

quantifying & managing the uncertainty). The students have also developed numerical methods for optimal & robust path-planning in problems with delayed information acquisition. E.g., a robot starts with a probability distribution over possible destinations, while the actual destination will be revealed at T , some later time. How should the robot move until then to minimize the expected time of arrival? Should there be hard or probabilistic constraints on the worst-case scenario? What if T itself is also a random variable? The group is currently working on 3 papers summarizing the results of REU-2018.

Next summer the program will continue with projects directed by [Robert Strichartz](#) and [Andy Borum](#).



2018 Math Major Graduates stand with Majors Director, Prof. Justin Moore, Prof. Ravi Ramakrishna '88, and Prof. Bob Connelly

Interest in Math clubs and circles has really exploded; currently, there are the Ithaca Girls' Math Circle and clubs in three elementary schools: Belle Sherman, Cayuga Heights, & Northeast. We are in the process of organizing clubs at SE Elementary School, and both middle schools in the district (Boynton & DeWitt); [for more information](#).

ED GEORGE '72 RECEIVES 2018 DISTINGUISHED ALUMNI AWARD

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another of Cornell's heralded statistics professors and beloved mentors.

"It was a who's who in statistics – [current Stats Chair and Professor] [Marty Wells](#), [Larry Brown](#), [Jim Berger](#), [Susie Bayarri](#), Chris Robert, [Bill Strawderman](#), [Linda Zhao](#), [Larry Wasserman](#), [Robert Wolpert](#), [Isa Verdinelli](#). We'd have a lecture a day and spend the rest working together and having fun," he said. "It was thrilling, as [George Casella](#) would become an encouraging and catalyzing force throughout my academic career."

It's these pioneering Cornell statisticians and colleagues who George credits for guiding and inspiring him, from an overwhelmed undergraduate, to an accomplished scholar and statistical theorist, to a Cornell Distinguished Alumni.

"More than anything else," he said, "being named a Distinguished Alumni fills me with deep gratitude to all those faculty and colleagues whose encouragement and support have made all the difference in the world." "More than anything else," he said, "being named a Distinguished Alumni fills me with deep gratitude to all those faculty and colleagues whose encouragement and support have made all the difference in the world."

WHAT'S HAPPENING AT THE MATH LIBRARY

ALUMNI NEWS

Did you know that [Elbert Cox](#), Cornell Ph.D. 1925, was the first African-American to earn a mathematics doctorate in the United States? Or that you can crochet [hyperbolic](#) surfaces? Alums this summer learned about these things and much more at the completely upscaled and revamped 2018 reunion event the Department and Mathematics Library hosted. The morning started with a presentation of the Department's history throughout Cornell's 150+ years. Interesting Cornelliana and striking photos of the campus (including one of a young White Hall!) were the highlight of this portion of

our event.

Retired Adjunct Associate Professor [Daina Taimina](#) ran an introduction to 'Crocheting in Hyperbolic Space' - see her prize winning [book on this subject here](#).

Professor [Robert Connelly](#) ran a Mathematical toys and games session that lasted for more than four hours. Children of all ages

had a great time!

Mathematics Librarian Henrik Spoon organized a scavenger hunt in the library. To earn a Rubik's cube, children had to search the stacks for Richard Schwartz's book "You Can Count On Monsters", guess the number of books in the stacks (55,000), count the number of faces on Michael Goldberg's [seven-faced-space-fillers](#), and decrypt a clue to find their prize. The library also had 3D printers making esoteric mathematical objects. Visitors stood transfixed as they saw the letter Pi being assembled in 3D in neon orange.

Please join us this June for our [2019 reunion](#) event!



Class of '88 alumni: Eran Gartner, Daniel Randall, and Ravi Ramakrishna at the library reunion event

'BEAUTIFUL' ODDITY UNVEILED AT MATH LIBRARY

By Jose Beduya, Cornell Chronicle

On Oct. 25, Cornell's Department of Mathematics unveiled a strange, shiny object that's made from one material, has uniform density, and always rests on the same side no matter how it's rolled or set down.

"In mathematical terms, it's convex, homogenous, and has exactly one stable point and one unstable point of equilibrium," explained [Ravi Ramakrishna](#) '88. "It's beautiful to look at, but it's also beautiful in that it has these interesting properties."

Known as a [gömböc](#), the object is a gift from its co-inventor, [Gábor Domokos](#), who attended the unveiling and dedication ceremony at the Mathematics Library. "The gömböc is at the interface between

convex geometry, geometric partial differential equations, and geomorphology," Domokos said. "As a physical object, it may appeal to many who otherwise may not appreciate math, and I hope it will

inspire interdisciplinary research."

Director of the Morphodynamics Research Group of the Hungarian Academy of Sciences and the Budapest University of Technology and Economics, Domokos was a Fulbright scholar and later a Mary S. Upson teaching fellow at Cornell early in his career.

He said institutions around the world have gömböc pieces in their collections, and he wanted to honor Cornell with its own. The gift is named after the year of the university's founding: "By donating Gömböc 1865 to the math department, I express my appreciation and gratitude for all the great intellectual adventures I experienced at Cornell."



Gábor Domokos adds Gömböc 1865 to the math library's display case of geometric curiosities. Photo by Lindsay France, Cornell Brand Communications

MATH COMPETITION DRAWS UPSTATE GIRLS TO CORNELL

By Linda B. Glaser, Staff Writer, College of Arts & Sciences

Thirty-four four-person teams from 18 schools in upstate New York competed on April 29 in [Girls' Adventures in Math \(GAIM\)](#), a team-based math competition for girls in grades three through eight held at Cornell University and 10 other locations nationwide. The national results have just been announced, and Ithaca's Cayuga Heights Elementary School finished first in the Cornell competition Elementary Division – and was one of the top five upper elementary teams nationally. Ithaca's DeWitt Middle School won the Cornell middle school category and ranked among the top 20 middle school teams nationally.

"We're proud of how well our competing teams ranked among the hundreds of teams from across the country. Watching the girls throughout the afternoon, I saw teamwork, fun and pride. We're grateful to all the volunteers who helped make it such a success," said [Robert Kleinberg](#), Cornell Associate Professor of Computer Science, who organized the event in collaboration with [Mary Ann Huntley](#), Senior Lecturer

and Director of Outreach in the Mathematics Department.

GAIM participants were challenged to engage in "creative, strategic, out-of-the-box problem-solving" to win. The teams, from a region ranging from Syracuse to Big Flats, competed in solving challenging math puzzles that called for creativity and ingenuity. After the competition, they participated in strategy games, puzzles

and Math Circle Leader, organized two of the winning teams and encouraged other local coaches to organize teams.

"Because I take all comers in math clubs, I have a mix of students: some who believe they are innately talented at math and some who think they aren't 'good at it' but wish they were. I think GAIM demonstrated to these girls that with exposure to problem-solving, with attention and interest, you can actually become good at it," Jones said.

The GAIM event at Cornell was supported by the Department of Mathematics in the College of Arts & Sciences and the Department of Computer Science as well as the national GAIM organization.

[GAIM 2018 Cornell University winners Upper](#)

[Elementary Division](#): First Place: Cayuga Heights Elementary, Second Place: Northeast Elementary School, Second Place: South Hill Elementary School Middle School Division: First Place: DeWitt Middle School Second Place: DeWitt Middle School, Third Place: Boynton Middle School.



Elementary and middle school girls gather to play games during the Girls' Adventures In Math in Klarman Hall Atrium.

and arts/crafts activities in the Groos Family Atrium in Klarman Hall.

Many of the winning teams included members who attend the weekly Ithaca Girls' Math Circle, an outreach project of the Cornell University Math Department. [Laura Jones](#), Senior Research Associate

ED SWARTZ AWARDED THE ROBERT A. & DONNA B. PAUL ACADEMIC ADVISING AWARD

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support of our exemplary faculty."

Swartz, professor of mathematics, focuses on the interplay between combinatorics, geometry/topology and algebra, with an emphasis on matroids and combinatorial properties of simplicial complexes. His students praise his enthusiasm for our subject and his

talent for making difficult material seem easy; they particularly appreciate how easy he is to approach and how generous he is with his time, advice, and encouragement. Swartz served from 2014-2017 as director of undergraduate studies and as director of the 2012 Summer Math Institute. During

the summers of 2006 and 2011, Swartz ran Research Experiences for Undergraduates.

The Paul academic advising fellowship was established in 1992 to honor undergraduate advisers who make a difference in the lives of their students.

DEPARTMENT BUZZ

Alex Townsend was awarded the inaugural SIAG/LA Early Career Prize. This prize is given every three years to a young researcher in applicable linear algebra. Alex won the prize, "for significant contributions to a broad range of linear algebra topics that includes low-rank matrices, orthogonal polynomials, and spectral methods."



Alex Townsend

Alex also received the **SIGEST award** jointly with **Berhard Beckermann** (professor at Université de Lille) from the **Society of Industrial and Applied Mathematics (SIAM)** for the paper "The singular values of matrices with displacement structure." Congratulations Alex!



Marie B. Langlois



Steve Bennoun

Marie B. Langlois and **Steve Bennoun** have been named **Project NExT** (New Experiences in Teaching) Fellows. The program focuses on professional development for recent Ph.D.s. They will become involved with mentoring, and attend Project NExT events at Mathfest in the summer and the Joint Mathematical Meetings, the largest annual meeting in North America, in the winter. Congratulations Marie and Steve!

Lou Billera
Celebrates 50 years
with the Department
of Mathematics.
Happy Anniversary
Lou!



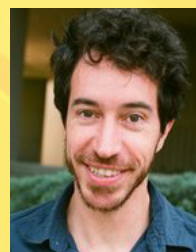
Lou Billera



Mia Minnes

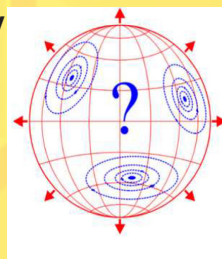
Mia Minnes (Ph.D. 2008 under the advisement of **Anil Nerode**), received tenure as an Associate Teaching Professor in the Computer Science department at UCSD as of July 1, 2019. Congratulations Mia!

Antonio Montalban (Ph.D. 2005 under the advisement of **Richard Shore**) currently a Professor at the University of California, Berkeley is a **2018 Simons Fellow**. Simons fellows receive academic leaves from one term to a full year. Congratulations Antonio!



Antonio Montalban

Math alum **Larry Somer '70** was honored on the occasion of his 70th birthday with a four day conference by the Institute of Mathematics of the Czech Academy of Sciences in Prague. The title of the Conference was "Cosmology on Small Scales 2018". See page 9 of [this document](#).



Camil Muscalu

Camil Muscalu has been named a 2019 Fellow of the American Mathematical Society (AMS). Muscalu was invited to join this year's class of AMS Fellows for contributions to multi-linear harmonic analysis with applications to partial differential equations and for expository writing in modern harmonic analysis. Congratulations Camil!



Kelsey
Houston-Edwards

Kelsey Houston-Edwards, (Ph.D. 2018 under the advisement of **Laurent Saloff-Coste**) shared the Gertrude Spencer prize with her First Year Writing Seminar student Kopal Jha. The prize recognized the collaborative student-teacher work that led to Ms. Jha's paper "Face-to-Facebook: Deliberating the role of Facebook in the Tahrir Square Revolution". Congratulations Kelsey!



Karola Meszaros

Karola Mészáros is a **Von Neumann Fellow** at the Institute of Advanced Study. Karola is collaborating with mathematicians there during the 2018-2019 academic year. Congratulations Karola!

DEPARTMENT BUZZ



Karen Vogtmann

Professor Emeritus **Karen Vogtmann** was awarded the London Mathematical Society **Pólya Prize** for her profound and pioneering work in Geometric Group Theory, particularly the study of automorphism groups of free groups. The 2018 LMS Prize winners were announced at the Society's Summer 2018 meeting. Congratulations Karen!



Julie Bergner (center), Assoc. Prof. at the University of Virginia is the 2018 Cornell University Mathematics Michler Fellow. Presenting her the fellowship certificate are AWM Treasurer, Ph.D. candidate, **Smaranda Sandu** (left), and AWM Faculty Advisor, Professor **Tara Holm** (right.)



Henrik Spoon

Henrik Spoon is the new director of the Mathematics Library. Henrik succeeds Steve Rocky '70. Henrik was formerly a Senior Research Associate in the Cornell Center for Astrophysics and Planetary Science. Welcome Henrik!



Future math major, **Leo Townsend** (left), at homecoming wearing his future majors t-shirt

H.C. Wang Professor, **Natalia Goncharuk**, was awarded the 2018 Prize of the Moscow Mathematical Society given to young mathematicians. The citation highlighted her works on, "**New fractal set 'bubbles' and complex rotation numbers.**" Congratulations Natalia!



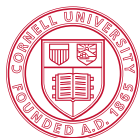
Nataliya Goncharuk

On behalf of the **Math Majors Committee**, it is our pleasure to announce that the department of mathematics is initiating a program of awarding travel fellowships to help our majors attend conferences in mathematics and present their research.



2018 Mathematics Department Award Recipients
 From left to right: Jason Manning, Frederik De Keersmaecker, Aleksandra Niepla, Romin Abdolazhadi, David Mehrle, Lila Greco, and Andres Fernandez Herrero
 *Not pictured: Alex Townsend, Elliot Cartee, and Aditya Vaidyanathan

Read Math Matters online: <https://www.math.cornell.edu/m/News/MathMatters>



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MATHEMATICS DEPARTMENT ENDOWMENTS & GIFTS

We are grateful to alumni, friends, and family for their generosity in supporting our endowments or providing other gifts and donations to the department.

The [Ruth I. Michler Memorial Prize](#), established by Gerhard and Waltraud Michler of Essen, Germany, in memory of their daughter, provides funding for the Ruth I. Michler Memorial Prize of the Association for Women in Mathematics. The awardee spends a semester at Cornell focusing on research.

The **Chelluri Lecture Series** was established by the parents of Raju Chelluri's '99 in his memory. Funds are used to invite distinguished mathematicians to deliver an annual lecture.

The **Michael D. Morley Senior Prize in Mathematics** is presented annually to an Ithaca High School student who has excelled in mathematics and who has demonstrated originality and innovative power in mathematics.

Teaching Awards for Graduate Students and faculty were created in 2001. The endowment supports awards to graduate students.

The **Colloquium Endowment Fund** was instituted to invite distinguished scholars to speak at the Oliver Club seminars. (See www.math.cornell.edu/~oliver/.)

The **Eleanor Norton York Endowment** was established in honor of Eleanor York, a long time employee in the Astronomy Department, to recognize outstanding graduate students in both Astronomy and Mathematics.

The **Faculty Book Endowment** is dedicated to improving our world-class collection of mathematics books and publications.

The **Hutchinson Endowment** was created by Genevra Hutchinson to honor her husband, John Hutchinson, who taught at Cornell for 42 years. This fund provides research

support for graduate students to work on their thesis problems.

The **Israel Berstein Memorial Fund** was established in honor of Israel Berstein, a professor in this department from 1962-1991. The memorial fund is intended to help young mathematicians in the field of topology.

The **Torng Prize**, established in 2017 by former graduate student Bung-Fung Torng, this prize is awarded annually to an outstanding graduate student for their work as a teacher. It provides summer support for the student to focus on their thesis work.

The **Logic Endowment** was started with a generous gift from William Craig '40 to support promising logic students.

The **Robert John Bättig Endowment** was established by his parents after his untimely passing. Robert was awarded a January 1998 Ph.D. in mathematics. The fund provides an annual prize to an outstanding continuing graduate student in mathematics at Cornell.

The **Undergraduate Travel Fellowship** created by the math majors committee, to help our majors attend conferences in mathematics and present their research.

If you would like to contribute, please make your check payable to **Cornell University**, please indicate the endowment by writing the purpose for the gift on the subject line of the check, and send it to:

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Gifts can also be made online at: www.giving.cornell.edu