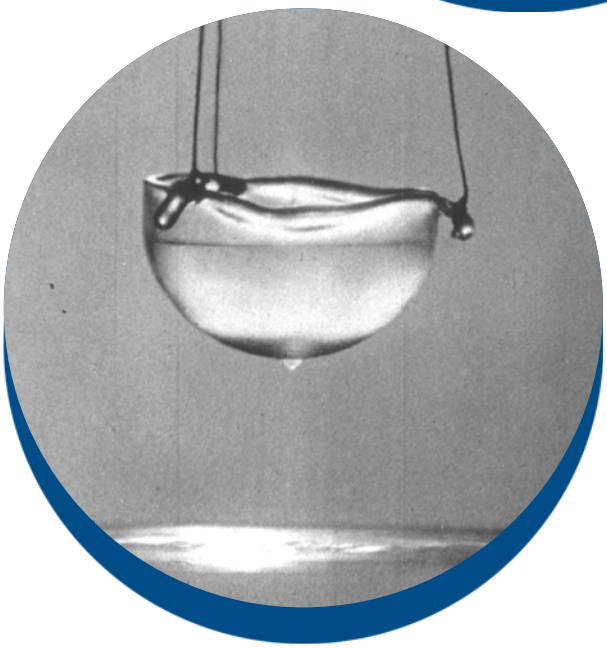
UC DAVIS

MATHEMATICS NEWSLETTER



New Research from Old Roots

Contents

Letter from the Chair	2
New Academic Staff	4
Research: Sofas	6
Research: Yang-Mills	8
Research: Quantum Mechanics	9
Undergraduate News	10
Graduate News	14, 17
Department Awards	12
Life After Davis	15-19
Emeriti	18
Staff News	19

Letter from the Chair

by Abigail Thompson, Department Chair

Until starting as Department Chair last July, I hadn't fully appreciated the incredible growth experienced by the Department of Mathematics in the past few years, during the term of former Chair Dan Romik. The number of mathematics majors at UC Davis has almost doubled in the past five years, from 416 to 823. Some of this growth is attributable to our new major in Mathematical Analytics and Operations Research, and some to the growing recognition that mathematics is central to so many current employment opportunities. We are delighted to have such an enthusiastic and energetic group of students to work with. Our faculty size has not kept up with this extraordinary surge in student numbers, and one of my goals as chair is to bring the two back into balance.

We enjoyed a fine year for recognitions and awards for excellence in both research and teaching. Professors Tudor Dimofte and Adam Jacob were selected as 2017 Hellman Fellows, awarded to "faculty members at the Assistant Professor rank who exhibit the potential for great academic distinction". James Bremer was named a 2016-17 UC Davis Chancellor's Fellow. This fellowship recognizes the achievements of outstanding faculty members early in their careers. Dr. Shuyang Ling, who completed his Ph.D. with Professor Thomas Strohmer, was awarded a Student Paper Prize for 2017 by the Society for Industrial and Applied Mathematics (SIAM). Dr. Ling is now a postdoc at the Courant Institute at NYU. Professor Jesús De Loera received the 2017 Mathematical Association of America Golden Section Teaching Award for Distinguished College or University Teaching of Mathematics for 2017, and Distinguished Professor Albert Schwarz was selected as a 2018 Fellow of the American Mathematical Society.

In May we hosted the inaugural Thurston Lecture, the first of an annual lecture series in honor of Fields Medalist William P. Thurston. The prize was endowed by UC Berkeley mathematics professor and 2015 Breakthrough Prize winner Ian Agol, who was a UC Davis Research Assistant from 1998 to 2000. Dylan Thurston, a professor of mathematics at Indiana University, Bloomington, and Bill Thurston's son, gave a lecture on "Rubber Bands and Rational Maps," as well as a talk directed towards undergraduates. Another notable Department activity saw Professor Steve Shkoller organize a graduate summer school and workshop on Wave Analysis at (appropriately) the Bodega Marine Lab in June. Former Chair Dan Romik was featured in a Numberphile YouTube video for his surprising and appealing work on the mathematics of moving a sofa around a tight corner, which he writes about in this newsletter. Special events in the coming

Pictured at left:

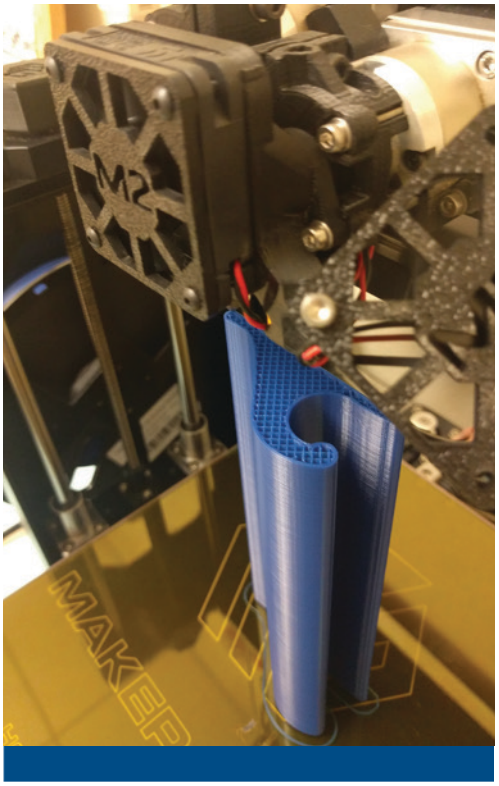
The Alexander Horned Sphere is a mathematical object discovered in 1924 by J.W. Alexander. On one side, the interior, it is standard and bounds a 3-dimensional ball, but its exterior is not standard. It shows that surfaces in 3-dimensional space can exhibit much more complicated behavior than curves in a plane. This sculpture shows the first few of the infinite iterations.

Donated by Julian Thurston in honor of William Thurston, UC Davis faculty from 1996 through 2003.

Pictured at right:

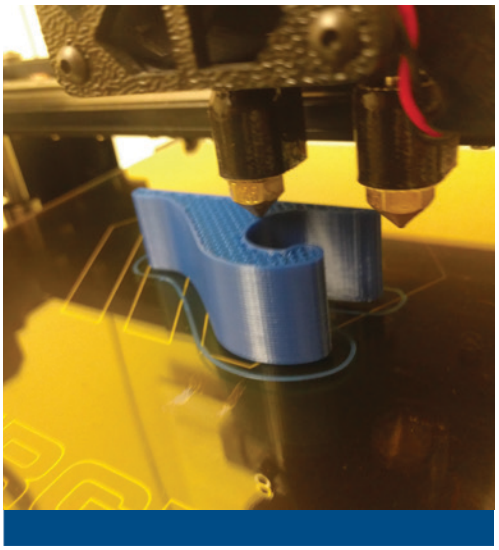
The coated glass print bed and brass nozzles of the Department's MakerGear M2 3D printer, in the process of printing a wave. The 3D printer has been placed in shared space, and used by faculty and graduate students for mathematical modeling. This model excels in ease of use and simple calibration.

Made possible by donations from Professor Emeritus Sherman Stein and Hannah Stein.



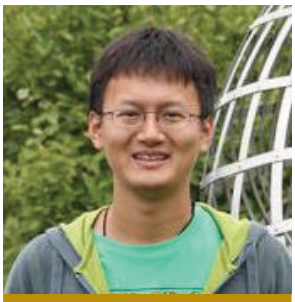
year, include a joint mini-symposium with the Music Department on Mathematics and Music, organized by Professor Janko Gravner. It's exciting to become the new chair in such an active and inspiring Department and I'm looking forward to the challenge.

We have been delighted with the increasing trend of support from our alumni and supporters. In addition to the wonderful endowment of the Thurston Lectures, we were pleased to receive a beautiful sculpture of the mathematically fascinating Alexander's Horned Sphere, given to the Department by Julian Thurston in honor of Bill Thurston. If you come by the Department be sure to stop by to see it in the lobby of MSB. A generous donation from Professor Emeritus Sherman Stein and Hannah Stein allowed the Department to purchase a 3-D printer. This has been used to print objects for Picnic Day, and to illustrate mathematical concepts (like Dan Romik's moving sofa) in innovative ways. While it doesn't spin straw into gold, it can spin plastic into Klein bottles, with mathematically illuminating results. These and other gifts make a critical contribution to our students and to the mathematical environment. I hope that you consider adding a gift to the Department to your giving plans. Gifts can be designated towards scholarships, research, lecture series or general uses. Please see the Department's web page or contact us to learn about donation possibilities.



Tudor Dimofte

Adam Jacob



Shuyang Ling

Jesús De Loera

Incoming Academic Staff

Shiqian Ma
Assistant Professor

Shiqian Ma received a B.S. from the School of Mathematical Sciences at Peking University in 2003, an M.S. from the Institute of Computational Mathematics at the Chinese Academy of Sciences in 2006, and a Ph.D. from the Department of Industrial Engineering and Operations Research at Columbia University in 2011 under the supervision of Donald Goldfarb. He then held a postdoctoral position at the Institute for Mathematics and Its Applications located at the University of Minnesota. After working for four and a half years at the Chinese University of Hong Kong as an Assistant Professor, he is very happy to join UC Davis.

Shiqian works in the field of numerical optimization. He designs and analyzes various algorithms for solving problems arising from fields such as machine learning, statistics, image processing, bioinformatics, and others. His recent research interests include accelerated first-order methods and stochastic algorithms, which are attracting lots of attentions in the optimization and machine learning communities.

While not doing math, Shiqian enjoys jogging, traveling, and reading.

José Simental Rodríguez
Krener Assistant Professor

José Rodríguez did his undergraduate studies Math at the National Autonomous University of Mexico (UNAM) before coming to Ohio University in Athens, Ohio, where he received his masters. Later he attended Northeastern University in Boston, Massachusetts, where he received his Ph.D. in May 2017, under the supervision of Professor Ivan Losev. José will spend the Fall of 2017 at the Hausdorff Institute for Mathematics in Bonn, Germany.

José's research interests lie in Representation theory, particularly that involving Cherednik algebras, Hecke algebras, and quantizations of symplectic resolutions. He is also interested in the geometric properties of these resolutions and, in particular, of quiver varieties. In Davis, he will be working under the mentorship of Professor Eugene Gorsky.

Outside of Mathematics, José enjoys biking and hiking. He am also an avid film buff, and he has reviewed movies for film websites in Spanish.

Robert Krone
Krener Assistant Professor

Robert Krone grew up in New York City. He received his Ph.D. from Georgia Tech in 2015 with advisor Anton Leykin. Before coming to Davis he was a postdoc at Queen's University for two years.

Robert's research area is applied algebraic geometry and commutative algebra, and he also enjoys combinatorics. Some of his interests include toric varieties, monomial ideals, tropical geometry, and algebraic statistics. Computation is a big part of his work, and he writes code in Macaulay2, an mathematics software system focused on supporting research in algebraic geometry and commutative algebra.

Robert's hobbies outside of math include rock climbing, skiing and board games.

Paloma Gutierrez Castillo
Krener Assistant Professor

Paloma Gutierrez Castillo was born and raised in Malaga, Spain where she also completed her undergraduate degree in Industrial Engineering, equivalent to Aerospace or Mechanical Engineering in the United States. During her undergraduate thesis, I had the first contact with researching in Fluid Mechanics, both in experimental and numerical approaches, resulting in her first publication. After finishing her undergraduate degree, she obtained her Masters in Environmental Hydraulics, also in Spain.

Paloma moved to the US to pursue her Ph.D.. She earned her Ph.D. in Applied Mathematics from Arizona State University where she was alternatively a TA and RA from 2012-2016. In her last year, she got ASU's Graduate Education Dissertation Fellowship, a University-wide Fellowship, and graduated in May 2017.

Her dissertation, "Rotating split-cylinder flows," is a numerical study of the behavior of the flow contained in a rotating split cylinder including three geometries: differentially rotating halves, oscillatory differentially rotating halves, and counter-rotating halves. The study focuses on the instabilities and inertial waves present in the flow as well as the study of the resulting bifurcations. It also contains a small experimental part. The work included in her dissertation is published in four papers in prestigious international journals, and was recognized with the Graduate Student Research Award of the School of Mathematical and Statistical Sciences at Arizona State University.

In July 2017 Paloma started a new exciting stage in her career: moving to UC Davis, where she felt very welcome. She started working on different computational projects related with complex fluids including Immersed Boundary Methods, Adaptive Mesh Refinement, and Elastic Turbulence. Currently, she is teaching MAT 025, Advanced Calculus.

Pictured: the Allegro Classic Seychelle Figure 8 Sofa

Research Highlight

The Equation Around the Corner

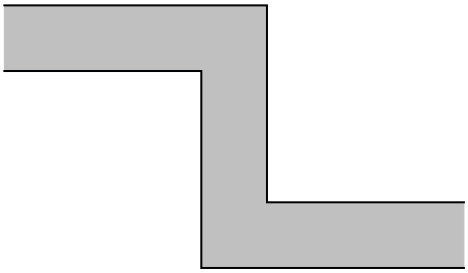


Figure 4, S-shaped hallway

Mathematicians have always looked to the physical world to find inspiration for new mathematics; indeed, some beautiful theoretical developments have emerged from our attempts to understand physical phenomena such as fluid flow, planetary motion, electromagnetism, chemical reactions, and... *furniture moving*??!

Yes, furniture-moving. It is not known what led the Austrian-Canadian mathematician Leo Moser to pose the mathematical question that became known as the moving sofa problem — likely it had to do with a house-moving experience from his student days — but the question, which Moser published in the problems section of the journal *SIAM Review* in 1966, has fascinated professional and amateur mathematicians alike in the time since its publication, spurred the creation of some intriguing new research, and remains unsolved today.

The question is deceptively simple to state. I'll quote it in Moser's original words: "What is the largest area region that can be moved through a 'hallway' of width one?" The hallway in question has the shape of the letter L, with two arms, each of width one, meeting at a right angle.

To understand what makes this question tricky, let's think what kind of "sofa" shapes we can construct that can move through the hallway and around the corner. Two simple shapes that immediately come to mind are that of a unit square, which has area 1 and can be simply pushed (translated) around the corner of the hallway; and a unit semicircle, which has a larger area of $\pi/2 = 1.5708\ldots$, and can be moved around the corner through a combination of translation and rotation motions, as shown in Figure 1. The natural question is now: can we build a "moving sofa" shape of even larger area?

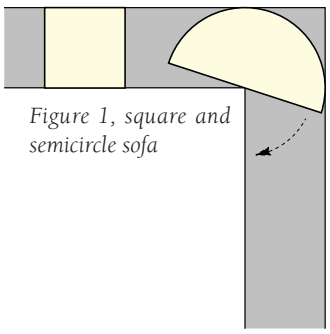


Figure 1, square and semicircle sofa

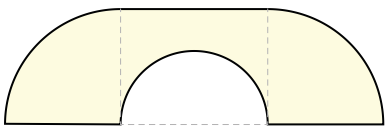


Figure 2, Hammersley's sofa, 1968

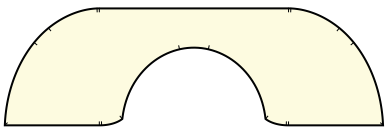


Figure 3, Gerver's sofa, 1992

Indeed we can; a short time after Moser posed the question, in 1968, the mathematician John Hammersley published a construction of a moving sofa with area $\pi/2 + 2/\pi \approx 2.2074$. He conjectured that this shape (now known as Hammersley's sofa) was the largest area possible, and also proved that a moving sofa shape cannot have area larger than $2\sqrt{2} \approx 2.828$.

Hammersley's conjecture about the optimality of his construction turned out to be false. In 1992, Joseph Gerver published a much more complicated construction of a shape, now known as Gerver's sofa, which has a slightly larger area of approximately 2.2195 (the precise area is defined in terms of the solutions to a complicated system of nonlinear equations that can only be solved numerically). Gerver's ingenious construction is quite elaborate, and requires gluing together 18 different curves, each one defined by a separate formula — a surprising amount of complexity to arise out of Moser's innocuous-seeming question; see Figure 3. Gerver conjectured that his construction has the largest area possible for a moving sofa (in fairness to him, unlike Hammersley he actually had some reasonably solid reasoning to base such a statement on), and it remains today the largest one found so far, but no one has yet found a proof of its optimality.

More recently, I myself was infected with the "moving sofa bug" and began researching the problem. This led me to publish two papers about it with novel results. In the first paper, published in 2016, I improved and extended some of the techniques developed by Gerver, and applied them to study a more symmetric variant of the moving sofa problem in which the sofa is required to be movable around right-angled corners both to the left and the right, or in other words movable through the *S*-shaped hallway shown in Figure 4 — what I call the ambidextrous moving sofa problem. I was able to derive an elaborate shape that satisfies this harder constraint and is a plausible candidate for being the solution to the problem, and has an area given by the intriguing mathematical constant

$$\sqrt[3]{3+2\sqrt{2}} + \sqrt[3]{3-2\sqrt{2}} - 1 + \tan^{-1}\left[\frac{1}{2}\left(\sqrt[3]{\sqrt{2}+1} - \sqrt[3]{\sqrt{2}-1}\right)\right] \approx 1.644955\ldots$$

The new shape is shown in Figure 5. Sadly, its practical usefulness for the design of lounging furniture appears to be in question, but it is mathematically very interesting!

by Dan Romik

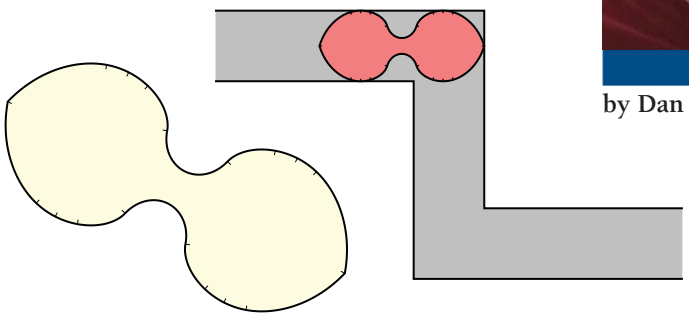
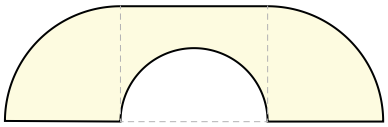


Figure 5, Romik's ambidextrous sofa



In the second paper, coauthored with Yoav Kallus earlier this year, we went back to Moser's original variant of the problem, and made some progress towards bridging the gap between the known lower bound on the largest area of a moving sofa (the number 2.2195... that appears as the area of Gerver's sofa) and the known upper bound (Hammersley's bound of $2\sqrt{2}$). Our main result is the proof of an improved upper bound of 2.37. The method involved the construction of an algorithmic proof scheme: a computer program that certifies a succession of improved upper bounds that will eventually converge to the optimal value. (The convergence is very slow unfortunately: certifying the bound 2.37 required 3 weeks of CPU time running on a modern desktop computer. I leave to the reader as an exercise to find further improvements to our algorithms that will result in improved bounds...)

To conclude, part of the beauty of pure mathematics is that it draws inspiration from many places, and that even seemingly whimsical questions can lead to serious mathematics. In this case, a question about furniture-moving has led to new ideas from diverse areas such as differential equations, geometry, computer-assisted proofs, and algorithmic optimization techniques. I hope you remember this and find it as inspiring as I do the next time you are struggling to fit a piece of furniture around an obstacle. And as you go about your daily life, remember: new and interesting mathematical ideas are always waiting just around the corner!

Exercise: The Optimal Width of a Sofa

Hammersley's construction, shown above, is based on the idea of cutting up the semicircle into two quarter-circular pieces, pulling them apart by a distance of d units, filling in the gap between the pieces with a rectangular block of dimensions $d \times 1$, and then removing from that block a semicircular piece with diameter d. Show that this construction results in a shape that can be moved through Moser's hallway, and reconstruct Hammersley's reasoning to arrive at his optimal value of d for which the area of the shape is $\pi/2 + 2/\pi$.

More on Constructing a Better Sofa

1. J. Gerver. *On moving a sofa around a corner.* Geometriae Dedicata 42 (1992), 267-283.

2. Y. Kallus, D. Romik. *Improved upper bounds in the moving sofa problem*. Preprint, 2017. https://www.math.ucdavis.edu/~romik/publications/

3. D. Romik. *Differential equations in the moving sofa problem*. Experimental Mathematics, to appear. https://www.math.ucdavis.edu/~romik/publications/

4. D. Romik. *The moving sofa problem*. Web article (2016). https://www.math.ucdavis.edu/~romik/movingsofa/

Adam Jacob joined our Department in 2015, and was awarded a Hellman Fellow in 2017.

Adam Jacob is a pure mathematician who works in the area of differential geometry. In general, he studies nonlinear partial differential equations that arise from the geometry of manifolds, with a special emphasis on manifolds which admit a complex structure. This current project focuses on the Yang-Mills equations, which were originally formulated in context of particle physics, yet can be studied from a purely geometric viewpoint.

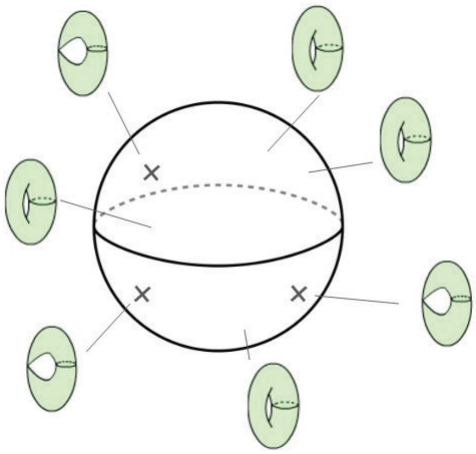
Research Highlight

Finding a Greater Understanding of Yang-Mills

by Adam Jacob

Yang-Mills theory was developed in the 1950's and 60's and plays a key role in our understanding of particle physics. The equations of motion given by this theory are known as the Yang-Mills equations, which can be formulated purely from a geometric viewpoint. Remarkably, their study has yielded profound insight into the mathematical structure of the geometric spaces where solutions exist. Most prominently, Simon Donaldson analyzed the space of solutions of the Yang-Mills equations to compute new invariants of 4-manifolds, work for which he was awarded the Fields Medal in 1986. In higher dimensions, study of the Yang-Mills equations becomes much more difficult. However, working on a complex manifold, if the connection is compatible with the complex structure, the equation can be simplified in many important ways, which can help overcome some of these difficulties.

I plan on using my Hellman grant to study two distinct problems related to the Yang-Mills equation and complex geometry. The first problem involves understanding the analytic deformation theory of a Yang-Mills connection with isolated singularities. A singularity of the Yang-Mills equations is the analogue of a black hole in the theory of general relativity, in other words it is a point where magnitude of the curvature approaches infinity. Despite the relative prominence the deformation space of smooth Yang-Mills connections plays in in many important problems, the singular theory is not well understood. I intend to focus on the case of complex dimension three (real dimension six), which has applications to the construction of singular solutions to the Yang-Mills equations on G_2 manifolds, which are seven dimensional manifolds of exceptional holonomy. It would also be interesting if this analytic deformation theory relates to the algebraic deformation theory of reflexive sheaves.



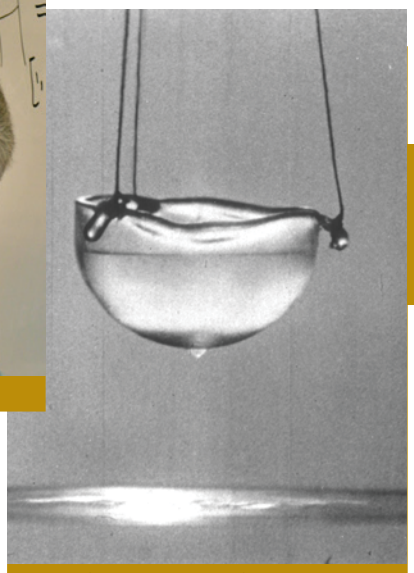
The above figure represents a 4-dimensional space. Each point in the 2-sphere has a torus fiber, with some fibers degenerating.

The second problem I intend to study involves investigating how Yang-Mills connections behave under a certain degeneration. Specifically, I will focus on elliptically fibered K3 surfaces, which can be described as a family of holomorphically varying elliptic curves fibered over the Riemann sphere, with 24 singular fibers. If X denotes such a surface, consider a sequence of Riemannian metrics on X collapsing the elliptic fibers. On a vector bundle over X, suppose there exists a sequence of Yang-Mills connections corresponding to this degeneration. Once can then ask: What is the limiting behavior of this sequence? Analytically, this is a very difficult question, since ellipticity of the equation completely degenerates as the fibers shrink. However, there is hope that a robust understanding of the geometry can help overcome these difficulties. In order to identify the limit, one can look to a conjecture of Fukaya, who postulates that after a coordinate dilation the connections will converge to a limiting connection, which restricts to a flat connection on each fiber. From the point of view of Strominger-Yau-Zaslow mirror symmetry, this limiting property is important, as it defines a dual Lagrangian fibration on the mirror K3 surface. Although Fukaya's conjecture is stated in a much more general setting, I hope to understand this picture better in the surface case.

Research Highlight

Quantum States of Matter

by Bruno Nachtergaele



still from movie by Alfred Leitner, 1963

The liquid helium above is in the superfluid phase. As long as it remains superfluid, it creeps up the wall of the cup as a thin film. It comes down on the outside, forming a drop which will fall into the liquid below. Another drop will form—and so on—until the cup is empty.

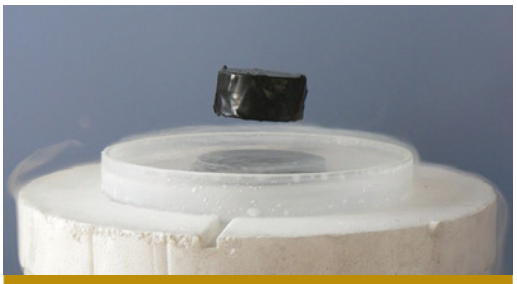


photo by Mai-Linh Doan, 2007

A magnet levitating above a high-temperature superconductor, cooled with liquid nitrogen. Persistent electric current flows on the surface of the superconductor, acting to exclude the magnetic field of the magnet. This current effectively forms an electromagnet that repels the magnet.

At the atomic and subatomic scale, the world is governed by the laws of quantum mechanics. Conservation laws of energy and momentum hold just as firmly as we have come to expect from our experience with the classical universe at larger scales. But in quantum mechanics, a system of particles can be in an entangled state, which does not resemble anything we know in daily life. The striking phenomena that highlight how different the quantum world is from our everyday experiences can all be traced back to the property called entanglement, which in essence means that the state of the system as a whole cannot be described in terms of properties of its individual components. Said differently, we cannot deduce the complete state of a system of particles by combining observations made on each particle separately.

Indeed the notion of particle itself is ambiguous. It is not so easy to pin down properties such as a particle's mass, charge, spin, etc. The creators of quantum mechanics realized that particles should be described as a state of a more fundamental object: a quantum field. The field may describe a given number of particles but it generally also has other meanings. This realization led to a working theory of quantum electrodynamics.

Bogoliubov first realized that interactions between the atoms in condensed matter systems such as liquid Helium may cause the quantum field that describes their collective state to present itself as a field with elementary excitations that are a different kind of particle than the atoms of the original description. These new particles are often referred to as quasiparticles. Bogliubov's point of view led to the first successful first-principles explanation of a strange state of matter called superfluidity.

A decade later saw the first successful theory of superconductivity by Bardeen, Cooper, and Schrieffer. Superconductivity is another quantum state of matter arising from the interaction between electrons and phonons, the latter being the quantum field describing the vibrations of the atoms in a crystal lattice.

Another success of the quantum field point of view of 'elementary' particles is the connection between spin and statistics given by the spin-statistics theorem. This theorem says that for quantum fields in 3+1 dimensional Minkowski space there is link between the transformation properties of the particle states under permutations of the particles and space rotations. As a result particles are of one of two kinds: on the one hand there are bosons with state vectors that are symmetric under permutation of the particles (coordinates) and for which the one particle states span an odd-dimensional irreducible representation of SU(2), and on the other hand we have fermions, of which the state vectors are anti-symmetric under permutations and for which the behavior under space rotations is described by an even-dimensional irreducible representation of SU(2).

In the seventies it was discovered that if space is two-dimensional, multi-particle state of identical particles are not required to be symmetric or anti-symmetric under permutations (Leinaas-Myrheim). In particular, states that form a representation of the braid group, instead of the permutation group, are consistent with all known principles of physics. The particles associated with such quantum fields are called anyons (Wilczek).

Two further developments prompted us and many other researchers to study the emergence of anyons in models of condensed matter physics. The first is the tantalizing prospect that anyons may provide a robust implementation of quantum memory useful for quantum computation (Kitaev). The second is the experimental confirmation that anyons occur in fractional quantum Hall systems. Therefore we have reason to believe that anyons are both real and useful. In order to start bridging the gap between toy models that demonstrate the theoretical possibility of a large variety of anyonic condensed matter systems and the experimental observations in systems of strongly correlated electrons, we are making a mathematical analysis of the stability of the anyonic properties of quantum lattice systems under perturbations of the interactions.

This is the topic of Matthew Cha's dissertation (Ph.D. 2017), as well as recently published and forthcoming joint work with Matthew and Pieter Naaijkens (Marie Sklodowska-Curie Fellow at Davis 2015-17). We proved that the anyonic nature of the excitation spectrum of Kitaev's abelian quantum double models, and the tensor category of the associated superselection sectors, is robust under a broad class of perturbations.

The mathematical quest to understand the quantum states of matter continues. Anyons and other intriguing questions about our universe are the focus of the new Center for Quantum Mathematics and Physics on campus. The possibility of helping bring quantum computers a step closer to reality only adds to the excitement.

Monica Vazirani, Undergraduate Vice Chair

Updates from the Undergraduate Program

by Monica Vazirani, Vice Chair for Undergraduate Affairs

This past year, the Department of Mathematics awarded 152 undergraduate degrees (119 majors and 33 minors) – up by over 40 from the previous year! In Mathematics 55 students graduated, 33 students graduated in Applied Mathematics, 7 students graduated in Mathematical and Scientific Computation. Our new Mathematical Analytics & Operations Research major graduated 24 students, compared to 6 last year, showing its incredible growing popularity. Ten graduates received Departmental citations for outstanding performance. In addition, Brynn Caddel, Trevor Chan, J.E. Paguyo, Douglas Sherman, Yu Wang, Peijun Xiao, and Mengda Xu completed senior theses. Furthermore, many of last year's graduating students went on to graduate school at prestigious institutions, including the University of Michigan, Columbia, Ohio State, UIUC, Stanford, and UC Davis. Others went on to jobs as K-12 teachers, or in industry, such as financial advisors in insurance companies. These achievements testify to the commitment and dedication of our students.

We began the 2016-2017 academic year by welcoming the largest incoming class in the history of the Department of Mathematics. With this large influx, the total number of students in our four majors is now over 880, including 114 in the new Mathematical Analytics and Operations Research program!

The Department of Mathematics places great importance in providing our students with a supportive and encouraging environment throughout their time with us. All of Math majors were invited to attend our Undergrad Welcome Event, which took place on September 27th. At the event, we discussed the great things that one can do with a major in mathematics. We also talked about the importance of starting early to plan a program of study in concert staff and faculty advisors. We are here to help all our students succeed, and we described the multiple sources of support that are available when needed.

A variety of activities are designed to foster this atmosphere. All students are welcome at the Math Club, which meets weekly (Thursdays 2:10-3:00pm in the Mathematical Sciences Building). It provides a place where students with common interests in mathematics can meet and socialize, and learn about a variety of topics in current mathematics research. Our new student chapter of the Association for Women in Mathematics (AWM) launched a mentorship program for not only undergraduates, but also for graduate students, post doctoral scholars and faculty.

In response to a college-wide directive, the Mathematics Department implemented a new mandatory advising model for our students. This model combines online assessment with individual advising appointments and group advising events, focusing advisor time and effort to maximize impact on student success. We believe that this initiative will increase the level of communication between students and faculty and staff, smooth students' progress through our programs, better prepare our students for life after college, and develop a stronger community within our programs. Particularly successful was our focused "Advising

Pictured above:
Monica provides some quick advice to new math majors at the Undergrad Welcome Event.

Pictured below:
Professor Tim Lewis and a specially chosen panel explains how math interacts with a wide variety of fields, as well as undergraduate research opportunities. The Undergrad Welcome event was well attended, with standing room only.

Pictured at left:
Malina Doherty, one of the advising staff, and Jackie Sun, co-president of Math Club, ready to help!

Week" during which students had short one-on-one meetings with our 7 faculty advisors. If the increased numbers of math majors is any indication, these efforts are a big success.

More and more of our math majors are seeking out mathematically based internships, for which they can receive degree credit in some cases. The companies our students worked at this past summer included Kaiser Permanente and several companies in China. The activities they engaged in involved cyber-security, marketing, and data analysis, applying mathematical techniques they learned in their mathematics classes at Davis.

The Department continues to expand course offerings and to hone the curriculum. This year, we will offer three special topics courses for undergraduates: "Knot Theory and Low-Dimensional Topology" (Prof. Thompson) in the Fall Quarter, "Introduction to General Relativity and Shock-Wave Theory" (Prof. Temple) in winter quarter, and "Introduction to Analytic Number Theory" (Prof. Tracy) in the spring quarter. Last Spring, approximately 50 students took our new one-unit career seminar "Get the Maximal Value out of your Math Degree." Led by Tim Lewis and Malina Gillies-Doherty, the course included a presentation by the Internship and Career Center, a graduate school panel, visits from alumni who now work at Google (Reuben La Haye), Liberty Mutual (Kate Ely), Sutter Health, and more. Our Math & Statistics Career Night also runs a panel where mathematicians in industry discuss their experiences and career development.

The Department ran a vigorous Research Experience for Undergraduates (REU) program over the summer. Students worked on a variety of projects spanning pure and applied mathematics. A group led by Prof. Bruno Nachtergaele, helped by graduate students Alvin Moon, Jake Reschke, and Jenny Brown, worked through problems about the dynamics of quantum spin chains. To see more samples of the research that our students have done and to get information on how to get involved in undergraduate research visit

http://math.ucdavis.edu/undergrad/research

Undergraduate research is a great way to jump start a mathematics career!

There are many opportunities available in the Department for enrichment of the undergraduate experience. Please look into them!

AWM Starts UC Davis Chapter

by Katelyn Jarvis and Emily Meyer

It has been a successful year for the student chapter of the Association for Women in Mathematics (AWM), a new organization at UC Davis, aimed at supporting and encouraging women and other underrepresented minorities in the field of mathematics. This year, at the Center for Student Leadership Awards, AWM was honored to be named by UC Davis as "The Inspirational Aggies of the Year."

AWM began a new Workshop Series for members of the Department of Mathematics, as well as a program pairing undergraduate students, graduate students, and faculty members together to foster mentorship and guidance within the Department.

Each quarter AWM also hosts a Speaker Series, with a focus on female researchers in STEM fields. This year's program included Alyssa Gottshall, a renowned speaker from the NSA.

Another important aspect of AWM is community outreach, visiting local middle and high schools to talk to students about math, play math games, and inspire them to continue to learn about mathematics.

AWM's current officers include President Katelyn Jarvis, Vice-President Emily Meyer, Secretary Sam Fleischer, and Treasurer Riley Abel.

Mathematics for the Future

The Department of Mathematics wishes to thank all alumni, parents, students, faculty, staff and friends who support the Department each year. For a list of our endowed funds, please see our web site:

http://www.math.ucdavis.edu/about/donation/

Your gift to the Department is tax deductible, and you can choose to have your name published or remain anonymous.

Your gift can be used towards undergraduate and graduate support, faculty and research support, and/or Departmental priorities. Your gifts ensure our future success.

Give Online

If you would like to give, please go to the UC Davis secured giving site at:

https://give.ucdavis.edu/MATM

Please choose "Mathematics General Support" for the gift designation and follow the prompts.

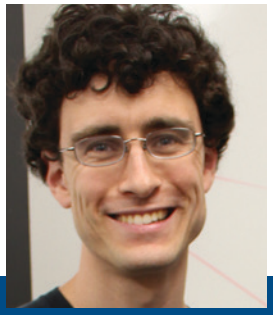
A list of donors can be found on the back cover of this newsletter. Thank you for your continuing support.

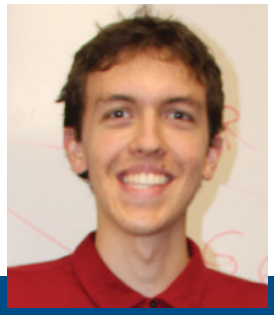
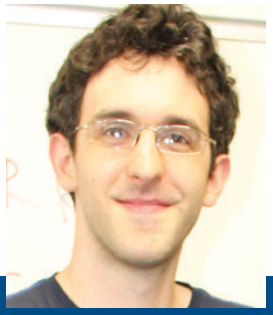
We appreciate the many donors who double or triple the impact of their gifts through their employers' matching gift program. For more information about matching gifts, you can go to:

http://matchinggifts.com/ucdavis/

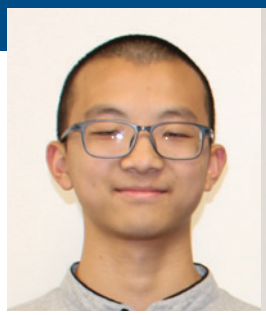
For additional questions please contact the Development Office at (530) 752-3429. For your reference, disclosures can be viewed at:

http://giving.ucdavis.edu/ways-to-give/disclosures.html.








Department Awards for 2017

G. Thomas Sallee Mathematics Teaching Award

The G. Thomas Sallee Mathematics Teaching Award honors Professor Emeritus Tom Sallee's 40-year career with the Department, his dedication to being an excellent teacher, and his life goal of developing and supporting talented mathematics educators.

An endowment was established in his name that allows the Department to recognize the best teaching of lower-division mathematics courses on an annual basis.

Recipient – Christopher O'Neill

G. Thomas Sallee Mathematics Prize

This award is also given in recognition of Professor Emeritus Tom Sallee, and reaffirms his life goal of developing and supporting talented individuals in mathematics. This prize recognizes exceptional undergraduate students of junior or senior standing who competed in this year's Spring Mathematics Competition.

Recipients – Jiannan Jiang

William K. Schwarze Scholarship in Mathematics

William Karl Schwarze was born in 1942 in San Francisco. He excelled in mathematics in high school and at UC Davis, where he received a bachelor's degree. He went on to graduate school at Berkeley and a career as a mathematics teacher in San Francisco. Perhaps due to his mathematical insights, Bill also became a successful investor in real estate. After his death in 1988, a trust he established with the SF Foundation has donated to a variety of humanitarian purposes, in particular to the Schwarze Scholarship to be presented today. This award is given to graduate students in Mathematics who have demonstrated outstanding mathematical scholarship and exceptional promise of making a strong professional contribution as a mathematics teacher and educator at the pre-college or college level.

Recipient – William Cuello and Kevin Lamb

Robert Lewis Wasser Memorial Scholarship

Robert Lewis Wasser was born in 1973 in Sacramento. He excelled in many areas—he was selected as a National Merit Scholar in 1991 and participated in the Academic Decathlon. Robert began at UC Davis in 1991. His academic achievements were numerous and impressive. He was one of the few students in our Department who had already taken as a sophomore some of our most challenging courses, such as Math 127. His instructor in that course, Professor Don Chakerian, said how much he was inspired by their discussions and that Robert's presence made the whole class much more lively and spirited. After his tragic death in an automobile accident in 1993, prior to his Junior year, his grandmother, Vera May Wasser, initiated the Robert Lewis Wasser Endowment in his memory, with contributions from family and friends. Its goal is to benefit promising mathematics students at UC Davis.

Recipient – Neng Chen and Zhenyi Chen


Eric C. Ruliffson Scholarship in Mathematics

Eric Canady Ruliffson attended UC Davis from 1964-1968, loved the study of math and excelled in it. He was first and foremost a problem solver, which helped him to achieve life-long personal and professional success. While attending UC Davis, Eric worked as a summer intern in the actuarial department of Pacific Mutual Insurance in Los Angeles and was hired by them upon graduation. After serving in the Navy, Eric attended graduate school in demography at UC Berkeley. In 1973 he resumed his actuarial career at Pacific Mutual Insurance. He became a partner at the San Francisco office of Coopers & Lybrand and named a Fellow in the Society of Actuaries. He was subsequently elected to the Board of Partners for Coopers and Lybrand, the first actuary to be so honored, and later served on the Board of Partners for PricewaterhouseCoopers, the world's largest consulting firm. The Eric C. Ruliffson Scholarship in Mathematics is awarded annually to students of junior or senior standing majoring in mathematics.

Recipients – Katharine Scott and Michael Venturino

Alice Leung Scholarship in Mathematics

Alice Siu-Fun Leung received a Master's degree in Mathematics in 1975 from UC Davis. She later worked as a global property management accountant in Hong Kong. She remembered with fondness her days at UC Davis. She enjoyed gardening and working as a volunteer helping animals.

In her will, Ms. Leung generously provided funding to award scholarships annually to graduate students in Mathematics. This award is given to students who have shown exceptional promise in all aspects of mathematics, including research, scholarship and teaching.

Recipients – Beibei Liu

Yueh-Jing Lin Scholarship in Mathematics

Yueh-Jing (Jean) Lin and Chau-Hsiung (Mike) Chuang created the Yueh-Jing Lin Fund in 2009. This endowment provides scholarship support to one or more mathematics students each year. The scholarships are available to high-achieving mathematics students, either undergraduate or graduate. Mr. and Mrs. Chuang are alumni of UC Davis who met while they were graduate students on campus. Jean received her Master's degree in mathematics in 1971, and Mike received his master's degree in agricultural education in 1969.

Recipients – Kyle Johnson and Kirill Paramonov

Henry L. Alder Award

Professor Henry L. Alder received his Ph.D. from UC Berkeley in 1947. After spending a year on the faculty in the Department of Mathematics at Berkeley, he joined the Davis faculty as an Instructor of Mathematics. He advanced to the rank of Professor in 1965, and officially retired in 1992. He then served as Department Chair from 1992 to 1994. After his retirement, Professor Alder continued to teach in the Department for many years.

Professor Alder was also active in other campus programs and was always a strong advocate for quality teaching. In 1999, Professor Alder gave a gift to the UC Davis Foundation to establish an endowment. This provides support to mathematics graduate students at UC Davis through the Henry L. Alder Prize for Excellence in Teaching, an award given each year to the graduate student who is deemed to be the top teacher among all graduate students in mathematics.

Recipients – John Challenor

Evelyn M. Silvia Scholarship for Future Mathematics Teachers

The Evelyn M. Silvia Scholarship for Future Mathematics Teachers was established by generous donations from family and friends of the late Professor Evelyn Silvia. Evelyn was hired by the Department in 1973 after receiving her Ph.D. from Clark University. The focus of Evelyn's passion and unwavering commitment was to develop talented mathematics teachers at the K-12 grade level. She was extremely generous with her time, whether it was as a campus committee member or as an adviser assisting students.

This scholarship honors Professor Silvia's memory by encouraging students who aspire to be future mathematics teachers. It recognizes a junior or senior with a major in mathematics, applied mathematics or statistics who has shown an interest in teaching mathematics.

Recipient – David Williamson

Galois Group Service Award

The Galois Group is "the official voice of the graduate students in Mathematics." All graduate students in the Department of Mathematics are members of Galois; this is how graduate students in mathematics collectively communicate with Department faculty and staff. The group also coordinates and facilitates various activities, such as Monthly Game Nights and New Student Welcomes.

Every year, the Galois Group presents an award to recognize outstanding service and/or sustained commitment to the graduate group.

Recipient – Stephanie Myers

Departmental Citation Awards

The Department recognizes undergraduate students of exceptional ability who have taken both a very strong selection of mathematics courses and have made substantial contributions to the Department or their program. In addition, they have all received strong recommendations from the faculty.

Recipients –

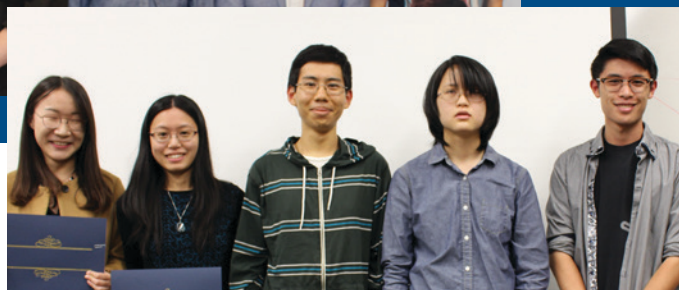
Kyle Johnson, Shiqi Yang, Christopher Wong, Ander Aguirre, Douglas Sherman, Peijun Xiao, Trevor Chan, J.E. Paguyo, Amanda Pan, Emily Kaar

Departmental Honors Awards

Every year, undergraduate students have the opportunity to participate in mathematical research, culminating in a senior thesis. Students typically work under the guidance of a faculty mentor to complete original research. The results are reviewed, and pending on the quality and substance, the student can receive Departmental high or highest honors.

Recipients –

Brynn Caddel, Kyle Johnson, Yu Wang, Mengda Xu, J.E. Paguyo, Peijun Xiao, Doug Sherman



Updates from the Graduate Programs

by Thomas Strohmer, Vice Chair for Graduate Affairs
by Matthias Köppe**, Chair of the Graduate Group in Applied Math**

Thomas Strohmer, Graduate Vice Chair

Matthias Köppe, Chair of GGAM

This year the Graduate Program in Mathematics welcomed 12 new graduate students. The total number of students in the program is now 69.

Several of our graduate students won prestigious awards during the 2016-2017 academic year and were recognized in the annual Department Awards ceremony, for teaching and scholarly achievement. In addition, Jamie Haddock received the Dissertation Year Fellowship for 17-18.

The Department and its graduate programs hosted several distinguished visitors during the year. We hosted our first Thurston Lecture, named after Fields Medalist and former UC Davis mathematician William Thurston. The inaugural lecture was, very fittingly, given by Dylan Thurston from Indiana University and enjoyed by a large audience. Other notable highlights include a Colloquium talk by Professor Christoph Thiele from the University of Bonn and the Joint Mathematics/Statistics Colloquium by Ravi Kannan from Microsoft Research.

Are You a Graduate?

We want to hear from you! Please send us information about yourself so that we can stay in touch and share in your experiences outside of UC Davis.

Please complete our Alumni Questionnaire:
http://www.math.ucdavis.edu/news/alumni_quest
or send e-mail to:
mso@math.ucdavis.edu
We will do our best to include it in the next newsletter.

In 2017 the Graduate Program in Applied Mathematics (run by GGAM) welcomed an incoming class of 11 new Ph.D. students, selected from a highly competitive pool of applicants. Our graduates go from our program to impressive careers in academia and industry. A small selection of our most recent graduates, as well as some of our earlier graduates, is available at right.

Two new faculty recently joined GGAM and are available to work with our graduate students on cutting edge research areas in modern areas of Applied Mathematics:

Xin Liu, Professor in the Computer Science Department, is an expert in data-driven networking, optimization, and machine learning. She was awarded an NSF CAREER award in 2005 and recently won a best paper award from the International Conference on Information Processing in Sensor Networks (IPSN).

Luis Rademacher, recently appointed Assistant Professor in the Department of Mathematics, is primarily interested in the foundations of data science and artificial intelligence, and this has led to a focus on problems in convex geometry, machine learning, matrix computations and optimization. He was awarded an NSF CAREER award in 2014. Recently he spent a semester at the Simons Institute for the Theory of Computing as an invited visiting scientist.

Scientific activities of GGAM included:

- Two GGAM Colloquia in the Fall quarter, by professors Dave Doty on “Computation by (not about) chemistry” and Luis Rademacher on “Provably efficient high dimensional feature extraction”;

- A GGAM mini-conference in the Winter quarter, which was run this year in a new format that included poster sessions, in which graduate students presented their applied mathematics research, in addition to talks by professors Miles Lopes, Xiaodong Li, and Patrice Koehl

- A new series of Applied Mathematics Ph.D. exit seminars and receptions in the Spring quarter.

Alumni Updates

Shuyang Ling, Ph.D. 2017

Shuyang Ling started as an Assistant Professor/Courant Instructor at the Courant Institute and the Center for Data Science at New York University. He recently won the SIAM Student Paper Prize for his paper "Self-calibration and biconvex compressive sensing," coauthored with his advisor.

Calina Copos, Ph.D. 2017

Calina Copos started as a Courant Instructor at NYU, where her research focuses on mathematical biology, mathematical modeling, fluid dynamics and scientific and high performance computing.

Yuan Zhou, Ph.D. 2017

Yuan Zhou started as a tenure-track assistant professor at U. Kentucky, Department of Mathematics. Her research focuses on optimization with integer variables.

Wenjing Liao, Ph.D. 2013

Wenjing Liao just started as a tenure-track assistant professor at Georgia Tech, School of Mathematics, after holding visiting positions at Duke U. and Johns Hopkins U.

Robert Hildebrand, Ph.D. 2013

Robert Hildebrand will become a tenure-track assistant professor at Virginia Tech, Department of Industrial Systems Engineering, in January 2018, after a postdoc at ETH Zürich, a Goldstine fellowship at IBM Research, and a fellowship at the Simons Institute for the Theory of Computing in Berkeley.

Calvin Zhang, Ph.D. 2013

Calvin Jiawei Zhang started his 2nd year as a tenure-track assistant professor at the University of Arizona, Department of Mathematics.

Brandon Dutra, Ph.D. 2016

During my time at Davis, with the support of my advisors, I spent three summers working as an intern at some fantastic companies. There I was exposed to the other side of academic research: taking research ideas to solve problems for clients. In my last internship before I finished my dissertation, I worked for Google in Mountain View applying machine learning techniques to improve movie recommendations. It was a great summer because I was applying tools from my favorite area in math—linear algebra and optimization—in industry.

The internship turned into a job offer and after graduation, I moved to Seattle and worked on helping clients build machine learning models using tools in the Google Cloud Platform. It is very similar to giving a talk at a conference when I was at Davis: I have to quickly and clearly explain the tools used without getting bogged down in the proof, or in this case, the technical details. Software engineering and mathematical research are similar in that they cannot be done in isolation; they require cross-functional collaboration to produce something beautiful. For example, the hardest part of machine learning is not the training part, it is reliably serving a model with low latency from anywhere in the world. This means I work with many internal teams. I feel comfortable working with and relying on others from my experiences working with many amazing people at Davis.

Over the last year, while I commute on public transportation, I have started to crochet. The experience it brings me is similar to programming or doing mathematics: I can create something interesting from nothing. I also like to think about the topology of the stitches and the finished work. I recommend more people to try it out. Just like in grad school, I have continued to travel. My favorite Google office is in Norway because it is Viking themed, and while in Paraguay I enjoyed many empanadas.

Life After Davis

Tim Wertz, Ph.D. 2015

I'm currently a Postdoctoral Teaching Fellow at Yale-NUS College in Singapore. Yale-NUS is a partnership between Yale and the National University of Singapore to create a liberal arts college in Southeast Asia, with their first graduating class finishing in 2017. I teach two courses per year, manage the tutoring program for STEM classes, and I'm in charge of starting up some outreach activities. So far, I've taught Linear Algebra and Topology for the math majors and Quantitative Reasoning, which is a required course for all freshmen.

Since I'm still in academia, my experience at Davis has been pretty useful. Naturally, one can't be a good teacher of mathematics if one isn't well-versed in mathematics, and I'm very happy with my education at Davis. Since I'm currently trying to start up some outreach programs here, my experience with Explore Math (particularly ARML and Math Circle) has been very helpful.

I stayed in Singapore during my fifth (and final) year as a graduate student. My partner is a Singaporean citizen, and he finished his Ph.D. a year before I finished mine, so I came here with him when he graduated. Through some connections between Davis and NUS, I was able to get a visiting student visa. I happened to hear that Yale-NUS needed a lecturer to cover a class for them, so I started doing that in the months before I graduated. After graduation, they hired me on as a postdoc.

At present, I speak enough Chinese to order food, and the older women at the restaurants here really love it. I often get a little extra when I order in Chinese. In fact, at least two have said "I love you" to me because of it. Other than that I'm pretty boring!

Yale-NUS College, photos by Weave

Yale-NUS College, photos by Weave

Graduate Degrees Awarded

Back, Amanda • Ph.D., Applied • *Tropical Atmospheric Dynamics Modulated by Large-Scale Flows,* Biello

Castillo, Federico • Ph.D., Math • *Local Ehrhart Positivity,* Fu Liu •
Post Ph.D. Placement: Visiting Assistant Prof., Kansas University

Cha, Matthew • Ph.D., Math • *Topologically Ordered States in Infinite Quantum Spin Systems,* Nachtergaele
Post Ph.D. Placement: Post Doctoral Fellowship, Michigan State University

Copos, Calina • Ph.D., Applied • *Modeling the Mechanics of Cell Locomotion: The Effects of Cell-Surface Interaction and Cytoskelton,* Guy
Post Ph.D. Placement: Courant Instructor, NYU- Courant Institute

Deride, Julio • Ph.D., Applied • *Essays on Variational Approximation Techniques for Stochastic Optimization Problems,* Wets
Post Ph.D. Placement: Internship, NASA- Langley Research Center

Jana, Indrajit • Ph.D., Math • *Spectrum of Random Band Matrices,* Soshnikov
Post Ph.D. Placement: Post Doctoral Fellowship, Temple University

Koenig, Dale • Ph.D., Math • *Trisections in three and four dimensions,* Thompson
Post Ph.D. Placement: Post Doctoral Fellowship, Okinawa Institute of Science and Technology

Kvinge, Henry • Ph.D., Math • *A Categorification of the Crystal Isomorphism* $B^{1,1} \otimes B(\Lambda_i) \cong B(\Lambda_{\sigma(i)})$ *and a Graphical Calculus for the Shifted Symmetric Functions,* Vazirani
Post Ph.D. Placement: Post Doctoral Fellowship, Colorado State University

Lang, Alexander • Ph.D., Math • *On the Classification of Supercharacter Theories*, Vazirani

Li, Chuanbin • Ph.D., Applied • *A Numerical Study on Flagellar Swimming in Viscoelastic Fluids Based on Experimental Data*, Guy/Thomases

Ling, Shuyang • Ph.D., Applied • *Bilinear Inverse Problems: Theory, Algorithms, and Applications,* Strohmer
Post Ph.D. Placement: Post Doctoral Fellowship, The Courant Institute of Mathematical Sciences, NYU

Patel, Swati • Ph.D., Applied • *The Effects of Ecological and Evolutionary Feedbacks on Community Dynamics,* Schreiber
Post Ph.D. Placement: Postdoctoral Researcher, University of Vienna

Rogers, Carson • Ph.D., Math • *Fibered links in the 3-sphere*, Thompson

Trockel, Dale • Ph.D., Applied • *The Influence of Momentum Flux at The Inflow Boundary of an Exhange Flow on Multi-Frontogenesis In Narrow Estuaries*, Largier

Zhou, Yuan • Ph.D., Applied • *Infinite-Dimensional Relaxations of Mixed-Integer Optimization Problems,* Koeppe
Post Ph.D. Placement: Assistant Prof., University of Kentucky

Sheu, Norman • M.A., Math
Bankston, Victor • M.A., Math
Barnett, Jason • M.S., Applied • Woodruff
Behar, Aviv • M.S., Applied • Koeppe
Harvie, Brian • M.A., Math
Johnson, Carter • M.S., Applied
Johnson, Jacob • M.S., Applied
Lazarus, Tynan • M.A., Math
Liu, Xiaochen • M.A., Math
Shu, Jingyang • M.A., Math

Alumni Updates

Albert DeSanti, Ph.D. 1984

Albert DeSanti recently retired from the US Navy in 2016 after more than 31 years of service. Having relocated to Davis after retiring, he looks forward to participating in Department of Mathematics events.

Burt Dixon, B.S. 1989, MAT 1990

Burt Dixon is Department Chair and math teacher at Foothill High School in Pleasanton, California. He is also the JV Football Coach.

Robin Yonash, B.S. 1965

Having been fortunate in graduating just when computers were becoming used by business, Robin Yonash worked initially as a FORTRAN and COBOL programmer, then moved to systems programming on the IBM 360 Series. At that time, all computers were "personal" in that they only ran one user program at a time. After working for such companies as IBM, Amdahl, and Tandem, Robin retired and moved back to her beloved Sierra Nevada mountains of Placer County, California where she has become a local historian.

She just published the third book in a trilogy about her hometown of Iowa Hill, California and has also produced a history of the Weimar Sanatorium and Cemetery. In addition, she is a Board Member for the Iowa Hill Community Cemeteries, Inc.

Interested in the Past?

Prior newsletters back to 1994 are available on the Department of Mathematics website.

https://www.math.ucdavis.edu/research/news/archive/

Life After Davis

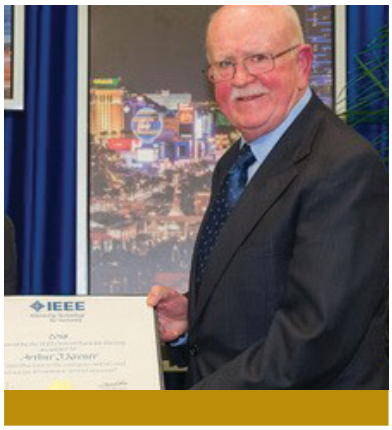
Swati Patel, Ph.D. 2016

This academic year, I started a postdoc at Tulane University after a one-year position at the University of Vienna. When I was applying for postdoc positions, I was offered both positions, and arranged to defer the Tulane position so I could spend a year in Vienna.

During my time in Vienna, I developed two new projects and built collaborations with other researchers in the MathBio program there. In my spare time, I attempted to learn German and explored many of Europe's beautiful cities, including Budapest, Ljubljana, Paris, Salzburg, Zurich, and London (but Vienna was still my favorite!). Two other Davis alumni also live in Vienna; it was nice to see a familiar face when I arrived!

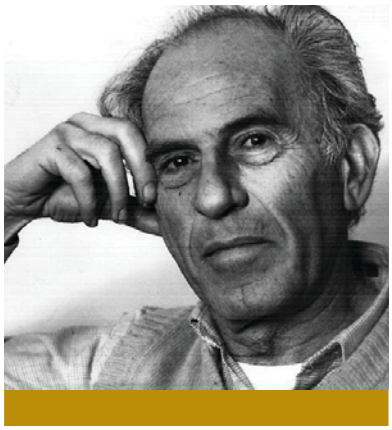
Now, at Tulane, I am enjoying getting more experience as an independent researcher, as well as exploring New Orleans, a city with culture like no other.

Emeriti Updates



Art Krener

Art Krener continues to teach and do research at the Naval Postgraduate School in Monterey. He and three masters students are conducting an ONR funded research project studying scheduling of energy production and consumption at forward operating bases. He also has an AFOSR project that studies how to speed up Model Predictive Control to control faster processes. Art reports that he and Jeanne are well and enjoy living in the Monterey area. They miss their Davis friends and invite them to come visit.



Sherman Stein

Sherman Stein reports that he is close to finishing the manuscript of the 6th edition of his calculus textbook. This revision has taken longer than writing the first edition. He also continues research into the logic of identities in x and y, with his most recent paper called "A Strange Property of Balanced Identities." Sherman notes that "I say 'strange' because I have no idea how I ever came upon the main theorem." He also relates, "during the 25 years of my retirement I have kept to my vow, 'Stay away from math education, in order to avoid ulcers.'"

Roger Wets

Roger Wets reports that he has been active in research activity, publishing a number of articles, and starting several new research projects funded by three separate agencies. He edited several volumes and is working on a new book with Johannes Royset, tentatively called "An Optimization Primer and Variational Extensions." Roger is supervising two Ph.D. students that are due to graduate in 2017 and June 2018. A highlight of the year was his 80th birthday, celebrated with a conference at UC Davis that was co-sponsored by the National Science Foundation.

Staff Update

by Gladis Lopez, Department Manager

Our focus during this year has been "excellence in customer service." We have a group of highly qualified staff members who pride themselves in providing great service to faculty, students and other staff members. We had a productive year, embracing changes from new administrative systems to increased student enrollments.

The past year saw 19 merit and promotion actions. We processed numerous research proposals to funding agencies, of which sixteen proposals were awarded. The Department faculty saw new proposals awarded totaling $3,297,950.

This year we welcomed new staff member Thu Pham as our contracts and grants coordinator. She replaces Keith Anglin, who accepted a promotion opportunity at the Nanomaterials in the Environment, Agriculture, and Technology Unit (NEAT).

There were several awards to Department staff. Sarah Driver, Tina Denena and I each received a Staff Appreciation and Recognition award this year. Sarah received the award from the office of Undergraduate Education for being one of the workshop facilitators for the academic advising series. Tina was recognized by the Department of Mathematics for taking on additional job functions while Sarah was on maternity leave of absence. I received the award for my administrative leadership.

Stephanie Myers received the Galois Group Service Award and Malina Gillies-Doherty was nominated for an advisor award. Malina also completed an M.A. in Higher Education Leadership. Finally, Alla Savrassova and Tina Denena completed 10 years of service at UC Davis. We thank them for their dedication and service. On a personal front, congratulations to Sarah and Cynthia for the arrival of their son, Jonah.

In July 2017 we had a mini staff retreat at my house. We had a great time and had the opportunity to network with NEAT ORU staff, who also participated in the retreat. Our theme was "teamwork." I value all our staff members and commend them for all their great contributions to the Department of Mathematics. We look forward to another productive year!

Life After Davis

Wenjing Liao, Ph.D. 2013

I finished my Ph.D. in Mathematics under the supervision of Prof. Albert Fannjiang in 2013. After graduate school, I spent two years at the Statistical and Applied Mathematical Sciences Institute in the program entitled Low-dimensional structures in high-dimensional space as a postdoctoral fellow. Meanwhile, I was a visiting assistant professor at Duke University from 2013 to 2016, and then I moved to Johns Hopkins University as an assistant research scientist from 2016 to 2017. I recently joined the School of Mathematics at Georgia Institute of Technology as a tenure-track assistant professor. My research interests are in imaging, signal processing, high dimensional data analysis and machine learning. I enjoy exploring real world data sets and solving real life problems.

I entered graduate school with zero research experience but strong interests in computational math. I benefited a lot from the graduate courses offered by our Department, including analysis by Prof. Thomases and Prof. Shkoller, probability by Prof. Romik, numerical PDE by Prof. Guy, scientific computation by Prof. Bai, applied harmonic analysis by Prof. Saito, compressive sensing by Prof. Strohmer, etc. By taking these classes, I was able to learn analysis, as well as to encounter a variety of interesting applications of mathematics, which inspired me to use tools in mathematics to solve applied problems. I started reading papers on imaging and compressive sensing with Prof. Fannjiang in my first year. Thanks to Prof. Fannjiang's guidance, I was able to understand the results better and better, and start thinking about improvements and new possibilities. I liked the topics that I worked on at graduate school, and many interesting extensions and applications led to new research topics.

I enjoyed my graduate life at UC Davis. When I took classes, I worked with many excellent people on projects. There were always interesting seminars and reading courses in our Department. The availability of travel funds allowed me to attend conferences and workshops at which I presented my research results and talked to people in my area. I obtained a lot support from the math community at Davis, and I am grateful to everyone who helped me along the way.

UCDAVIS
MATHEMATICS

1015 Department of Mathematics
University of California, Davis
One Shields Avenue
Davis, CA 95616-8633

Address Service Requested

Nonprofit Org
U.S. Postage
PAID
UC Davis

Join us on Facebook!

The Department of Mathematics is on Facebook! Visit us there to get updates on current seminars, events and news. We'd be happy to include any memories or photos you have of the Department on our wall.

To "like" us, search for "Department of Mathematics - UC Davis" on the Facebook web page:

https://www.facebook.com/

Get News by Email

Would you like to help the environment and save the Department of Mathematics money by receiving future newsletters by email? If so, just indicate your preference on the newsletter subscription page:

http://www.math.ucdavis.edu/news/

You can also view past newsletters on the Newsletter Archive:
http://www.math.ucdavis.edu/research/news/archive/

Featuring the 2016-17 Academic Year
Newsletter Committee:
Joel Hass, Editor
Gladis Lopez, Management Services Officer
Marianne Waage, Designer

Thanks For Your Support

The Department of Mathematics wishes to gratefully acknowledge the generosity of the following donors, who have contributed to its support over the past several years.

Dr. Ian Agol
Rex & Mary Allen
William & Laura Beattie
Christopher E. Broski
Yueh-Jing & Chau-Hsiung Chuang
Richard R. Collins
Doyle O. Cutler, Ph.D.
Bruno Nachtergaele & Marijke Devos
Sarah M. Donovan
Gennis D. Emerson
Daniel & Joy Faletti
Gary F. Gruenhage, Ph.D.
Fields & Carol Gunsett
Robert Guy
David & Lauren Hall
Joel Hass & Abigail Thompson
Stephen C. Hennagin, Ph.D.
Herbert L. Holden
Donald Ichikawa & Jann Nakashima Ichikawa
Hazel B. Jacoby
Robert E. Jaffa
Jeffrey & Pamela Jarvis
Edmond & Susanna Kong
Juleen Lam
Jack F. Latimer
Eric K. Lee
Youn-Sha Chan & Jennifer Lee
Jeffrey S. Martell
Nelson & Mika Max
Charles N. Morris, III
Tan M. Nguyen
Shon Prisbrey & Carrie Jensen Prisbrey
Dan Romik
Sandra S. Ruliffson
Amre S. Saadeh
Brent Schultz
Bryan & Erica Schultz
Jennifer L. Sharples, Psy.D
Jim & Marilyn Simons
Roy W. Simpson
Sherman & Hannah Stein
Seth & Jennifer Stevelman
Allan J. Thompson
John & Ngangiang Thoo
Curtis C. Travis, Jr., Ph.D.
Ursula Van Dijk
Ronald L. Vucurevich
Carolyn M. Weist
Robert & Sally Weist
James & Sybil Wells
Andrew & Kathleen Williams
Dennis & Betty Winslow
Earl Q. Wong, Ph.D.
Sidney Wong & Marion McCurdy