# Mathematics People

## Pollack Awarded AMS Centennial Fellowship


Aaron Pollack

The AMS has awarded its Centennial Fellowship for the academic year 2021–2022 to **Aaron Pollack** of the University of California, San Diego.

Pollack tells the *Notices*: "My research centers around automorphic forms, specifically automorphic forms on exceptional groups and the $L$-functions of automorphic forms. Much of my recent work has been focused on trying to understand if there exists a robust arithmetic theory of modular forms on exceptional groups, similar to the arithmetic theory of classical holomorphic modular forms.

"In more detail, classical holomorphic modular forms occupy a special place in the world of all automorphic forms. They have a classical Fourier expansion and Fourier coefficients, and through the Fourier coefficients one can see connections to other areas of number theory. For example, sometimes the Fourier coefficients of holomorphic modular forms count arithmetic or geometric objects. The arithmeticity properties of the Fourier coefficients also play key roles in work on special values of $L$-functions.

"For reductive groups $G$ for which the associated symmetric space is not a complex manifold, one can ask if there exists any parallel theory of special automorphic forms for $G$ that have the potential to take the place of the holomorphic modular forms. Gan, Gross, Savin, and Wallach singled out a special class of such automorphic forms on the so-called quaternionic exceptional groups. Much of my work has been focusing on developing the theory of these quaternionic modular forms, including results on their Fourier expansion and Fourier coefficients."

Pollack received his PhD from Princeton University in 2014 under the direction of Christopher Skinner. He held a National Science Foundation Postdoctoral Fellowship at Stanford University from 2014 to 2017. He was assistant professor at Duke University from 2017 to 2020 and spent the academic year 2017–2018 as a member of the Institute for Advanced Study. He is currently assistant professor at UCSD. He was awarded a Simons Collaboration Grant for Mathematicians in 2018. He intends to use the Centennial Fellowship for course release and to visit the University of Utah, Columbia University, and ESI Vienna. He says, "I am grateful to the AMS for the support the fellowship provides, which allows me to have more time to focus on research."

The stipend for the 2021–2022 Centennial Fellowship is US$50,000. The award was made at the recommendation of the Centennial Fellows Selection Committee. The primary selection criterion is the excellence of the candidate's research.

**Please note:** Information about the competition for the 2022–2023 AMS Centennial Fellowship will be published in the "Mathematics Opportunities" section of an upcoming issue of the *Notices*.

*—Elaine Kehoe*

## 2021 MAA Annual Meeting Prizes

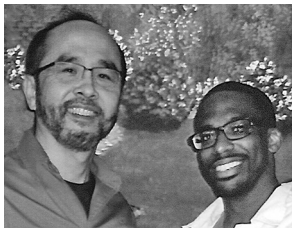
The Mathematical Association of America (MAA) awarded several prizes at the 2021 Joint Mathematics Meetings, held virtually January 6–9, 2021.


Nathan Carter

**Nathan Carter** of Bentley University received the Beckenbach Book Prize for *Introduction to the Mathematics of Computer Graphics* (Mathematical Association of America, 2016). The prize citation reads in part: "In an inviting and readable style, Carter leads us through a cornucopia of mathematical tricks and structure, illustrating them step-by-step with the freeware POV-Ray—an acronym for Persistence of Vision Raytracer. Each section of his book starts with a natural question: Why is this fun? Of course, the answer is a striking image or two—to which a reader's impulsive response is, How might I do that? Whereupon, Carter proceeds to demonstrate. He leads us through vectors, geometrical transformations in two and three dimensions, lines of sight and perspective, the theory of color and lighting techniques, animation, applications of Bernstein

polynomials and Bezier curves, and finishes with subdivision algorithms. Nathan Carter's book is a modern-day version of the master woodcutter Albrecht Dürer's 1525 mathematical and artistic treatise *The Art of Measurement with Compass and Straightedge*." Carter received his PhD from Indiana University in 2004. He uses computer science to advance mathematics by writing open-source software for university mathematics education in areas including mathematical logic and abstract algebra visualization. He is a past recipient of several awards from the MAA, including the Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member (2010), the Beckenbach Book Prize for *Visual Group Theory* (2012), and the Trevor Evans Award (2012). His honors from Bentley University include Outstanding Scholarly Contribution (2012) and two Innovation in Teaching Awards (2014, 2016). Carter tells the *Notices*: "My hobbies are mostly biking to work and playing video games with my children. But probably the most important fact about me as a person is that I am a Christian."

**Travis Kowalski** of the South Dakota School of Mines and Technology was awarded the Chauvenet Prize for his article "The Sine of a Single Degree," *The College Mathematics Journal* **47** (2016). The citation reads in part: "In a standard trigonometry course, one typically considers the sine of standard angles 30°, 45°, and 60°, but what about sine of 1°? This paper boldly asks if it is possible to find an exact value for sin 1° in terms of ratios of radicals and integers, and then takes the reader on a beautiful mathematical tour involving geometry, algebra, and complex numbers to answer that question." Kowalski earned his undergraduate and graduate degrees from the University of California and spent two years as a visiting professor at Colorado College. He has been a professor of mathematics at the South Dakota School of Mines and Technology since 2004 and currently serves as its interim head of mathematics. He is a recipient of the MAA's 2017 George Polya Award and the 2019 Burton W. Jones Award for Distinguished Teaching. His mathematical interests include complex analysis and formal power series; mathematical pedagogy; and exploring the intersection of mathematics, history, art, and culture. He also enjoys creating napkin art, playing tabletop games with his family, and panicking at the ever-increasing size of his email inbox.


Francis Su (left) and Christopher Jackson (right)

**Francis Su** of Harvey Mudd College and **Christopher Jackson** were honored with the Euler Book Prize for *Mathematics for Human Flourishing, with reflections by Christopher Jackson* (Yale University Press, 2020), which presents mathematics "as a discipline that has the power to transform lives and speak to the very core of what it means to be human." The prize citation states: "Su's writing artfully blends personal narrative with scholarly perspectives and mathematical problems that challenge the reader to engage in their own mathematical journey as the book unfolds. As powerful as Su's narrative is, his thesis is driven home in dramatic fashion through the included writings of Christopher Jackson, whose own journey led him to discover the transformative power of mathematics from behind prison walls." Su writes about the dignity of human beings and the wonder of mathematical teaching. He received his PhD from Harvard University. He is a former MAA president and current AMS vice president. His research is in geometric combinatorics and applications to the social sciences, and he has coauthored numerous papers with undergraduates. His awards from the MAA include the Haimo Award for distinguished teaching of mathematics and the 2018 Halmos–Ford Award for mathematical writing. He authors the Math Fun Facts website and is the creator of @mathfeed, a math news aggregator on Twitter. Christopher Jackson works in the education department at the Coleman Federal Prison in Florida and has helped more than fifty inmates so far learn math to get their General Equivalency Diplomas. His hobbies include studying, reading, working out, and keeping current with world events. His goal is to use his experiences to get people excited about math education in particular and also education in general.


Deanna Haunsperger

**Deanna Haunsperger** of Carleton College was honored with the Gung and Hu Award for Distinguished Service to Mathematics "for her prolific service to mathematics, including with the Mathematical Association of America; for her influential leadership of women in mathematics; for her long focus on inclusion and on building inclusive mathematical communities; and for a laudable career that has been rich in mathematical research, mathematical education, and mathematical exposition." She has been coeditor of *Math Horizons*, cofounder and codirector of the Summer Mathematics Program for Women Undergraduates (SMP), and a member of many MAA committees. The SMP program (which she cofounded with her husband Stephen Kennedy) was recognized with the AMS Mathematics Programs That Make a Difference Award in 2014. Haunsperger received the M. Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics from the Association for Women in Mathematics in 2012 and (with Kennedy) the MAA Meritorious Service Award in 2016. She helped found and chaired the first committee for the MAA Inclusivity Prize. Haunsperger received her PhD in mathematics from Northwestern University in 1991. From 1991 to 1994 she and Kennedy taught at St. Olaf College,

and they joined the Carleton faculty in 1994. She tells the *Notices*: "I'm an avid photographer, and I've never met a craft I haven't liked."

The Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics were awarded to **Dave Kung** of St. Mary's College of Maryland, **David Austin** of Grand Valley State University, and **Elaine Kasimatis** of California State University, Sacramento.


Dave Kung

Dave Kung was recognized "for outstanding teaching and mentorship and his leadership in making mathematics more inclusive at St. Mary's College of Maryland (SMCM) and beyond." He "integrates mathematics into life experiences through both the development of innovative and popular courses and diverse collaborations with music, athletics, labor, and many other components of collegiate, public, and private life. His energy is contagious, inspiring passion for mathematics, teaching, fun, fairness, and humanism." He received his PhD from the University of Wisconsin–Madison in 2000. At St. Mary's College, he has facilitated outstanding experiences for students from groups historically underserved by the mathematics community. He cofounded a departmental emerging scholars program (ESP), which he then helped expand to the other STEM disciplines. He also founded the local Southern Maryland Math Circle for 7th–12th graders, focusing on the poorest areas of the community. Teaming with other mathematicians, he has worked to improve mathematics literacy and responsible citizenship by developing curriculum materials for a Math for Social Justice course. He has initiated college-wide programs such as a New Faculty Seminar and a Teaching Excellence Workshop on Culturally Sensitive Teaching and has sparked the creation of programs for graduate student professional development across the nation. He has held leadership roles in the Young Mathematicians' Network and in various MAA committees. He currently serves as director of MAA Project NExT and director of strategy and implementation for Transforming Post-Secondary Education in Mathematics (TPSE-Math). He has lectured widely on the relationship between math and music and presented a twelve-lecture series on this subject, released on DVD by the Teaching Company. Kung tells the *Notices* that he is "often spotted around campus running, swimming, playing violin, causing 'good trouble'—and cajoling [my] nine year-old daughter to do the same."

David Austin was honored "for his record of exemplary mathematics teaching at Grand Valley State University and his support and expansion of programs to build relationships between indigenous communities and the broader mathematical community through mathematical creativity." Austin received his PhD from the University of Utah under Ron Stern. After holding a postdoctoral position at the Institute for Advanced Study, he joined the University of British Columbia, then moved to Grand Valley State University. He has played a major role in developing his department's applied mathematics courses and its new applied mathematics major and has offered annual workshops in teaching linear algebra to Project NExT participants. He has also run multiple summer schools on mathematical graphics and served as a mentor for a local robotics team. In his role as a director for the Alliance for Indigenous Math Circles (AIMC), he has helped to organize and run summer camps for indigenous students and their teachers and has nurtured connections between the AIMC and the American Institute for Mathematics. While at UBC, he helped found a chapter of the American Indian Science and Engineering Society. Austin is a long-time contributor to the AMS's online *Feature Column*. He promotes and writes open educational resources to improve access to higher education, is a director of the Alliance of Indigenous Math Circles, and mentors 7th–12th grade students in math and programming within the FIRST robotics program.

Elaine Kasimatis is recognized as a "thoughtful and inspiring teacher and a deeply caring mentor whose support builds her students' penchant for persevering to make sense of the mathematics they are exploring. Her broad and deep work through regional, state, and national efforts has profoundly influenced not only students, but also generations of mathematics teachers and, in turn, their students." She received her PhD from the University of California, Davis, in 1986 under the direction of Sherman K. Stein. She joined the faculty at Cal State, Sacramento, where she developed a course to engage future elementary school teachers in genuine mathematical processes—exploration, conjecture, and proof—that has influenced thousands of teachers and mathematics faculty members over the past thirty years. She developed a capstone course connecting real analysis and abstract algebra content to high school curricula, revamped the university's curriculum for remedial mathematics, created professional development programs for faculty members teaching remedial mathematics, and developed a course to train tutors. Her work on the NSF-funded Access to Algebra program increased the success of middle school students in Algebra 1 classes around the country. She was a cocreator of the College Preparatory Mathematics curriculum for middle and high schools, which was named an Exemplary Mathematics Program by the US Department of Education in 1999. She has also worked to create a new school and develop a teacher preparation program in Rwanda. Besides her mathematics and education work, she enjoys spending time with her daughter, working in her yard, and learning about different cultures.

*—From MAA announcements*

# 2021 AWM Annual Meeting Prizes

The Association for Women in Mathematics (AWM) awarded several prizes at the 2021 Joint Mathematics Meetings, held virtually January 6–9, 2021.


Emily Riehl

**Emily Riehl** of Johns Hopkins University was awarded the 2021 Joan and Joseph Birman Prize in Topology and Geometry "for her deep and foundational work in category theory and homotopy theory. Riehl has proved many fundamental theorems in category theory and its relations to homotopy theory and has produced a large body of exceptional research, as well as expository and pedagogical work. Her work is transforming the ways we work with higher categorical objects, drawing on classical category-theory tools and constructions to illustrate and simplify higher categorical constructions. Riehl's theorems and machinery beautifully showcase how these higher categorical constructions can often be viewed as intuitive generalizations of the ordinary ones. Her books on category theory and on homotopical category theory have become the standard references, and her draft book on ∞-categories is already finding immediate use by researchers. Riehl is an internationally recognized scholar for her important research works in category theory and her innovative ideas about mentorship and communication of mathematics." Riehl received her PhD in 2011 from the University of Chicago under the direction of Peter May. From 2011 to 2015, she was a Benjamin Peirce and NSF Postdoctoral Fellow at Harvard University. She joined the faculty at Johns Hopkins in 2015 and is currently an associate professor. She has held visiting positions at the Mathematical Sciences Research Institute, the Hausdorff Research and Max Planck Institutes, the Centre of Australian Category Theory, and the Centre for Advanced Study in Oslo, Norway. In 2020 she received the Johns Hopkins President's Frontier Award, which supports researchers who break new ground and are likely to become leaders in their fields. Riehl tells the *Notices*: "As a postdoc, I was the bassist and a founding member of the band Unstraight, who I still play for on occasion. More recently, I've followed some of my homotopy theory colleagues into trail running and ultramarathons. All of my 'races' so far have been canceled or virtual, but in 2020 I managed to run three 50K's, the first two while based in Berkeley at the Mathematical Sciences Research Institute."

**Lynda R. Wiest** of the University of Nevada, Reno, was awarded the Louise Hay Award for Contribution to Mathematics Education for her significant contributions to "advancing mathematics education in K–12 across a variety of school settings. She has created innovative courses and summer programs, addressing gender equity and diversity issues." Before earning her PhD from Indiana University in 1996, Wiest taught elementary and middle school students in Pennsylvania for eleven years. Her major interests are research and classroom applications in K–12 teaching and learning, particularly in mathematics and educational equity, especially in mathematical problem solving and reasoning, geometry and spatial skills, quantitative literacy, gender equity, and preservice and inservice teacher education. She is the founder and director of the Northern Nevada Girls Math and Technology Program (NNGMTP), which hosts girls entering the seventh and eighth grades from Nevada's rural and urban areas at the University of Nevada, Reno. The summer camp boosts the girls' interest in mathematics, advances their mathematics education and problem-solving skills, and presents participants with university campus experience. Many of these students have chosen to pursue degrees in math and engineering.


Raegan Higgins

**Raegan Higgins** of Texas Tech University received the M. Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics. Her research interests "revolve around time scales—particularly oscillation criteria for certain linear and nonlinear second-order dynamic equations." She received her PhD in mathematics in 2008 from the University of Nebraska. According to the prize citation, "Higgins' excellence in teaching and mentoring and her commitment to diversity have consistently shined through." She cofounded the Young Women in Mathematics: Fostering Success program in 2013. She is also a member of the organizing committee of the Emmy Noether High School Mathematics Day and over the years has given numerous talks, organized workshops, and served as career panelist for the female high school and undergraduate students who participate in this annual event. From 2014 to 2017, she served as an instructor for the Enhancing Diversity in Graduate Education (EDGE) program, of which she herself is an alumna. She has been a codirector of the program since 2017. She is a cofounder of the Network of Minorities in Mathematical Sciences, which highlights the contributions and accomplishments of blacks in the mathematical sciences through its website, Mathematically Gifted and Black. She has also studied the impact of professional development on the self-efficacy of middle-school mathematics teachers. In 2014, Higgins received a Women in STEAM Award from the Center for the Integration of STEM Education and Research, and in 2020 she was recognized as an Integrated Scholar for her synergistic activities at the intersection of teaching, service, and

research. Also in 2020 she was recognized with a Service Award of the AWM. Higgins tells the *Notices*: "I am from Louisiana. I am wife to the handsome and supportive Dr. Kamau Oginga Siwatu, professor and department chair of Educational Psychology and Leadership in the College of Education at Texas Tech University. I am the mother to daughter Jalia, an inquisitive ten-year-old who is an outstanding goalie, and son, Tendaji, a fun-loving second grader who aspires to be a SWAT officer. During the stay-at-home orders as a result of COVID-19, I began running. I reached a milestone of running two miles in less than twenty minutes. The ultimate goal is to run 30 minutes nonstop. My favorite non-chocolate candy is lemonheads."

**Bonnie Berger** of the Massachusetts Institute of Technology was the 2020 Sonia Kovalevsky Lecturer. She delivered her lecture, titled "Compressive Genomics: Leveraging the Geometry of Biological Data," at the 2021 SIAM Conference on Computational Science and Engineering, held virtually in March 2021. The award citation reads: "Bonnie Berger has an outstanding record of research contributions in the area of computational biology, which have furthered our understanding of the structure of proteins and the genome. Berger's work is characterized by its successful interdisciplinarity and mathematical depth. In addition to theoretical and algorithmic contributions, she has contributed significantly to the rapid advancement of the fields of systems biology and genomics by her numerous software developments, which are widely used by researchers in other disciplines. Her work has received, and continues to receive, numerous accolades and national and international awards. In addition to being a highly accomplished research leader in bioinformatics and computational biology, Berger has an enviable record of mentorship of young investigators and service to the profession. Her intellectual impact is multifaceted and far reaching." The Kovalevsky Lecture highlights the achievements of women in applied and computational mathematics.

*—From AWM announcements*

# Shu Awarded von Neumann Lectureship


Chi-Wang Shu

**Chi-Wang Shu** of Brown University has been chosen the recipient of the 2021 John von Neumann Prize of the Society for Industrial and Applied Mathematics (SIAM). Shu was honored "for fundamental contributions to the numerical solution of partial differential equations." The citation states: "His work on finite difference essentially non-oscillatory (ENO) methods, weighted ENO (WENO) methods, finite element discontinuous Galerkin methods, and spectral methods has had a major impact on scientific computing." Shu received his PhD from the University of California, Los Angeles, in 1986. He joined Brown University in 1987, where he has been chair of the Division of Applied Mathematics (1999–2005) and is currently the Theodore B. Stowell University Professor of Applied Mathematics. His honors include the First Feng Kang Prize of Scientific Computing (1995) and the SIAM/ACM Prize in Computational Science and Engineering (2007). He is a Fellow of the AMS, as well as of SIAM and the Association for Women in Mathematics (AWM), and he was an invited speaker at the International Congress of Mathematicians in 2014. He will deliver the John von Neumann Lecture at the SIAM Annual Meeting, currently scheduled for July 2021.

*—From a SIAM announcement*

# Clay Research Fellows Announced

The Clay Mathematics Institute (CMI) has awarded Clay Research Fellowships for 2021 to the following four young researchers: **Maggie Miller** of the Massachusetts Institute of Technology, **Georgios Moschidis** of the University of California, Berkeley, **Lisa Piccirillo** of the Massachusetts Institute of Technology, and **Alexander Smith** of the Massachusetts Institute of Technology.


Maggie Miller

Maggie Miller received her PhD in 2020 from Princeton University, advised by David Gabai. She is currently an NSF Postdoctoral Fellow at MIT. According to the citation, "Miller has advanced the understanding of manifolds in dimensions 3 and 4 with her power and creativity, wielding a wide range of techniques—algebraic, combinatorial, geometric, and topological. She has developed a theory of singular fibrations in 4-manifolds and used it to make significant progress on a thirty-five-year-old problem of Casson and Gordon: for a large class of fibered ribbon knots, she proves that the associated fibration of the 3-sphere extends over the closed complement of the ribbon disc in the 4-ball. Her abundance of insight has made Miller a sought-after collaborator, working with a variety of coauthors to advance different aspects of low-dimensional topology: topological versus smooth isotopy for genus-1 surfaces in the 4-ball; taut foliations in 3-manifolds; concordance; trisections of 4-manifolds;

diffeomorphisms of nonorientable 3-manifolds; and the use of knot Floer homology to give lower bounds on the bridge index of knots." Miller has been appointed a Clay Research Fellow for a term of four years beginning July 1, 2021. She will be based at Stanford University.


Georgios Moschidis

Georgios Moschidis obtained his PhD in 2018 from Princeton University, advised by Mihalis Dafermos. He is currently a Miller Research Fellow at Berkeley. According to the citation, "Moschidis's work is focused on mathematical problems arising in classical general relativity, the theory of gravity first formulated by Einstein in 1915. In this context, he is particularly concerned with instability phenomena. Moschidis gave the first rigorous account of the celebrated Friedman 'ergo-sphere' instability, whose existence was conjectured in the early 1970s. In a remarkable series of papers over the last few years, he has also addressed the problem of instability for anti-de Sitter (AdS) spacetime, the ground state solution to the Einstein equations with a negative cosmological constant. In contrast to the Friedman instability, the much-sought-after instability in this context (which has been observed in numerical simulations) is nonlinear in origin. Moschidis's achievements include a rigorous proof of the instability of AdS in the case of the Einstein–Vlasov system with spherical symmetry. His groundbreaking proof contains ideas that transform the understanding of large-data phenomena in solutions of the Einstein equations." Moschidis has been appointed a Clay Research Fellow for a term of two years beginning July 1, 2021. He will be based at Princeton University.

Lisa Piccirillo received her PhD in 2018 from the University of Texas at Austin, advised by John Luecke. She held an NSF Postdoctoral Fellowship at Brandeis University before moving to MIT. The citation reads: "Piccirillo is renowned for her work in low-dimensional topology. Most famously, she proved that the Conway knot is not slice, i.e., there is no 2-disc smoothly embedded in the 4-ball that intersects the bounding 3-sphere in the Conway knot. The sliceness of the Conway knot had been an open problem for over fifty years, gaining iconic status as a test problem. Many sophisticated tools were developed in the area to tackle problems of this type, drawing on diverse parts of mathematics, including gauge theory, representation theory, and symplectic topology. Piccirillo's proof involves an ingenious fusion of these tools with inspired, direct topological constructions. In recognition of this achievement, she was awarded the inaugural Maryam Mirzakhani New Frontiers Prize in 2020. She continues to demonstrate the power of her techniques by solving long-standing problems in low-dimensional topology." Piccirillo has been appointed a Clay Research Fellow for a term of three years beginning July 1, 2021. She will be based at the Massachusetts Institute of Technology.


Alexander Smith

Alexander Smith obtained his PhD in 2020 from Harvard University, advised by Noam Elkies and Mark Kisin. He currently holds a National Science Foundation Postdoctoral Fellowship at MIT. The citation reads: "Alexander Smith has already solved major problems in number theory and forged a novel research program that combines ideas from combinatorics and probability with sophisticated aspects of number theory. Conditional on the Birch and Swinnerton-Dyer conjecture, he has largely settled an influential conjecture of Goldfeld from 1979 describing how ranks should be distributed in quadratic twist families of elliptic curves. This significantly advances our understanding of the ancient problem of deciding which numbers are congruent in the sense of being the area of a right-angle triangle with rational side lengths. Smith has also determined the exact distribution of the Sylow 2-subgroups of the class groups of imaginary quadratic fields, thereby proving the Cohen–Lenstra–Gerth conjectures from the 1980s. In recognition of these achievements, he was awarded the inaugural David Goss Prize in Number Theory." Smith has been appointed a Clay Research Fellow for a term of four years beginning July 1, 2021. He will be based at Stanford University.

Clay Research Fellowships are awarded on the basis of the exceptional quality of candidates' research and their promise to become mathematical leaders.

*—CMI announcements*

# Prizes of the Canadian Mathematical Society

The Canadian Mathematical Society (CMS) has awarded several prizes for 2021.


Joel Kamnitzer

**Joel Kamnitzer** of the University of Toronto is the recipient of the 2021 Jeffery-Williams Prize, which recognizes outstanding and sustained contributions to mathematical research by a member of the Canadian mathematical community.

The prize citation reads in part: "The CMS recognizes Dr. Kamnitzer as a world leader in the field of geometric representation theory. He has had some of the most original and

influential contributions of the past twenty years in his field. His field of research can be described as an interface between algebra, geometry, and modern mathematical physics. Among his recent interests are the categorification program and algebraic problems in modern mathematical physics. One particular strand of Dr. Kamnitzer's research is a novel approach to knot homology based on the study of the affine Grassmannian, an infinite-dimensional manifold which is one of the main objects of modern geometric representation theory. In particular, he developed a geometric approach to categorification of knot homology. Another important contribution of Dr. Kamnitzer is his work on symplectic duality, which involves the quantization of certain slices of the affine Grassmannian."

Kamnitzer received his PhD in 2005 from the University of California in Berkeley under the supervision of Allen Knutson. He held postdoctoral positions at the Massachusetts Institute of Technology, at the University of California, Berkeley, and at the Mathematical Sciences Research Institute. He joined the faculty of the University of Toronto in 2008, where he has been full professor since 2016. Among his honors are an American Institute of Mathematics (AIM) Five-Year Fellowship (2005–2010); the André Aisenstadt Prize of the Centre de Recherches Mathématique (2011); a Sloan Foundation Research Fellowship (2012–2014); several Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grants and an E.W.R. Steacie Memorial Fellowship; and a Simons Fellowship (2014–2015) and Simons CRM Professorship (2020). In his spare time, he enjoys cycling and cross-country skiing with his wife and three daughters.

**Luke Postle** of the University of Waterloo has been awarded the 2021 Coxeter–James Prize for his work in the area of graph theory. According to the prize citation, he "is an exceptional young researcher in structural graph theory… . He quickly earned a strong international reputation by using a broad and innovative range of tools to solve old and deep problems in combinatorics." As a leading researcher in graph theory, "he made groundbreaking progress on many famous conjectures in graph coloring, including Hadwiger's Conjecture, the Goldberg–Seymour Conjecture, Reed's Conjecture, and Jaeger's Conjecture.

"Luke Postle has launched a new paradigm in graph coloring with his introduction of a new generalization of coloring. Namely, in 2015, Luke Postle and his collaborator Zdenek Dvorak introduced correspondence coloring in an article published in the *Journal of Combinatorial Theory B*, now referred to as DP-coloring by the community after their surnames. Correspondence coloring is a generalization of list coloring. List coloring, itself a generalization of coloring, was first introduced by Erdős, Rubin, and Taylor in the 1970s and is now the subject of over a thousand journal articles. In list coloring, each vertex has its own list from which it must be colored. In correspondence coloring, they abstracted this by removing any 'global' notion of color and rather only using a 'local' notion, individual to each vertex. Such a generalization can actually be used for inductive purposes to solve list coloring problems; namely, they used the concept to solve a fifteen-year-old conjecture that planar graphs without four to eight cycles are 3-list-colorable. Correspondence coloring has been both used to solve open coloring problems and studied in its own right as a natural form of coloring. For example, correspondence coloring proved a key ingredient in Luke Postle's research on Reed's conjecture." Postle received his PhD in 2012 from the Georgia Institute of Technology, advised by Robin Thomas. He was an Emory Mathematics Fellow (2012–2014) at Emory University before joining the University of Waterloo, where he is currently an associate professor. He was awarded a Tier 2 Canada Research Chair from the Natural Sciences and Engineering Research Council of Canada (NSERC; 2015–2020), an Early Researcher Award from the Government of Ontario (2016–2021), and the Golden Jubilee Research Excellence Award from the Faculty of Mathematics at Waterloo (2018).

**Chao Zhang** was recognized with the 2020 G. de B. Robinson Award for his paper "Ekedahl–Oort Strata for Good Reductions of Shimura Varieties of Hodge Type," *Canadian Journal of Mathematics* **70** (2018), no. 1, 451–480. His work "is devoted to the study of Shimura varieties. These varieties have become a valuable tool in modern number theory. Their étale cohomology constitutes one of the ways to construct Galois representations. They also provide concrete incarnations of automorphic forms realized as modular forms. Zhang introduces stratifications of the special fibers of Shimura varieties of Hodge type in odd characteristics into spaces that are easier to understand, e.g., they are quasi-affine and smooth. His work vastly generalizes previous work of Frans Oort for moduli spaces of principally polarized abelian varieties and of Ben Moonen, Torsten Wedhorn, and Eva Viehmann for special classes of Shimura varieties (those of PEL type). Zhang's result has been instrumental in recent important developments in the construction of torsion Galois representations, e.g., in the work of Wushi Goldring and Jean-Stefan Koskivirta, and in the study of the tautological ring of Shimura varieties, such as in the work of Torsten Wedhorn and Paul Ziegler." Zhang received his PhD in 2018, then held postdoctoral positions at Tsinghua University in Beijing and at the Institute of Mathematics of Academia Sinica in Taipei. He joined Southeast University in December 2019 and is currently an associate professor.

*—From CMS announcements*

# Waterman Awarded Benter Prize

**Michael S. Waterman** of the University of Southern California and the University of Virginia has been awarded the 2020 William Benter Prize in Applied Mathematics for his work in computational biology and bioinformatics, which concentrates on the creation and application of mathematics, statistics, and computer science to molecular biology, particularly to DNA, RNA, and protein sequence data. He is the codeveloper of the Smith–Waterman algorithm for sequence comparison and of the Lander–Waterman formula for physical mapping. He received his PhD in statistics and probability from Michigan State University in 1969, and he has held positions at the Los Alamos National Laboratory and Idaho State University, as well as many visiting positions throughout his career. He is a founding editor of the *Journal of Computational Biology*, a Fellow of the American Association for the Advancement of Science, the Institute of Mathematical Statistics, the Society of Industrial and Applied Mathematics (SIAM), the International Society of Computational Biology, and the National Academy of Inventors. He is an elected member of the American Academy of Arts and Sciences, the National Academy of Sciences, and the National Academy of Engineering. The prize is awarded by the City University of Hong Kong, carries a cash award of US$100,000, and recognizes "outstanding mathematical contributions that have had a direct and fundamental impact on scientific, business, finance and engineering applications."

*—From a Benter Prize announcement*

# NAS Held Prize Awarded

**Adam W. Marcus** of Ecole Polytechnique Fédérale de Lausanne, **Daniel A. Spielman** of Yale University, and **Nikhil Srivastava** of the University of California, Berkeley, have been awarded the 2021 Michael and Sheila Held Prize of the National Academy of Sciences (NAS).

Marcus, Spielman, and Srivastava solved long-standing questions on the Kadison–Singer problem and on Ramanujan graphs and, in the process, uncovered a deep new connection between linear algebra, geometry of polynomials, and graph theory that has inspired the next generation of theoretical computer scientists. Their groundbreaking papers on these questions, both published in 2015, solved problems that mathematicians had been working on for several decades. The three were awarded the Pólya Prize in 2014 for this work. Marcus received his PhD from the Georgia Institute of Technology in 2008. He was awarded the inaugural Dénes König Prize in Discrete Mathematics from the Society for Industrial and Applied Mathematics (SIAM) in 2008 for his work in solving the Stanley–Wilf conjecture. Spielman received his PhD from the Massachusetts Institute of Technology in 1995. He has been a recipient of the Gödel Prize (with Shang-Hua Teng) in both 2008 and 2015; of the Nevanlinna Prize in 2010; and of a MacArthur Fellowship (2012). He was named a Simons Investigator in 2012 and is an elected member of the NAS. Srivastava received his PhD from Yale University in 2010, and he gave an invited lecture at the International Congress of Mathematicians in 2014.

The Held Prize honors outstanding, innovative, creative, and influential research in the areas of combinatorial and discrete optimization or related parts of computer science, such as the design and analysis of algorithms and complexity theory. It carries a cash award of US$100,000.

*—From an NAS announcement*

# 2021 Sloan Fellows Announced

The Alfred P. Sloan Foundation has announced the names of the recipients of the 2021 Sloan Research Fellowships. Each year the foundation awards fellowships in the fields of mathematics, chemistry, computational and evolutionary molecular biology, computer science, economics, neuroscience, physics, and ocean sciences. Grants of US$75,000 for a two-year period are administered by each Fellow's institution. Once chosen, Fellows are free to pursue whatever lines of inquiry most interest them, and they are permitted to employ fellowship funds in a wide variety of ways to further their research aims.

Following are the names and institutions of the 2021 awardees in the mathematical sciences.

- **Bhaswar B. Bhattacharya**, University of Pennsylvania
- **Tamás Darvas**, University of Maryland, College Park
- **Yu Deng**, University of Southern California
- **Xiumin Du**, Northwestern University
- **Jessica Fintzen**, Duke University
- **Pavel Galashin**, University of California, Los Angeles
- **Adel Javanmard**, University of Southern California
- **Ilya Khayutin**, Northwestern University
- **Brandon Levin**, University of Arizona
- **Yevgeny Liokumovich**, University of Toronto, Mississauga
- **Fedor Manin**, University of California, Santa Barbara
- **Alexander Perry**, University of Michigan

- **Lisa Piccirillo**, Massachusetts Institute of Technology
- **Brandon Seward**, University of California, San Diego
- **Egor Shelukhin**, University of Montreal
- **Yakov Shlapentokh-Rothman**, Princeton University
- **William Slofstra**, University of Waterloo
- **Nathaniel Stapleton**, University of Kentucky
- **Laura Starkston**, University of California, Davis
- **Madeleine Udell**, Cornell University

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# ACM Fellows

The Association for Computing Machinery (ACM) has elected its class of Fellows for 2020. Following are the names of the new Fellows whose work involves the mathematical sciences.

- **Yao-Wen Chang**, National Taiwan University, for contributions to algorithmic electronic design automation.
- **Moses Charikar**, Stanford University, for design of efficient algorithmic techniques for big data, hashing, approximation algorithms, and metric embeddings.
- **Graham R. Cormode**, University of Warwick, for contributions to data summarization and privacy enabling data management and analysis.
- **Mathieu Desbrun**, California Institute of Technology, for contributions to geometry processing and discrete differential geometry.
- **Alan Edelman**, Massachusetts Institute of Technology, for contributions to algorithms and languages for numerical and scientific computing.
- **Nicholas Higham**, University of Manchester, for contributions to numerical linear algebra, numerical stability analysis, and communication of mathematics.
- **Holger H. Hoos**, Leiden University, for contributions to automated algorithm selection and configuration for optimization and machine learning.
- **Ravi Kumar**, Google Research, for contributions to web science modeling, analytics, and algorithms.
- **Kevin Leyton-Brown**, University of British Columbia, for contributions to artificial intelligence, including computational game theory, multi-agent systems, machine learning, and optimization.
- **Jose Meseguer**, University of Illinois at Urbana-Champaign, for the development of logical methods for design and verification of computational systems.
- **Prakash Panangaden**, McGill University, for making continuous state systems amenable to logical and computational treatment.
- **Manish Parashar**, Rutgers University, for contributions to high-performance parallel and distributed computing and computational science.
- **Haesun Park**, Georgia Institute of Technology, for contributions to numerical algorithms, data analytics, and leadership in computational science and engineering.
- **Michael O. Rabin**, Harvard University, for fundamental, pioneering contributions to the theory of computation, probabilistic algorithms, and cryptography.
- **Paul Resnick**, University of Michigan, for contributions to recommender systems, economics and computation, and online communities.
- **Steven Salzberg**, Johns Hopkins University, for contributions to computational biology, including software for DNA sequence analysis, alignment, and genome assembly.
- **Olga Sorkine-Hornung**, ETH Zurich, for contributions to digital geometry processing, computer animation, computer graphics and visual computing.
- **Yufei Tao**, Chinese University of Hong Kong, for contributions to algorithms for large-scale data processing.
- **Olga Troyanskaya**, Princeton University and Simons Foundation, for contributions to computational biology and data integration.
- **Cathy H. Wu**, University of Delaware, for contributions to bioinformatics, computational biology, knowledge mining and semantic data integration.

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