

# Mathematics People

## Daubechies Awarded Benter and Fudan–Zhongzhi Prizes



Ingrid Daubechies

INGRID DAUBECHIES of Duke University has been awarded the 2018 William Benter Prize in Applied Mathematics and the 2018 Fudan-Zhongzhi Science Award. The Benter Prize, given 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.” The Fudan-Zhongzhi Award of the Fudan Science and Innovation Forum carries a cash award equivalent to US\$435,000. It recognizes Daubechies’ leadership in wavelet theory and time-frequency analysis, which fundamentally changed image and signal processing. The Fudan–Zhongzhi Science Award recognizes scientists who make fundamental achievements in the fields of mathematics, physics, and biomedicine.

Daubechies has made exceptional contributions to a wide spectrum of scientific and mathematical subjects, including profound work with wavelets. Wavelets are mathematical functions used in processing digital signals and shrinking digital photos and movies. The US Federal Bureau of Investigation, for example, has used her digital compression techniques for managing its huge amount of data pertaining to fingerprints. In addition, she has created and applied mathematical algorithms for spotting art forgeries and analyzing damaged paintings. Her algorithms are used to compare the different styles of artists, pinpoint when a work was painted, and to restore artwork that has cracked, faded, or been damaged during conflict, without actually touching the artwork.

Daubechies was born in Belgium and received her PhD in physics from the Free University Brussels in 1980. After two years of postdoctoral work in the United States, she returned to join the faculty of the Free University. In 1987 she joined AT&T Bell Laboratories in Murray Hill, New Jersey. She later served as professor of mathematics at Rutgers University. In 1994 she became professor of mathematics

at Princeton University. She was director of the program in applied and computational mathematics from 1997 to 2001. She joined the faculty at Duke University in 2011.

Her honors include the Steele Prize for Mathematical Exposition (1994), the Satter Prize in Mathematics (1997), the National Academy of Sciences Award in Mathematics (2000), the Gold Medal of the Flemish Royal Academy of Arts and Sciences, Belgium (2005), the ICIAM Pioneer Prize (2007), the Steele Prize for Seminal Contribution to Research (2011), and the Nemmers Prize in Mathematics (2012). In 2005 she gave the AMS Gibbs Lecture and the AWM-SIAM Sonia Kovalevsky Lecture; in 2006 she gave the Emmy Noether Lecture at the Joint Mathematics Meetings in San Antonio. She was the SIAM John von Neumann Lecturer in 2011. She is a member of the American Academy of Arts and Sciences (1993), the US National Academy of Sciences (1998), and the Royal Netherlands Academy of Arts and Sciences (1999). She was elected a Fellow of the Institute for Electrical and Electronics Engineers (IEEE) in 1998. She was the first woman to serve as president of the International Mathematical Union (2011–2014). She was a member of the inaugural class of AMS Fellows (2012). She is also the first woman to win the Benter Prize.

—From Benter Prize and Fudan–Zhongzhi Prize announcements

## Pym and Walton Awarded Lichnerowicz Prize



Brent Pym

BRENT PYM of McGill University and CHELSEA WALTON of the University of Illinois at Urbana–Champaign have been awarded the 2018 Lichnerowicz Prize, awarded for notable contributions to Poisson geometry.

Brent Pym received his PhD from the University of Toronto in 2013, under the direction of Marco Gualtieri. He has held postdoctoral positions at McGill, Oxford, and Edinburgh universities before becoming assistant professor at McGill. In his thesis work, Pym classified the noncommutative deformations of complex projective 3-space, proved

the 4-dimensional case of the Bondal conjecture about Fano Poisson manifolds, and, jointly with Gualtieri and Li, developed the theory of the Stokes groupoids on Riemann surfaces. In recent work, Pym developed the notion of an elliptic singularity for a holomorphic Poisson structure and used it to obtain some of the only available classification results in dimension greater than 3. He has also developed the notion of a holonomic Poisson manifold (joint with Schedler), bringing the theory of perverse sheaves into the mainstream of Poisson geometry. In additional joint works, Pym has contributed to the enumerative geometry of non-commutative spaces and to the theory of Dirac structures and Courant algebroids as objects in shifted symplectic geometry. Pym tells the *Notices*: “Outside of mathematics, I enjoy cooking, playing jazz saxophone, and spending time with my infant daughter.”



Chelsea Walton

Chelsea Walton completed her PhD in 2011 at the University of Michigan under the direction of Toby Stafford and Karen Smith. Following postdoctoral stays at the University of Washington, the Mathematical Sciences Research Institute, and the Massachusetts Institute of Technology, she became assistant professor at Temple University in 2015. In July 2018, she joined the faculty of the

University of Illinois at Urbana–Champaign. Walton has written several important works in Poisson geometry, in addition to being a well-established expert in noncommutative algebra and quantum groups. Her work in Poisson geometry includes a deep investigation of the 3-D and 4-D Sklyanin algebras, especially those that are module-finite over their center. Joint with Wang and Yakimov, Walton showed that these are close analogues of Poisson algebras, namely Poisson  $Z$ -orders, which carry Poisson structures on the center. Walton, in joint work with several collaborators, has written a deep series of works on actions of Hopf algebras on commutative and noncommutative domains, showing that semisimple Hopf actions generally factor through group algebra actions, and also investigating the difficult non-semisimple case. She also gave a negative answer to the long-standing conjecture about whether the universal enveloping algebra of the Witt algebra is noetherian (joint with Sierra). Walton tells the *Notices*: “Outside of mathematics, I enjoy watching TV to turn my brain off. In fact, I have a documentary about the Backstreet Boys on pause as I type this. But I could very well start working if I get an idea. This is the way creativity works, I guess... Nick Carter and Hopf algebras.”

The André Lichnerowicz Prize in Poisson geometry is awarded every two years at the International Conference on Poisson Geometry in Mathematics and Physics to re-

searchers who completed their doctorates at most eight years before the year of the conference.

—Giovanni Forni, Chair, Prize Selection Committee

## Lim and Mehrmann Awarded Hans Schneider Prize

LEK-HENG LIM of the University of Chicago and VOLKER MEHRMANN of Technische Universität Berlin have been chosen as recipients of the 2019 Hans Schneider Prize.



Lek-Heng Lim

Lim and collaborators have made several fundamental contributions to linear and multilinear algebra, matrix theory, and their applications. These include his work on eigen and singular values of tensors, on tensor ranks, on a Perron-Frobenius theorem for nonnegative tensors, and on ill-posedness and NP-hardness of some tensor problems. A striking result of his shows that every  $n \times n$

matrix is a product of at most  $2n + 5$  Toeplitz matrices. Another lays the theoretical foundation for measuring the distance between subspaces of different dimensions. This work finds applications in statistics, data analysis, optimization, and computational mathematics. At the same time, it makes use of diverse ideas of techniques from several areas of mathematics. Lim received his PhD in 2007 from Stanford University under Gene Golub and Gunnar Carlsson. He was assistant professor at the University of California Berkeley from 2007 to 2010, when he joined the faculty at Chicago. In 2017 he received the Stephen Smale Prize from the Society for the Foundations of Computational Mathematics and the Wilkinson Prize in Numerical Analysis and Scientific Computing from the Society for Industrial and Applied Mathematics (SIAM).



Volker Mehrmann

Mehrmann was one of the early contributors to the development of efficient and reliable numerical algorithms for systems and control theory. He has made fundamental contributions to the solution of algebraic and differential algebraic equations arising in optimal control and to efficient numerical codes for implementing these solutions. He has also made very significant contributions to numerical methods for linear algebra problems with special structure (such as Hamiltonian or symplectic) and developed techniques that preserve this structure when

contributions to numerical methods for linear algebra problems with special structure (such as Hamiltonian or symplectic) and developed techniques that preserve this structure when

computing spectra. He has played an important role in the development of software that implements these algorithmic ideas. His theoretical results and numerical software are being used in industry. In addition, he has played a very important role in mentoring younger mathematicians, in the working of many mathematical societies, and as an editor of several major journals. He was elected president of the European Mathematical Society (EMS) in 2018. Mehrmann tells the *Notices*: “I like to do long bike tours (this year from Berlin to Copenhagen), and I love to knit. I am still knitting my own socks, and one of my upcoming projects is to knit a Klein bottle.”

The Hans Schneider Prize in Linear Algebra is awarded every three years by the International Linear Algebra Society (ILAS) for research, contributions, and achievements at the highest level of linear algebra. The prize may be awarded for an outstanding scientific achievement or for lifetime contribution.

—Peter Semrl  
President, ILAS

## Prizes of the New Zealand Math Society

The New Zealand Mathematical Society (NZMS) has announced several awards for 2018.



Alex James

ALEX JAMES of the University of Canterbury and CARLO LAING of Massey University are the recipients of the 2018 Research Award. James was recognized for her contributions in mathematical modeling, ranging from the theoretical, such as Lévy walks and complex ecological systems, to the very applied, such as masting and snail dynamics. She is a part-time mathematician and spends the rest of her time riding cargo bikes, building forts, and rescuing friendly bears with her two small children.



Carlo Laing

Laing was recognized for his sustained contributions to the field of mathematical neuroscience and pioneering work in the study of coupled oscillator networks. He tells the *Notices*: “I have played percussion in samba bands for the last eighteen years and performed with a New Zealand group in the Asakusa Samba Carnival held in Tokyo this past August.”

FABIEN MONTIEL of the University of Otago was chosen the recipient of the Early Career Award for “outstanding



Left to right: Andre Nies, Dan Turetsky, Noam Greenberg

contributions to the development of mathematical and computational methods in wave scattering theory and his innovative approach to modelling the propagation of ocean waves in ice-covered seas.”

NOAM GREENBERG of the Victoria University Wellington, ANDRE NIES of the University of Auckland, and DAN TURETSKY of Victoria University Wellington were awarded the 2018 Kalman Prize for Best Paper for the paper Laurent Bienvenu, Noam Greenberg, Antonin Kucera, Andre Nies, and Dan Turetsky, “Coherent Randomness Tests and Computing the  $K$ -Trivial Sets,” *Journal of the European Mathematical Society* 18 (2016), 773–812.

The Student Prize for the best contributed talk by a student at the annual New Zealand Mathematics Colloquium was awarded to PASCAL EUN SIG CHEON of the University of Auckland for the talk “Domain Truncation in Pipeline Monitoring Problems.”

—From an NZMS announcement

## IEEE Awards Announced

The Institute of Electrical and Electronics Engineers (IEEE) has honored two researchers whose work involves the mathematical sciences. ÉVA TARDOS of Cornell University has been awarded the 2019 John von Neumann Medal “for contributions to the field of algorithms, including foundational new methods in optimization, approximation algorithms, and algorithmic game theory.”

PRAMOD P. KHARGONEKAR of the University of California, Irvine was honored with the 2019 Award in Control Systems “for contributions to robust and optimal control theory.”

—From an IEEE announcement

## Rhodes Scholars Announced

The Rhodes Trust has announced the names of the American scholars chosen as Rhodes Scholars for 2019. Following are the names and brief biographies of the scholars whose work involves the mathematical sciences.

ALALEH AZHIR of New York City, is a senior at Johns Hopkins University with a triple major in biomedical engineering, computer science, and applied mathematics and statistics. She has a perfect GPA (including an A+ in twenty-two courses). A Goldwater Scholar, she has many publications in genomics and various biomedical subjects in major national and international journals and has done research at Harvard University, the Massachusetts Institute of Technology, the National Institutes of Health, and laboratories in Switzerland, as well as at Johns Hopkins. She mentors middle school students, edits a philosophy journal, runs arts programs for children in underresourced neighborhoods, and provides cooked meals for a shelter for survivors of domestic abuse. She immigrated from Iran when she was fourteen. She will do the MSc in women's and reproductive health at Oxford.

JENNIFER HUANG of Granger, Indiana, graduated in 2017 from Indiana University with a perfect 4.0 GPA, majoring in mathematics and social and cultural analysis. As an undergraduate, she conducted cross-disciplinary research, including an ethnography of Iceland's renewable energy industry and a computational text analysis of *Poetry* magazine's archives. She coauthored a paper in a leading science journal, *Proceedings of the National Academy of Sciences*, and wrote stories that received Indiana University's top undergraduate fiction award. After graduating, she has redirected her focus toward community-based political and policy work. She is currently working both as the civic engagement program coordinator at the Institute of Politics at the University of Chicago and as a policy associate in the Office of the Mayor of South Bend. She will read for an MSc in social science of the Internet and a master's in public policy.

LIA PETROSE of Laurel, Maryland, graduated from the University of Pittsburgh in 2017 with a BS in neuroscience and economics with a minor in chemistry. A Truman Scholar, she has a vision of improving how data are used to facilitate health care delivery. She wrote three first-authored papers in leading medical journals and is currently a research assistant for Dr. Heidi Williams at the Massachusetts Institute of Technology. As an undergraduate, she was elected to the executive board of the student government and served as the student member of the Board of Trustees Committee on Academic Affairs. She was born and raised until adolescence in Ethiopia. She will read for a BA in computer science and philosophy at Oxford.

JAMES W. BRAHM of Huntsville, Alabama, is a senior at the US Air Force Academy, where he majors in computer

science and minors in Chinese, as well as nuclear weapons and strategy. A Truman Scholar, he does research at the intersection of cybersecurity and computer science and has a computer-science-related patent pending with the US Patent Office. He commands the Wing Information Services Team, which is responsible for ensuring informational technology support to over 4,000 cadets. Throughout his undergraduate career, he has worked extensively in cybersecurity, including as an intern at the National Security Agency, where he engineered reusable software to support US intelligence efforts. He is an Eagle Scout and enjoys freefall parachuting. At Oxford, he will pursue an MSc in computer science.

KRISTINA M. CORREA of Robstown, Texas, is a senior at Stanford University, where she majors in biology and minors in computer science. She is the daughter of Mexican immigrants and was raised by a single mother. She has never received a grade below an A across her demanding undergraduate and graduate courses. She has done extensive research in four different laboratories, and her senior thesis relates to cellular glycans and cancer. She has been an active volunteer working with children whose parents have cancer and as a tutor for low-income and/or minority students. She plans a career in computational immunology and is committed to Latino empowerment in the sciences. At Oxford, Kristina intends to do master's degrees in integrated immunology and computer science.

VIDAL M. ARROYO of Rancho Santa Margarita, California, is a senior at Chapman University, where he is pursuing a BS in biochemistry and molecular biology with a minor in computational science and integrated educational studies. He is Chapman University's first Rhodes Scholar. He has maintained a perfect GPA. He has researched the link between cancer and obesity, as well as outcome disparities in survivors in childhood cancers. His studies have also focused on the use artificial intelligence to strengthen and personalize cancer treatments. As the founder and president of Chapman STEMtors, he has worked to expose at-risk youth to careers in science. At Oxford, he will read for a DPhil in engineering science.

MADISON L. TUNG of Santa Monica, California, is a senior at the US Air Force Academy, where she is majoring in mathematics and humanities and minoring in Chinese. A Truman Scholar, she researches the use of artificial intelligence and other mathematical techniques to develop tools for decision makers. Ultimately, she believes in the power of artificial intelligence to improve people's lives. She is a six-time All-American, national champion in women's wrestling and holds a black belt in hapkido (Korean martial art). Her hobbies include ice climbing and jiu-jitsu. At Oxford, she will read for master's degrees in computer science and in global governance and diplomacy.

—From a Rhodes Trust announcement

## AAAS Fellows Elected

The American Association for the Advancement of Science (AAAS) has elected its new fellows for 2018.

**The new Fellows of the Section on Mathematics are:**

- ERIC M. FRIEDLANDER, University of Southern California
- ILSE C. F. IPSEN, North Carolina State University
- GEORGE EM KARNIADAKIS, Brown University
- C. T. KELLEY, North Carolina State University
- DAVID E. KEYES, King Abdullah University of Science and Technology (Saudi Arabia)
- YI LI, John Jay College of Criminal Justice, City University of New York

**The new Fellows of the Section on Statistics are:**

- A. JOHN BAILER, Miami University
- SONG XI CHEN, Peking University
- DIANNE M. FINKELSTEIN, Massachusetts General Hospital/ Harvard T. H. Chan School of Public Health
- EDWARD L. IONIDES, University of Michigan
- DAVID A. MARKER, Westat
- SHARON-LISE TERESA NORMAND, Harvard Medical School
- GIOVANNI PARMIGIANI, Dana-Farber Cancer Institute

—From an AAAS announcement

## ACM Fellows

The Association for Computing Machinery (ACM) has elected its new Fellows for 2018. Below are the names, affiliations, and citations for the new Fellows whose work involves the mathematical sciences.

- TAMAL DEY, Ohio State University, “for contributions to computational geometry and computational topology.”
- MOHAMMAD T. HAJIAGHAYI, University of Maryland, College Park, “for contributions to the fields of algorithmic graph theory and algorithmic game theory.”
- DAN HALPERIN, Tel Aviv University, “for contributions to robust geometric computing and applications to robotics and automation.”
- SANJEEV KHANNA, University of Pennsylvania, “for contributions to approximation algorithms, hardness of approximation, and sublinear algorithms.”
- TOM LEIGHTON, Akamai Technologies, “for his leadership in the establishment of content delivery networks and his contributions to algorithm design.”
- TONIANN PITASSI, University of Toronto, “for contributions to research and education in the fields of computational and proof complexity.”
- AVI WIGDERSON, Institute for Advanced Study, “for contributions to theoretical computer science and mathematics.”

—From an ACM announcement

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