
Mathematics People

Reingold, Vadhan, and Wigderson Awarded Gödel Prize

OMER REINGOLD of the Weizmann Institute of Science, SALIL VADHAN of Harvard University, and AVI WIGDERSON of the Institute for Advanced Study, Princeton University, were named recipients of the Gödel Prize of the Association for Computing Machinery (ACM) at the ACM Symposium on the Theory of Computing (STOC) held May 31–June 2, 2009, in Bethesda, Maryland. The Gödel Prize for outstanding papers in the area of theoretical computer science is sponsored jointly by the European Association for Theoretical Computer Science (EATCS) and the Special Interest Group on Algorithms and Computing Theory of the ACM (SIGACT). The prize carries a cash award of US\$5,000.

Reingold, Vadhan, and Wigderson were recognized for their development of “a new type of graph that enables the construction of large expander graphs, which play an important role in designing robust computer networks and constructing theories of error-correcting computer codes. Using the new zig-zag graph, this technique was able to solve one of the most intriguing open problems in computational complexity theory, that of detecting a path from one node to another in very small storage for undirected graphs (in which the nodes are connected by lines with no direction).” In a paper titled “Entropy Waves, the Zig-Zag Graph Product and New Constant Degree Expanders”, the authors presented their research on a rich family of expander graphs, which are used for critical computer theory applications. These sparse but highly connected graphs were constructed using the zig-zag graph product. This new tool makes it possible to construct large expanders from smaller expanders while preserving degree and connectivity.

In a paper titled “Undirected Connectivity in Log-Space”, Reingold proved that connectivity in undirected graphs can be solved in logarithmic storage (i.e., enough storage to hold a constant number of pointers or counters stored elsewhere in the computer). The author’s key observation is that any connected graph is a very weak expander, but applying the zig-zag product makes it possible to turn the graph into an expander of only moderately large size. This solution had been possible using randomness but had not been accomplished with a deterministic algorithm, as

Reingold demonstrated. The findings of Reingold, Vadhan, and Wigderson were published in the *Annals of Mathematics* in 2002. The subsequent findings of Reingold on undirected connectivity in log-space were published in the *Journal of the Association for Computing Machinery* in 2007.

Reingold received the ACM Grace Murray Hopper Award in 2005 for “the outstanding young computer professional of the year”. He completed a Ph.D. and pursued a short period of postdoctoral studies at the Weizmann Institute. He received his B.Sc. in mathematics from Tel Aviv University.

Vadhan received his Ph.D. in applied mathematics from the Massachusetts Institute of Technology and won the 2000 ACM Doctoral Dissertation Award. He has earned a Certificate of Advanced Study in Mathematics from Churchill College, Cambridge University, and received his A.B. in mathematics and computer science from Harvard University. Wigderson received the 1994 Nevanlinna Prize from the International Congress of Mathematicians in Zurich.

The Gödel Prize is named in honor of Kurt Gödel, an Austrian-American mathematician and philosopher who had a major impact on scientific and philosophical thinking in the twentieth century. The award recognizes his major contributions to mathematical logic and the foundations of computer science.

—From an ACM announcement

AMS Menger Awards at the 2009 ISEF

The 2009 Intel International Science and Engineering Fair (ISEF) was held May 10–15, 2009, in Reno, Nevada. This was the fifty-ninth year of the ISEF competition. More than fifteen hundred students in grades 9 through 12 from over fifty countries participated in the fair. Student finalists who competed at the ISEF went through a multi-step process to qualify and won an all-expense-paid trip to the fair. They qualified by winning local, regional, and state fairs in the United States or national science fairs abroad. In addition to numerous grand awards presented by the ISEF, sixty-seven federal agencies and professional and educational organizations, including the American Mathematical Society (AMS), participated by giving special awards. Prizes given by the AMS included cash, certificates, books, and tote bags.



AMS Menger Award winners. Front row, left to right: Alicia Zhang, Sohini Sengupta, Almas Abdulla, Yale Fan. Back row, left to right: Sameer Deshpande, Jeffrey Chan, Sarah Sellers, Joshua Vekhter, Andrei Triffo, and Ed Connors, committee chair.

For the AMS, this was the twenty-second year of participation, and it was the twentieth year of presentation of the Karl Menger Awards. The members of the 2008–2009 AMS Menger Prize Committee and AMS Special Awards Judges were Edward Connors, University of Massachusetts (chair); Doron Levy, University of Maryland; and David Scott, University of Puget Sound. The panel of judges reviewed all fifty-seven projects in mathematics, as well as mathematically oriented projects in computer science, physics, and engineering. From these entries they interviewed several students selected for further consideration for a Menger Award. In the mathematics category forty-five entries were individuals, and twelve were submitted by teams of two or three students. The AMS gave awards to one first-place winner, two second-place winners, and four third-place winners (including one team of three students), and honorable mentions to five others.

The Karl Menger Memorial Prize winners are as follows:

First-Place Award (US\$1,000): “Graph Crossings and Cyclic Permutations: Towards a Proof of Zarankiewicz’s Conjecture”, JOSHUA VEKHTER, 17, Williamsville East High School, East Amherst, New York.

Second-Place Awards (US\$500): “Infinite Sums of Zeta Functions and Other Dirichlet Series”, ANDREI TRIFFO, 17, Synge Street CBS Secondary School, Dublin, Ireland; and “A Quantum Algorithm for Molecular Dynamics Simulation”, YALE WANG FAN, 17, The Catlin Gabel School, Portland, Oregon.

Third-Place Awards (US\$250): “Universal Law for the Distribution of Odd Periodic Cycles within Chaos in Non-linear Dynamical Systems: An Analysis of Rigid Bifurcation”, ALMAS ABDULLA, 15, West Shore Junior/Senior High School, Melbourne, Florida; “Dirichlet Prime Magic Square”, SARAH L. SELLERS, 18, Hedgesville High School, Hedgesville, West Virginia; “Controlling HIV from Transformation

into AIDs: Mathematical Modeling of HIV Dynamics”, SOHINI SENGUPTA, 17, Ocean Lakes High School, Virginia Beach, Virginia; and “Survival Analysis of Gene Expression Data Using a Hybrid Dimension Reduction Technique”, SAMEER K. DESHPANDE, 18, Texas Academy of Mathematics and Science, Denton, Texas, JEFFREY CHAN, 16, William P. Clements High School, Sugar Land, Texas; and ALICIA ZHANG, 17, Liberal Arts and Science Academy High School, Austin, Texas.

Honorable Mention Awards: “Sequences of Reducible 0,1 Polynomials”, MARTIN A. CAMACHO, 13, Central High School, St. Paul, Minnesota; “Convergence Acceleration for the Power Series Representation of the Exponential Integral”, MICHAEL C. YURKO, 15, Detroit Catholic Central High School, Novi, Michigan; “‘Mathemagical’ Pool”, WENHAN CUI, 14, Cookeville High School, Cookeville, Tennessee; “An Analysis of Erdős’s

Conjecture”, MATTHEW H. STOFFREGEN, 18, Woodland Hills High School, Pittsburgh, Pennsylvania; and “A Relativistic Generalization of the Navier-Stokes Equations to Quark-Gluon Plasmas”, NILESH TRIPURANENI, 18, Clovis West High School, Fresno, California.

The Society for Science and the Public (SSP), a nonprofit organization based in Washington, D.C., owns and has administered the ISEF since 1950. Intel became the title sponsor of ISEF in 1996.

The panel of judges was impressed both by the quality, breadth and originality of the work and the dedication and enthusiasm of the students. The projects covered a wide range of topics, as indicated by the titles of the award-winning projects.

In all, fifty-one male and twenty-one female students entered the competition. Of the monetary award winners (first, second, and third place), four are female and five are male. Sarah Sellers (third place) was the only 2009 winner to have also placed in 2008 (honorable mention).

The AMS’s participation in the Intel-ISEF is supported in part by income from the Karl Menger Fund, which was established by the family of the late Karl Menger. For more information about this program or to make contributions to this fund, contact the AMS Development Office, 201 Charles Street, Providence RI, 02904-2294, or send email to development@ams.org, or phone 401-455-4151.

—Ed Connors, University of Massachusetts

Mathematical Sciences Awards at the 2009 ISEF

The 2009 Intel International Science and Engineering Fair (ISEF) was held May 10–15, 2009, in Reno, Nevada.

More than fifteen hundred students in grades 9 through 12 from over fifty countries participated in the fair. The Society for Science and the Public, in partnership with the Intel Foundation, has honored the following mathematics students with Grand Awards, which consist of cash and other prizes.

Best of Category Award (US\$5,000) and *First Award* (US\$3,000): “The Classification of Certain Fusion Categories”, ERIC K. LARSON, 17, South Eugene High School, Eugene, Oregon.

Second Awards (US\$1,500): “Universal Law for the Distribution of Odd Periodic Cycles within Chaos in Nonlinear Dynamical Systems: An Analysis of Rigid Bifurcation, Year II”, ALMAS ABDULLA, 15, West Shore Junior/Senior High School, Melbourne, Florida; “Forcing a Draw in K-in-a-Row Games”, SHENG-HAO CHIANG, 18, National Experimental High School at Hsinchu Science Park, Hsinchu City, Chinese Taipei; “On G-Difference: A Property of Permutations and Words”, KRISTIN R. CORDWELL, 18, Manzano High School, Albuquerque, New Mexico.

Third Award (US\$1,000): “Sequences of Reducible 0,1 Polynomials”, MARTIN A. CAMACHO, 13, Central High School, St. Paul, Minnesota; “Matching Preclusion for the (n,k) -Bubble-Sort Graphs”, DAVID A. SHERMAN, 18, Wylie E. Groves High School, Beverly Hills, Michigan; “An Analysis of Erdős’s Conjecture”, MATTHEW H. STOFFREGEN, 18, Woodland Hills High School, Pittsburgh, Pennsylvania; “Infinite Sums of Zeta Functions and Other Dirichlet Series”, ANDREI TRIFFO, 17, Synge Street CBS Secondary School, Dublin, Ireland.

Fourth Award (US\$500): “An Investigation of the Closure of the Set of Singleton Sets of Natural Numbers under Union, Intersection, Complement, Addition, Multiplication”, JASON S. GROSS, 17, Commack High School, Commack, New York; “Approximation of the Size of Distorted Spherical Objects, and a New Algorithm for Precisely Estimating the Size of Spherical Fullerene Molecules”, JUN SUP LEE, 15, Langley High School, McLean, Virginia; “Parameterizing Knots with Chebyshev Polynomials”, Jenna K. Freudenburg, 18, Kalamazoo Area Math and Science Center, Kalamazoo, Michigan; “Graph Crossings and Cyclic Permutations: Towards a Proof of Zarankiewicz’s Conjecture”, JOSHUA VEKHTER, 17, Williamsville East High School, East Amherst, New York; “MicroRNA Expression Patterns in Mouse Lung Development and Cancer”, KEVIN KYLE HAWKINS, 17, Glen Oak High School, Canton, Ohio.

The Seaborg SIYSS Award was presented to Larson for “The Classification of Certain Fusion Categories”. He will receive an all-expense-paid trip to attend the Stockholm International Youth Science Seminar (SIYSS) during the Nobel Prize Ceremonies in December 2009. The award is named for the late Glenn T. Seaborg, Nobel Laureate in chemistry.

—Elaine Kehoe

Crowdy Receives CMFT Young Researcher Award

DARREN CROWDY of Imperial College, London, has been awarded the 2009 CMFT Young Researcher Award at the Computational Methods and Function Theory (CMFT) conference held in Ankara, Turkey, June 8–12, 2009. He was honored for his work in developing mathematical techniques for solving engineering problems involving complicated geometries. His research in conformal mapping led to his updating of the Schwarz-Christoffel formula so it could be used for more complicated shapes and, therefore, in more diverse applications in physics and engineering.

The CMFT Young Researcher Award is given every four years for outstanding scientific contributions in the fields of mathematics associated with the CMFT conference. These fields include the interaction of complex variables and scientific computation, including related topics from function theory, approximation theory, and numerical analysis. The award consists of a cash prize of 1,000 euros (approximately US\$1,400) and the opportunity to give a plenary address at the CMFT 2009 conference.

—From an Imperial College announcement

Ford Foundation Diversity Fellowships Awarded

The Ford Foundation has named the recipients of its Diversity Fellowships for 2008. The Ford Foundation’s predoctoral, dissertation, and postdoctoral fellowship programs seek to increase the presence of underrepresented minorities on college faculties. Awardees later serve as role models and mentors for a new generation of scholars. Two awardees in the mathematical sciences received Predoctoral Fellowships of US\$20,000 a year for up to three years. TANIECEA A. ARCENEUX of Princeton University is a student in applications of mathematics. ANTHONY M. FRANKLIN of North Carolina State University is a student in the field of statistics.

—From a Ford Foundation announcement

Korchmáros Receives Euler Medal

GÁBOR KORCHMÁROS of the University of Basilicata has been chosen to receive the 2008 Euler Medal, awarded annually by the Institute of Combinatorics and Its Applications (ICA). The medal is given to mathematicians who have made distinguished lifetime contributions to combinatorial research and who are still active in research. According to the prize citation, Korchmáros has made “important contributions to combinatorial geometry and applications to the theory of codes and cryptography.”

Inspiring Mathematicians

Emmy Noether The Mother of Modern Algebra M. B. W. Tent

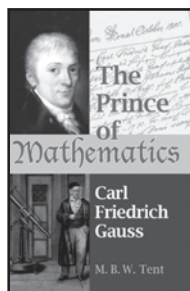


“This book is an excellent biography of the premier female mathematician of the twentieth century. . . the author engages in a great deal of “literary creativity” in generating the supposed dialog between Emmy and her parents, siblings, students and coworkers. None of it is beyond the bounds of plausible conversation, and she is presented as a woman of substance who cared little for the trappings of style and pomp.”

—Charles Aschbacher, *MAA Reviews*

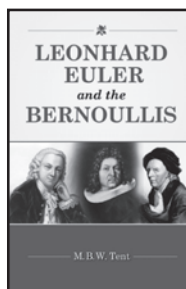
The Prince of Mathematics Carl Friedrich Gauss M. B. W. Tent

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—*Mathematics Teaching in the Middle School*

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Mathematics People

He is “a leading representative of the theory of ovals and their generalizations in higher dimensional spaces over finite fields.” His current research also includes the known embedding problem of arcs in an oval, which has relevant applications to coding theory, and algebraic curves defined over a finite field and their automorphism groups. His work is characterized by a variety of methods borrowed from combinatorial geometry, the theory of groups and graphs, and algebraic geometry.

—*From an ICA announcement*

Royal Society of London Elections

The following mathematical scientists have been elected to the Royal Society of London: MICHAEL BATTY, University College London; JONATHAN P. KEATING, University of Bristol; and BURT J. TOTARO, University of Cambridge. Elected as a foreign member was YAKOV SINAI, Princeton University and Landau Institute of Theoretical Physics, Academy of Sciences of Russia.

—*From a Royal Society of London announcement*