Mathematics People

AMS Menger Awards at the 2013 ISEF

The 2013 Intel International Science and Engineering Fair (ISEF) was held May 12–17, 2013, at the Phoenix Convention Center in Phoenix, Arizona. This year, more than 1,600 students in grades nine through twelve (selected from 433 affiliate fairs in more than seventy countries, regions, and territories) participated in the world's largest precollege science research competition. The first fair was held in Philadelphia in 1950. In 1958, the fair became international, when Japan, Canada, and Germany joined the competition.

Student finalists who competed at this year's Intel ISEF went through a multistep 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 ISEF, more than sixty federal agencies, professional and educational organizations, including the American Mathematical Society (AMS), participated by giving special awards. Prizes given by the AMS included cash, certificates, and a booklet about Karl Menger, given to each award winner.

For the AMS, this was the twenty-fifth year of participation and it was the twenty-third year of the presentation of the Karl Menger Awards.

The members of the 2013 AMS Menger Prize Committee and AMS special awards judges were JOnathan King, University of Florida (chair); Mihai Stoiciu, Williams College; and John Milton, Claremont McKenna College. The panel of judges initially reviewed all seventy-two projects in mathematics: sixty-three by individuals, and nine by teams. From these entries they selected a subset of students who were interviewed for further consideration for a Menger Prize. The AMS gave awards to one first-place winner, two second-place winners, four third-place winners, and honorable mentions to five others.

The Karl Menger Memorial Prize winners for 2013 are listed below, together with each student's high school and project title.

First Place Award (US$1,000): COLIN AITKEN, Leland High School, San Jose, California, "Dots and lines: A combinatorial interpretation of the homotopy groups of finite topologies".

Second Place Awards (US$500): STANISLAV I. ATANASOV, Model High School of Mathematics "Academician Kiril Popov", Plovdiv, Bulgaria, "Rational fixed points of polynomial involutions"; HANNAH LARSON, South Eugene High School, Eugene, Oregon, "Classification of dome fusion categories of rank 4".

AMS Menger Awards. Back row: (l-r): Jonathan King (chair), Maksim Bezrukov, Ilya Kirillov, Asbjorn Nordentoft, Colin Aitken. Front row (l-r): Stanislav Atanasov, Aliasksandr Stadolnik, Hannah Larson, Simanta Gautam.

Third Place Awards (US$250): ASBJORN C. NORDENTOFT, Aurehoj Gymnasium, Gentofte, Denmark, "Applications of Dirichlet series"; SIMANTA GAUTAM, Albemarle High School, Charlottesville, Virginia, "A novel approach to the spherical codes problem"; ILYA KIRILLOV, Lyceum 1303, Moscow, Russia, "Configuration spaces of 4-bar linkages"; MAKSIM L. BEZRUKOV, Gymnasium #41, and ALIASKSANDR O. STADOLNIK, Gymnasium #13, Minsk, Belarus (team entry), "Percolation games on Cayley graphs of groups".

Honorable Mention Awards: RUMEN R. DANGOVSKI, Sofia High School of Mathematics, Sofia, Bulgaria, "On Weitzenboeck derivations of free metabelian associative and Lie algebras"; YU-FANG HSU, National Nanke International Experimental High School, Taiwan Chinese Taipei, "Resolving an open problem related to figurate numbers by Pell equations"; SARAH SHADER, Laramie High School, Laramie, Wyoming, "Intercalates galore"; AKHIL NISTALA, Novi High School, Novi, Michigan, "Matching preclusion and conditional matching preclusion for dual-cubes"; DAVID PAN, Canterbury School, Fort Wayne, Indiana, "A maximum principle and its applications".

As indicated by these project titles, student research covered a wide swath. The judges were impressed by the quality, breadth, and originality of the work, as well as the dedication and enthusiasm shown. Many projects contained original research that one would expect from

graduate students. For the second time in recent history, one of the prize-winning entries was from a team (MAKSIM BEZRUKOV and ALIASKSANDR STADOLNIK, third place). In the mathematics section, there were two entries from fourteen-year-olds, and the youngest Menger finalist was sixteen (YU-FANG HSU, Honorable Mention).

The Society for Science and the Public (http://www.societyforscience.org/), a nonprofit organization based in Washington, DC, owns and has administered the ISEF since 1950, first sponsored by Westinghouse and then, since 1998, by Intel.

The Intel ISEF finals for next year will be held May 11–16, 2014, in Los Angeles, California, at the Los Angeles Convention Center. (See http://www.societyforscience.org/intelisef2014).

The AMS's participation in ISEF is supported in part by income from the Karl Menger Fund, which was established by the family of the late Karl Menger (http://www.ams.org/profession/prizes-awards/ams-awards/menger-award). The income from the donation by the Menger family covers less than the amount of the awards. The balance, including the travel expenses of the judges, comes from the AMS's general fund. 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 telephone 401-455-4103.

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Mathematical Sciences Awards at ISEF

The 2013 Intel International Science and Engineering Fair (ISEF) was held May 12–17, 2013, at the Phoenix Convention Center in Phoenix, Arizona. The Society for Science and the Public, in partnership with the Intel Foundation, selects a Best in Category contestant, who receives a cash award of US$5,000. The student chosen this year in the Mathematical Sciences category was VINAY S. IYENGAR, seventeen, of Oregon Episcopal School, Portland, Oregon, for his project titled "Efficient characteristic 3 Galois field operations for elliptic curve cryptographic applications". Iyengar also received a First Award, which carries a cash prize of US$3,000. He was also chosen as the recipient of a Grand Award from the European Union Contest for Young Scientists, which consists of an all-expenses-paid trip to attend the European Union Contest for Young Scientists. The Oregon Episcopal School was awarded a grant of US$1,000. More award winners and the titles of their projects follow.

First Award (US$3,000): VINAY IYENGAR, seventeen, Oregon Episcopal School, Portland, "Efficient characteristic 3 Galois field operations for elliptic curve cryptographic applications"; KATHERINE L. CORDWELL, seventeen, Manzano High School, Albuquerque, New Mexico, "Lower central series quotients of finitely generated algebras over the integers".

Second Award (US$1,500): SALAHALDEEN I. ABU-ALSHAIKH, sixteen, Jubilee School, Amman, Jordan, "Closed-form volumes of a wide family of astroidal ellipsoids and the hyperbolic octahedron"; AKHIL NISTALA, seventeen, Novi High School, Novi, Michigan, "Matching preclusion and conditional matching preclusion for dual-cubes"; SIMANTA GAUTAM, seventeen, Albemarle High School, Charlottesville, Virginia, "A novel approach to the spherical codes problem"; NIRANJAN BALACHANDAR, sixteen, and NIRALI K. THAKOR, fifteen, Shepton High School, Plano, Texas, "Simulation of protein folding using Monte Carlo methods in a triangular lattice".

Third Award (US$1,000): ASBJORN C. NORDENTOFT, nineteen, Aurehoj Gymnasium, Gentofte, Denmark, "Applications of Dirichlet series"; YU-FANG HSU, sixteen, National Nanke International Experimental High School, Taiwan, Chinese Taipei, "Resolving an open problem related to figurate numbers by Pell equations"; DANIEL M. HANOVER, fifteen, John L. Miller Great Neck North High School, Great Neck, New York, "Kaprekar's constant: A journey to new bases"; ASHWIN P. RAMACHANDRAN, seventeen, Randolph School, Huntsville, Alabama, "A novel mathematical model of cellular apoptosis under the influence of Hsp70"; KEVIN K. LEE, sixteen, University High School, Irvine, California, "Electromechanical modeling of the heart in moving domains using the phase-field method"; ANDRES J. A. COLON, seventeen, and EDWIN S. TORRES-CUEVAS, seventeen, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico, "Study of integrals of parametric functions for Fermat's curve of third degree".

Fourth Award (US$500): RETSELISITSOE E. MONYAKE, seventeen, Harmony High School, Virginia, South Africa, "An alternative proof of the Pappus chain theorem using the method of circle inversion"; HANNAH K. LARSON, eighteen, South Eugene High School, Eugene, Oregon, "Classification of some fusion categories of rank 4"; COLIN C. AITKEN, seventeen, Leland High School, San Jose, California, "Dots and lines: A combinatorial interpretation of the homotopy groups of finite topologies"; SHASHWAT KISHORE, sixteen, Unionville High School, Kennett Square, Pennsylvania, "Analysis of novel clustering algorithms for gene expression patterns"; RISHI S. MIRCHANDANI, sixteen, Fox Chapel Area High School, Pittsburgh, Pennsylvania, "Superadditivity and subadditivity in fair division"; EVAN Z. LIU, seventeen, Albuquerque Academy, Albuquerque, New Mexico, "A mathematical analysis of set variants"; ROHAN B. BANERJEE, sixteen, and ARCHIS R. BHANDARKAR, seventeen, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, "On the stability of lung parenchymal lesions with applications to early pneumothorax diagnosis"; NAYANA R. KORAVATTI, sixteen, and AISHWARYA C. ASHOK, sixteen, Amrita Vidyalayam, Davangere, India, "Dissection of square into 'N' congruent squares".

—From an ISEF announcement