

CPS Plasma Page

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Study of Cosmic Rays Wins CPS Plasma Excellence Award at Intel ISEF

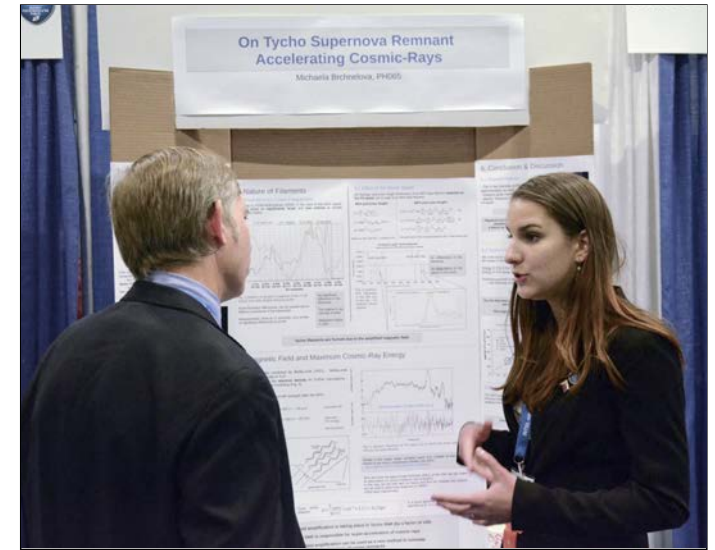
Los Angeles, CA – CPS has awarded their 2014 Excellence in Plasma Physics Award to Michaela Brchnelova, for her study of supernova remnants, structures that result from a star exploding in a supernova. The prize of \$1500 is given each year to what the CPS judges determine to be the best plasma-related presentation at the Intel International Science and Engineering Fair (ISEF).

The annual Intel ISEF (<https://student.societyforscience.org/intel-isef>) is the world's preeminent science and engineering fair, with more than 1700 student participants from over 70 countries. Ms. Brchnelova's project, titled 'On Tycho Supernova Remnant Accelerating Cosmic-Rays,' examined the possibility that supernova remnants might strongly accelerate cosmic rays. Using radio and x-ray data, she showed that remnants of the Tycho supernova have filaments formed by magnetic field amplification, and that these filaments have physical characteristics that can amplify cosmic rays to energies of order 10^{15} electron volts—some 1000 times larger than the energies in the Large

Hadron Collider. Ms Brchnelova attends the High School of Jura Hronca, in Bratislava, Slovakia.

CPS Chair Lee Berry was aided in judging by Prof. Troy Carter and Postdoc Seth Dorfman, both from the Department of Physics and Astronomy at UCLA. These judges were impressed that Brchnelova grounded her research in an article written by a UCLA colleague, and that she was able to present her research and theory convincingly.

Besides winning the CPS prize, Ms. Brchnelova received the Intel First Award of \$3000 in Physics and Astronomy, as well as an all expense paid trip to tour CERN from the European Organization for Nuclear Research – CERN.

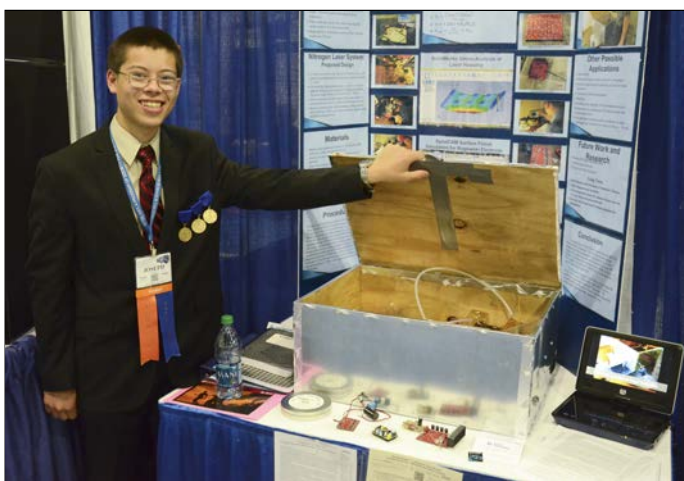


Michaela Brchnelova presents her winning project, *On Tycho Supernova Remnant Accelerating Cosmic-Rays* at Intel ISEF. Photo/Lee Berry

them dealing with novas of one kind or another. Other topics ranged from satellite design to nuclear fusion. The projects below attest to the variety and creativity of the plasma presentations at this year's Intel ISEF.

Solid State Fan: Eliot Lim, Shiyang Yu, Zhong Liang Ou Rang, NUS High School of Mathematics and Science, Singapore
American Intellectual Property Law Association Second Award (\$250); China Association for Science and Technology (\$1200); Intel Engineering: Electrical and Mechanical (\$500)

Cube Satellites: Miniature Satellite Design and Operations for Pulsed Plasma System Applications: Matthew Hileman, The Classical Academy, College Pathways, Colorado Springs, CO
International Council on Systems Engineering First Award (\$1500); Intel Engineering: Electrical and Mechanical Fourth Award (\$500)



Joseph Patrick Lee received an Intel Third Award (Physics and Astronomy) for this project, *The Development of a Novel, Low Cost, High Power, Tunable UV Supercontinuum Laser Source*. Photo/Lee Berry

Ms. Brchnelova is no stranger to the Intel ISEF. In 2013 she received the Pricilla and Bart Bock Second Award of \$500 for a presentation about x-ray measurements of the Tycho supernova, which she continues to study.

The judges reviewed 13 plasma-related presentations, a number of

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*Marianne Konikoff discusses her plasma project, **A Novel Method for Quantitative Spectral Classification of R Coronae Borealis Stars**, with an Intel ISEF Judge. Photo/Lee Berry*

Nova Delphini 2013: A Backyard Analysis of a Classical Nova: Piper Michelle Read, Dripping Springs High School, Dripping Springs, TX
American Association of Physics Teachers and the American Physical Society Second Award (\$800); Intel Physics and Astronomy Fourth Award (\$500)

Velocity Gradients in Relation to Spatial Scales of Star-Forming Dense Cores in the Perseus Molecular Cloud: Luhong Li, John L. Miller Great Neck North High School, Great Neck, NY
Priscilla and Bart Bok First Award (\$1000); Astronomical Society of the Pacific and the American Astronomical Society

The Development of a Novel, Low Cost, High Power, Tunable UV Supercontinuum Laser Source: Joseph Patrick Lee, Saint Peter's Academy, New Market, AL
INTEL Physics and Astronomy Third Award (\$1000)

3D Hydrodynamic Simulation of Classical Nova Explosions: Coleman J. Kendrick, Los Alamos High School, Los Alamos, NM
Priscilla and Bart Bok Second Award (\$500) - Astronomical Society of the Pacific; New American University Provost Scholarship - Arizona State University; Intel Physics and Astronomy Second Award (\$1500)

Achieving Net Gain Nuclear Fusion in Microcapsules of Coupling Sonoluminescence and Magnetic Compression:

Raghum Vamsi Dhara, Mission San Jose High School, Fremont, CA
United Technologies Corporation (\$3000 in UTC common stock)

Nuclear Fusion Using a Pyroelectric Crystal Particle Accelerator: Tucker John Sandbakken, Jason Syndergaard, Maple Mountain High School, Spanish Fork, UT
All expense paid trip to visit CERN laboratory, home of the LHC, at the European Organization for Nuclear Research.

Predicting the Strength of Solar Flares using Sunspot Characteristics: Kayla Ishida, Waimea High School, Waimea, HI.
National Oceanographic and Atmospheric Administration Internship alternate

Model of Soliton Waves: Jan Mazac, Mendelovo Gymnazium Opava, Prispevkova Organizace, Opava, Czech Republic

A Novel Method for Quantitative Spectral Classification of R Coronae Borealis Stars: Marianne Virginia Konikoff, Saint Joseph's Academy, Baton Rouge, LA

The Relationship between Air Properties and the Deflection Experienced by an Electric Arc, Year Two: Isfar Syed Munir, Tracy Joint Union High School, Tracy, CA.

This year more than 1,700 high school students from about 70 countries, regions, and territories displayed their independent research at the Intel ISEF. Photo/Lee Berry

