CPS Plasma Page

Published by the Coalition for Plasma Science, Vol.16., No.1, July 2013

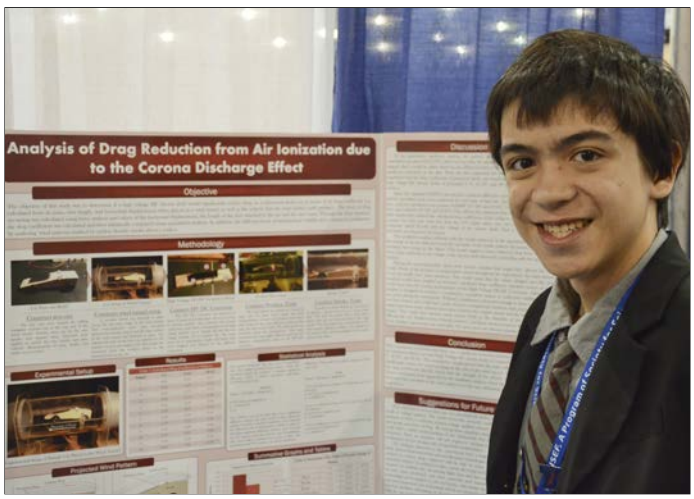
Fusor Team wins CPS Plasma Excellence Award at Intel ISEF

Phoenix, AZ – "It's not getting any easier," CPS Chair Lee Berry acknowledges with a smile. Berry, who has helped to select and present the CPS Award for Excellence in Plasma Physics at the Intel International Science and Engineering Fair since 2005, noted that there are now more eligible projects with increased plasma-related content, and that the quality of the work continues to set new standards. This year three students from Washington state won the admiration of the CPS judges, earning the Plasma Excellence prize of $1500 for their research on a table-top fusion device.

Winners Jake Hecla (Aviation High School, Des Moines), Raymond Maung (Kentwood Senior High School, Covington) and Rian Chandra (Capital High School, Olympia) all belong to the Northwest Nuclear Consortium, a small group of students with a passion for nuclear physics. Hosted by Microsoft IT Program Manager Carl Greninger, the group built a Farnsworth type inertial electrostatic fusion reactor, or "fusor," in his garage in 2011. Hecla, Maung and Chandra decided to examine the reactor's neutron production to see if it is spherically symmetric with reference to the central focus, as expected.

Raymond Maung (left), Jake Hecla and Rian Chandra impressed the CPS judges with their project, ***Anisotropic Emission of Neutrons from a Farnsworth IEC Fusion Reactor.*** *Photo/Lee Berry*

Mounting neutron-sensitive plastic slides and bubble detectors around the fusor, the team discovered that neutron flux was higher at the front and rear of the device, lower on the sides and top. These findings would suggest that some neutrons may be produced outside the central plasma, challenging current assumptions about the way fusors work. Although the team has only begun this investigation, they plan future experiments to test new hypotheses. Besides receiving the CPS award, this team also received the Intel Physics and Astronomy 2nd Award of $1500.



Matthew Ho experimenteted with Pinewood Derby cars for his project ***Analysis of Drag Reduction from Air Ionizatino due to the Corona Discharge Effect.*** *Photo/Lee Berry*

Lee Berry and fellow judge Seth Dorfman, a Post-Doc at UCLA, selected fifteen candidates for the CPS award. One favorite project, from Matthew Ho of High Technology High School in Lincroft, NJ, explored the effect of coronal discharge on the force of drag against pinewood derby cars. Ho placed varying high voltage DC electric fields across features of the cars, placed them in a small wind tunnel, then measured the force of drag with the discharge turned on and off. He hypothesized that a high-voltage DC field would provoke a significant electromotive force on the air particles between the electrodes, reducing the observed drag. He concluded that the coronal discharge had a significant effect on the drag coefficient of an object, and that it could be used to modify the path of air over an object, consequently reducing drag.

A third project, presented by Aric Floyd of Hawken Upper School (Gates Mills, OH) used microplasmas, a unique class of atmospheric-pressure plasmas, to process nanomaterials. It is the first project to synthesize iron oxide nanoparticles using such a medium. The judges were impressed with his hard work and originality. Intel was also impressed, awarding him a Chemistry 4th Award of $500.

The other candidates, listed below, attest to the range and creativity of this year's plasma projects.

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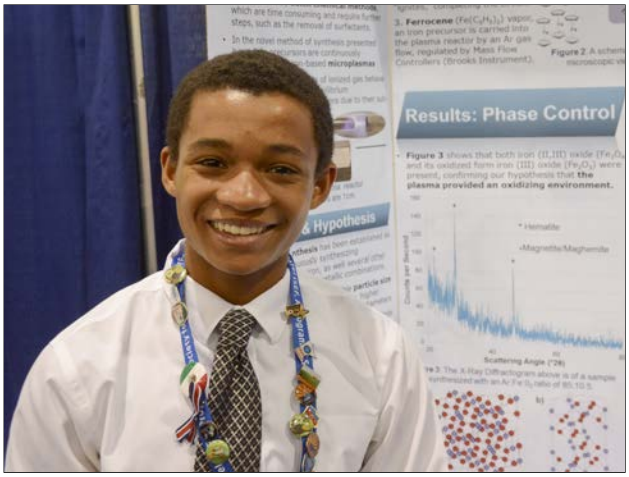

Eric Floyd's project, ***Synthesis of Size- and Phase-Controlled Iron Oxide Nanoparticles via Continuous, Atmospheric Pressure Microplama,*** *demonstrated a unique way to synthesize iron oxide particles. Photo/Lee Berry*

Predicting Earthquakes by Monitoring the Electron Content of the Ionosphere: Nicolas Marone, Aviv Rabinovich, Ort Henri Ronson, Ashqeion, Israel.
American Geosciences Institute 3rd Award ($250); China Association for Science and Technology (CAST) Award ($3000); Sigma Xi, The Scientific Research Society, Honorable Mention.

Stoichiometric Laser-Induced Breakdown Spectroscopy (LIBS) Analysis for Simple and Cost Effective Production of Optical Quality Ceramic Yttrium Aluminum Garnet (YAG): Matthew Chun, Jericho High School, Jericho, NY.
Intel Engineering Materials and Bioengineering 4th Award ($500).

Farnsworth Fusor: Michal Racko, Jozef Lettrich Secondary Grammar School, Martin, Slovakia.
Intel Physics and Astronomy 3rd Award ($1000); United Technologies Corporation Award ($3000 in shares of UTC common stock).

Creating PEAS: Portable Elemental Analysis System – Developing and Implementing a Novel Cold Cathode Source: Jennifer Csele, Notre Dame College School, Welland, Ontario, Canada.
European Organization for Nuclear Research - CERN – (All-expense paid trip to see CERN); Google Thinking Big Award; West Virginia University Renewable Tuition Scholarship Award.

Ablation Resistance and Performance of Metals in Magnetoplasmadynamic Applications: Michael Sherburne, Andres Artze, James W. Robinson Junior Secondary School, Fairfax, VA.
Alcoa Foundation "Using Metals" 3rd Award ($1000)

Apparatus and Analysis Techniques for Miniature Pulsed Plasma Sources: Adam Bowman, Montgomery Bell Academy, Nashville, TN.
Intel Engineering Electrical-Mechanical Award ($500); National Aeronautic and Space Administration 3rd Award ($1000).

Problem Solving Chaos: Dominic Yurk, Robert L. Paschal High School, Fort Worth, TX.
AAPT and APS certificate of honorable mention.

Effects of an Outer Grid on Inertial Electrostatic Confinement Fusion: Jonathan Morrell, Fremont High School, Plain City, UT.

Solar Tsunami: A Study of the Correlation Between Coronal Mass Ejections and Extreme Ultraviolet Waves: Kayla Ishida, Waimea High School, Waimea, HI.

Sunspots: Solar Flare Prediction through Utilization of the Maunder Butterfly Pattern: Kelly Schmidt, Elko High School, Elko, NV.

Experimental Study of the Shape of Plasma Discharge in the Air: Michal Dorko, Sasa Havrillova, Gymnazium svateho Tomasa Akvinskeho, Kosice, Slovakia

Silicon Coating Deposition in Magnetron Discharge on Various Surfaces: Ilya Evseev, Sergei Kurochkin, State Educational Budge Institution Lyceum 1511 at National Research Nuclear University.

Each year more than 1,500 high school students from about 70 countries, regions, and territories display their independent research at the Intel ISEF. Photo/Lee Berry