

**2012 SUMMER RESEARCH PROGRAM FOR HIGH SCHOOL JUNIORS**

**AT THE**

**UNIVERSITY OF ROCHESTER'S**

**LABORATORY FOR LASER ENERGETICS**

**STUDENT RESEARCH REPORTS**

**PROGRAM COORDINATOR**

**Dr. R. Stephen Craxton**

LABORATORY FOR LASER ENERGETICS

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During the summer of 2012, 16 students from Rochester-area high schools participated in the Laboratory for Laser Energetics' Summer High School Research Program. The goal of this program is to excite a group of high school students about careers in the areas of science and technology by exposing them to research in a state-of-the-art environment. Too often, students are exposed to "research" only through classroom laboratories, which have prescribed procedures and predictable results. In LLE's summer program, the students experience many of the trials, tribulations, and

rewards of scientific research. By participating in research in a real environment, the students often become more excited about careers in science and technology. In addition, LLE gains from the contributions of the many highly talented students who are attracted to the program.

The students spent most of their time working on their individual research projects with members of LLE's scientific staff. The projects were related to current research activities at LLE and covered a broad range of areas of interest including experimental concept development and diagnostics modeling, computational modeling of implosion physics, materials science, laser system development and diagnostics, isotope separation, and database development. The students, their high schools, their LLE supervisors, and their project titles are listed in the table. Their written reports are collected in this volume.

The students attended weekly seminars on technical topics associated with LLE's research. Topics this year included laser physics, fusion, holography, nonlinear optics, shape memory polymers, electronic paper, and scientific ethics. The students also received safety training, learned how to give scientific presentations, and were introduced to LLE's resources, especially the computational facilities.

The program culminated on 29 August with the "High School Student Summer Research Symposium," at which the students presented the results of their research to an audience including parents, teachers, and LLE staff. Each student spoke for approximately ten minutes and answered questions. At the symposium the 16th annual William D. Ryan Inspirational Teacher Award was presented to Ms. Sage Miller, a mathematics and computer science teacher at Webster Schroeder and Webster Thomas

High Schools. This award honors a teacher, nominated by alumni of the LLE program, who has inspired outstanding students in the areas of science, mathematics, and technology. Ms. Miller was nominated by Troy Thomas and Avery Gnolek, participants in the 2011 Summer Program.

A total of 297 high school students have participated in the program since it began in 1989. The students this year were selected from over 60 applicants. Each applicant submitted an essay describing their interests in science and technology, a copy of their transcript, and a letter of recommendation from a science or math teacher.

In the past, several participants of this program have gone on to become semifinalists and finalists in the prestigious, nationwide Intel Science Talent Search. This tradition of success continued this year with the selection of Emily Armstrong as one of the 300 semifinalists nationwide in this competition.

LLE plans to continue this program in future years. The program is strictly for students from Rochester-area high schools who have just completed their junior year. Application information is mailed to schools and placed on the LLE website in early February with an application deadline near the middle of March. For more information about the program, please contact Dr. R. Stephen Craxton at LLE.

This program was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

### High School Students and Projects (Summer 2012)

Name	High School	Supervisor	Project Title
Emily Armstrong	Mercy	M. Barczys and B. E. Kruschwitz	Wavefront Measurements of High-Power UV Lasers with a Hartmann Sensor
Virginia Boy	East Rochester	R. W. Kidder	Integrating Semantic Technology with Legacy Databases
Christa Caggiano	Victor	C. Dorrer and K. L. Marshall	Fabrication and Characterization of Radial and Azimuthal Polarization Converters with Photoaligned Liquid Crystals
Ian Gabalski	Webster Thomas	P. B. Radha	Polar Drive Target Designs for Early NIF Experiments
MaryKate Hanchett	Fairport	W. T. Shmayda	Oxygen Uptake Using a Nickel Catalyst
Aaron Jo	Victor	W. T. Shmayda and N. Redden	Hydrogen Isotope Separation Using Gas Chromatography
Alec Kirkley	Pittsford Sutherland	G. Fiksel	Magnetic Field Penetration into a Conducting Hohlraum
Evan Lustick	Canandaigua Academy	R. S. Craxton and M. D. Wittman	Modeling Density Changes Inside a Cryogenic Target Using a Fabry-Perot Interferometer: A Feasibility Study
Aimee Owens	Home School	T. Z. Kosc and S. D. Jacobs	Performance Degradation of OMEGA Liquid Crystal Polarizers
Jesse Pan	Webster Thomas	S. X. Hu	Opacity Effects in Inertial Confinement Fusion Implosions
Mitchell Perry	Brighton	J. Qiao	Deformable Grating Design Optimization for Large-Aperture Pulse Compressor Systems
Raz Rivlis	Brighton	R. Boni	Optical Modeling and Analysis of a High Throughput and High Temporal Resolution Spectrometer
Lucas Shadler	West Irondequoit	W. D. Bittle	Prediction of Getter Bed Regeneration Intervals Through Absolute Humidity and Flow Rate
Julia Tucker	Brighton	R. Epstein	The Dependence of Plasma Ionization Equilibrium on Electron and Radiation Temperatures
Jack Valinsky	Brighton	W. R. Donaldson and D. H. Froula	Electronic Analysis of Pulse Propagation Through an X-Ray Framing Camera
Charles Wan	Penfield	K. L. Marshall	Dynamic Mechanical Analysis of Cryogenic Target Materials