

2013 SUMMER RESEARCH PROGRAM FOR HIGH SCHOOL JUNIORS

AT THE

UNIVERSITY OF ROCHESTER'S

LABORATORY FOR LASER ENERGETICS

STUDENT RESEARCH REPORTS

PROGRAM COORDINATOR

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During the summer of 2013, 15 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 laser physics, computational modeling of implosion physics, experimental diagnostic development, spectroscopy, cryogenic deuterium properties, liquid crystal devices, tritium detection and capture, ballistic deflection transistors, positioning systems, and 3-D virtual modeling. 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, atomic force microscopy, 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 28 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 LLE presented its 17th annual William D. Ryan Inspirational Teacher Award. The recipient this year was Mrs. Eugenie Foster, a mathematics teacher from Brighton High School. 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. Mrs. Foster was nominated by Mitch Perry, Julia Tucker, and Jack Valinsky, participants in the 2012 Summer Program.

A total of 312 high school students have participated in the program since it began in 1989. The students this year were selected from nearly 80 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 Yifan Kong 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-NA0001944.

High school students and projects—Summer 2013.

Name	High School	Supervisor	Project Title
Aaron Appelle	Brighton	R. Sobolewski and Y. Akbas	Drift-to-Ballistic Electron Transport for Operation of Ballistic Deflection Transistors
Alexander Frenett	Allendale Columbia	F. J. Marshall	Integration of X-Ray Microscope Elements to a High-Speed Framing Camera Format
Sara Gnolek	Webster Thomas	W. T. Shmayda	Catalytic Oxidation of Hydrogen in Air Streams
Samuel Goodman	Pittsford Mendon	W. T. Shmayda	Detecting Hydrogen in Helium Streams
Michael Hartman	Pittsford Sutherland	R. W. Kidder	Emulating Laser Facility Operations Through a Real-Time Collaborative Network
Eric Hwang	Penfield	R. Boni and W. R. Donaldson	The Development and Testing of a Signal Processing Algorithm to Improve OMEGA Beam Timing
Katherine James	Honeoye Falls-Lima	K. L. Marshall	Rewritable Photoalignment of Liquid Crystals as a Route to High-Laser-Damage-Threshold Active Beam Shapers
John Jamieson	Allendale Columbia	M. J. Guardalben	Modeling the Effects of Deformable Mirror Location in the OMEGA EP Pulse Compression System
Yifan Kong	Webster Schroeder	R. S. Craxton	Beam-Pointing Optimization for Proton Backlighting on the NIF
Nathaniel Rogalskyj	McQuaid	G. Brent and D. Lonobile	A Radiation and Cryogenic Tolerant Encoder
Ben Saltzman	Brighton	P. M. Nilson	Determining Plasma Temperature Using K-Line Shifts in Rapidly Heated Matter
Adeeb Sheikh	Pittsford Sutherland	R. Epstein	Controlling Laser Beam Speckle with Optimized Illumination of Zooming Phase Plates
Logan Toops	Webster Thomas	R. Sobolewski and Y. Akbas	Modeling and Controlling Electron Movement in a Ballistic Deflection Transistor
Erin Wang	Brighton	D. R. Harding	Thermodynamics of the Solid-Liquid Phase Boundary of Deuterium
Cameron Ziegler	Canandaigua Academy	S.-W. Bahk	Alignment of an Offner Triplet Radial Group Delay Compensator