

2014 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

University of Rochester

250 East River Road

Rochester, NY 14623-1299

During the summer of 2014, 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 laser physics, computational modeling of implosion physics, radiation physics, experimental diagnostic development, cryogenic targets, theoretical and experimental chemistry, tritium capture, electronics, image display, 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 attosecond science. 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 27 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 18th annual William D. Ryan Inspirational Teacher Award. The recipient this year was Dr. Jeffrey Lawlis, Chair of the Science Department at Allendale Columbia 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. Dr. Lawlis was nominated by Alex Frenett, a participant in the 2013 Summer Program.

A total of 328 high school students have participated in the program since it began in 1989. The students this year were selected from nearly 70 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.

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.

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High School Students and Projects (Summer 2014)

Name	High School	Supervisor	Project Title
Ryan Dens	Allendale Columbia	D. W. Jacobs-Perkins	Display of Scientific Image Sources with Mobile Devices
Pranav Devarakonda	Brighton	R. Epstein	The Use of Rosseland- and Planck-Averaged Opacities in Multigroup Radiation Diffusion
William Franceschi	Victor	B. E. Kruschwitz and A. Kalb	Optimization of Wavefront Control Using a High-Resolution Wavefront Sensor
Emma Garcia	Penfield	R. S. Craxton	Optimization of Uniformity for Current Polar Drive Implosion Experiments on the National Ignition Facility
Jack Gumina	Harley	K. L. Marshall	Next-Generation Polymers for High Power UV Replicated Optics
Krishna Patel	Webster Schroeder	W. T. Shmayda	Capturing Hydrogen on Chilled Molecular Sieve
Sophia Rogalskyj	Mercy	W. T. Shmayda	Water Collection on a Platinum-Coated Molecular Sieve
Liam Smith	Webster Schroeder	R. W. Kidder	Evaluation of a Collaborative Networking Environment for Experimental Configurations
Jeremy Weed	Victor	D. Hassett, R. Peck, and D. Axman	Creating an Open Source LLE-Based Ethernet to LonTalk Adapter
Felix Weilacher	Penfield	P. B. Radha	Optimizing Beam Profiles for Polar Drive Implosions on the National Ignition Facility
Kyle Xiao	Webster Schroeder	K. L. Marshall	Computational Modeling of Azobenzenes for Optically Addressable Liquid Crystal Alignment
Nathan Xu	Pittsford Sutherland	S. X. Hu	Effects of Alpha Particle Stopping-Power Models on Inertial Confinement Fusion Implosions
Christopher Ye	Webster Schroeder	J. A. Delettrez	Limits on the Level of Fast Electron Preheat in Direct-Drive Ignition Designs
Robin Zhang	Webster Schroeder	C. Kingsley	Statistical Investigation of Cryogenic Target Defects
Roger Zhang	Webster Schroeder	R. S. Craxton	Polar-Driven X-Ray Backlighter Targets for the National Ignition Facility
Junhong Sam Zhou	Victor	C. Stoeckl	Analyzing the Sensitivity of a Hard X-Ray Detector Using Monte Carlo Methods