

2010 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 2010, 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 diagnostic development, computational modeling of implosion physics, opacity data for hydrodynamic simulations, laser physics, experimental and theoretical chemistry, materials science, cryogenic target characterization, target positioning and viewing systems, 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, atomic force microscopy, electrostatics, and electronic paper. 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 25 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 14th annual William D. Ryan Inspirational Teacher Award was presented to Mr. Brad Allen, a

physics teacher at 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. Mr. Allen was nominated by Leela Chockalingam, Aaron Van Dyne, and Harvest Zhang, participants in the 2009 Summer Program.

A total of 265 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 Barry Xu 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 end 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 2010)			
Name	High School	Supervisor	Project Title
James Baase	Victor	G. Brent, D. J. Lonobile	Optimizing the Movement of a Precision Piezoelectric Target Positioner
Andrew Chun	Brighton	F. J. Marshall	X-Ray Imaging with Compact Kirkpatrick-Baez Microscopes
Robert Cooper	Allendale-Columbia	R. W. Kidder	Designing and Implementing an Ontology for LLE Experimental Diagnostics
Luke Coy	Greece Arcadia	R. S. Craxton, R. Rombaut	A Graphical User Interface for User Generated Opacity Files
Kyra Horne	Fairport	M. J. Guardalben	Reducing UV Near-Field Beam Modulation on OMEGA EP by Angularly Detuning the Frequency Conversion Crystals
Karin Hsieh	Webster Schroeder	W. T. Shmayda	Modeling Tritiated Water Desorption from Stainless Steel
Connie Jiang	Brighton	D. W. Jacobs-Perkins, R. Huff	Testing and Installation of the Reticule Projector on OMEGA's Target Viewing System
George Liu	Pittsford Sutherland	R. Epstein	Imploded Shell Parameter Estimation Based on Radiograph Analysis
Thomas Mo	Webster Schroeder	R. S. Craxton	X-Ray Backlighting of Shock Ignition Experiments on the National Ignition Facility
Eric Pan	Webster Thomas	T. B. Jones	Using Surface Evolver to Model the Behavior of Liquid Deuterium
Ryan Shea	Fairport	W. T. Shmayda	Tritium Desorption from Stainless Steel Surfaces at Variable Temperatures
Laura Tucker	Brighton	R. S. Craxton	A Design for a Shock Ignition Experiment on the NIF Including 3-D Effects
Katherine Wegman	Pittsford Mendon	K. L. Marshall	Liquid Crystal Beam Shaping Devices Incorporating Coumarin-Based Photoalignment Layers
Francis White	McQuaid	D. H. Edgell, M. D. Wittman	Determination and Correction of Optical Distortion in Cryogenic Target Characterization
Barry Xu	Brighton	S. X. Hu	Electron-Ion Temperature Relaxation Models for Inertial Confinement Fusion
Andrew Yu	Pittsford Sutherland	K. L. Marshall	Modeling Absorption Spectra of Optically Switchable Azobenzenes