

2004 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

March 2005

Laboratory Report 337

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University of Rochester

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During the summer of 2004, 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 optics modeling, analysis of OMEGA implosion experiments, hydrodynamics modeling, cryogenic target characterization, liquid crystal physics and chemistry, materials science, the development and control of laser fusion diagnostics, and OMEGA EP laser system design and engineering. 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, holographic optics, fiber optics, femtosecond lasers and their applications, computer-controlled optics manufacturing, and global warming. 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 William D. Ryan Inspirational Teacher award was presented to Mr. Claude Meyers, a former physics

teacher at Greece Arcadia High School. This annual 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. Meyers was nominated by David Bowen, a participant in the 2001 Summer Program.

A total of 176 high school students have participated in the program since it began in 1989. The students this year were selected from approximately 50 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 two students (Bruce Brewington and Jeremy Chang) as among the 300 semifinalists nationwide in this competition. Brewington was selected as a finalist in the Talent Search—an honor bestowed upon only 40 of the nearly 1600 participating students.

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. Applications are generally mailed out in early February with an application deadline near the end of March. Applications can also be obtained from the LLE website. 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-FC52-92SF19460.

High School Students and Projects (Summer 2004)

Name	High School	Supervisor	Project Title
Daniel Balonek	Byron-Bergen HS	D. Jacobs-Perkins	An Optical Measurement System for Characterizing Cryogenic Fusion Targets
Gregory Balonek	Byron-Bergen HS	S. Craxton	How Good is the Bright Ring Characterization for Uniformity of Deuterium Ice Layers within Cryogenic Nuclear Fusion Targets?
Robert Balonek	Byron-Bergen HS	D. Lonobile	Design and Fabrication of a Handheld Optically Coupled Water Flow Calibrator
Bruce Brewington	Fairport HS	S. Craxton	3-D Characterization of Deuterium Ice-Layer Imperfections in Cryogenic Inertial Confinement Fusion Targets
Daniel Butler	Brighton HS	R. Boni	Automated Focusing of the ROSS Streak Tube Electron Optics
Jeremy Chang	Penfield HS	M. Guardalben	Grated Compressor Modeling
Joseph Dudek	Honeoye Falls-Lima HS	C. Stoeckl	Hexapod Motion Through Remote Computer Activation
Laurie Graham	Bloomfield HS	S. Regan	Experimental Investigation of Far Fields on OMEGA
Jivan Kurinec	Rush-Henrietta HS	M. Bonino/ D. Harding	Mechanical Properties of Spider Silk at Cryogenic Temperatures
Jonathan Kyle	Gates-Chili HS	J. DePatie	Operational Specifications for the Two-State Motor Controller
Ted Lambropoulos	Pittsford-Mendon HS	J. Marozas	Optimal Pinhole Loading via Beam Apodization
Yekaterina Merkulova	Penfield HS	J. Delettrez	Spatial Distribution of the Reflected Laser Light at the Experimental Chamber Wall
Arun Thakar	Pittsford-Mendon HS	R. Epstein	Numerically Calculated Spherical Rayleigh–Taylor Growth Rates
Glen Wagner	Fairport HS	T. Kosci/ K. Marshall	Computer Modeling of Polymer Cholesteric Liquid Crystal Flake Reorientation
Tina Wang	Webster-Schroeder HS	V. Smalyuk	Modeling of X-Ray Emission in Spherical Implosions on OMEGA
Ariel White	East Irondequoit-Eastridge	K. Marshall	Photopatterning of Liquid Crystal Alignment Cells