

2005 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 2005, 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 computational hydrodynamics modeling, cryogenic target fabrication and characterization, liquid crystal 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, and femtosecond lasers and their applications. 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 24 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. Stephen Locke, a chemistry teacher at Byron-Bergen 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. Locke had the rare distinction of receiving his nomination from a whole family—Christine Balonek (2002) and her brothers Gregory, Robert, and Daniel (2004).

A total of 191 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 (Frank Fan and Lauren Weiss) as among 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. 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.

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High School Students and Projects (Summer 2005)			
Name	High School	Supervisor	Project Title
Mary Brummond	Honeoye Falls-Lima	M. J. Guardalben	Correcting Pulse-Front Errors in the OMEGA EP Pulse Compressor
Philip Chang	Pittsford Sutherland	K. L. Marshall	Application of Computational Chemistry Methods to the Prediction of Electronic Structure in Nickel Dithiolene Complexes
Brandon Corbett	Allendale Columbia	T.J.B. Collins/ P. B. Radha	Maximization of Inertial Confinement Fusion Yields Through Laser Pulse Optimization
Adam DeJager	Greece Odyssey	S. F. B. Morse/ R. Kidder	Optical Time Domain Reflectometry for the OMEGA EP Laser
Frank Fan	Webster Schroeder	R. S. Craxton	Investigation of the Effect of a Plastic Ring on the Uniformity of Ice Layers in Cryogenic Inertial Confinement Fusion Targets
Alex Grammar	Brighton	R. Boni/ P. A. Jannimagi	Relative Quantum Efficiency Measurements of the ROSS Streak Camera Photocathode
Stewart Laird	Harley School	J. P. Knauer	Characterization of a High-Energy X-Ray Compound Refractive Lens
Brian MacPherson	Penfield	R. Epstein	Dynamic Energy Grouping in Multigroup Radiation Transport Calculations
Karyn Muir	Honeoye Falls-Lima	J. C. Lambropoulos	Micromechanics and Microstructure of WC Hard Metals
Brian Pan	Penfield	W. Seka	Improving the Illumination Uniformity of a Cryogenic Target with a Layering Sphere
Nicholas Ramos	Palmyra-Macedon	S. Mott/ D. J. Lonobile	X-Ray Framing Camera Characterization Automation
Valerie Rapson	Greece Olympia	K. L. Marshall	Contaminant Resistant Sol-Gel Coatings
Martin Wegman	McQuaid	W. R. Donaldson	Superconducting Electronics for the ICF Environment
Lauren Weiss	Brighton	L. M. Elasky	Categorization and Analysis of Defects in Cryogenic Laser Fusion Targets
Rosie Wu	Brighton	D. H. Edgell	Analysis of Inner Ice Surface Perturbations Using Bright Ring Characterization