2006 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 2006, 13 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, materials science, laser-fusion diagnostic development, fiber optics, database development, computational chemistry, and the computational modeling of electron, neutron, and radiation transport. 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, liquid crystals, atomic force microscopy, and the physics of music. 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 30 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. Thomas Lewis, a former earth science teacher (currently retired) 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. Lewis was nominated by Benjamin L. Schmitt, a participant in the 2003 Summer Program, with a letter co-signed by 13 other students.

A total of 204 high school students have participated in the program since it began in 1989. The students this year were selected from approximately 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 three students (Alexandra Cok, Zuzana Culakova, and Rui Wang) as among the 300 semifinalists nationwide in this competition. Wang was selected as a finalist—an honor bestowed upon only 40 of the 1700 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 2006)			
Name	**High School**	**Supervisor**	**Project Title**
Deshpreet Bedi	Brighton	F. Marshall	X-Ray Diffraction Measurements of Laser-Generated Plasmas
Ryan Burakowski	Churchville-Chili	T. Kosc	PCLC Flakes for OMEGA Laser Applications
Alexandra Cok	Allendale Columbia	S. Craxton	Development of Polar Direct Drive Designs for Initial NIF Targets
Zuzana Culakova	Brighton	K. Marshall	Improved Laser Damage Resistance of Multi-Layer Diffraction Gratings Vapor-Treated with Organosilanes
Eric Dobson	Harley	J. Delettrez	Modeling Collisional Blooming and Straggling of the Electron Beam in the Fast-Ignition Scenario
Elizabeth Gregg	Naples Central	S. Mott/J. Zuegel	Fiber Optic Splice Optimization
Daniel Gresh	Wheatland-Chili	R. Kidder	Implementing a Knowledge Database for Scientific Control Systems
Matt Heavner	Fairport	C. Stoeckl	Realtime Focal Spot Characterization
Sean Lourette	Fairport	C. Stoeckl	Neutron Transport Calculations Using Monte-Carlo Methods
Ben Matthews	York Central	D. Lonobile/ G. Brent	Precision Flash Lamp Current Measurement—Thermal Sensitivity and Analytic Compensation Techniques
Ryan Menezes	Webster Schroeder	D. Harding	Evaluation of Confocal Microscopy for Measurement of the Roughness of Deuterium Ice
Rui Wang	Fairport	K. Marshall	Computational Modeling of Spectral Properties of Nickel Dithiolene Dyes
Nicholas Whiting	Bloomfield	R. Epstein	Dynamic Energy Grouping in Multigroup Radiation Transport Calculations