

2002 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 2002, 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 laser optics modeling, analysis of OMEGA implosion experiments, hydrodynamics modeling, cryogenic target physics and characterization, liquid crystal chemistry, thin-film deposition, and the development and control of laser fusion diagnostics. 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 lasers, fusion, holographic optics, hydrodynamic instability, laboratory astrophysics, computer-controlled optics manufacturing, and microcontrollers 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 28 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. James Keefer, a physics and

chemistry teacher at Brockport 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. Keefer was nominated by Priya Rajasethupathy, a participant in the 2000 Summer Program.

A total of 145 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 year, the program was particularly productive, resulting in the selection of three students (Siddhartha Ghosh, Phoebe Rounds, and Joy Yuan) as among the 300 semifinalists nationwide in this competition. Rounds 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. For more information about the program or an application form, 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-FC03-92SF19460.

High School Students and Projects (Summer 2002)

Name	High School	Supervisor	Brief Project Title
Megan Alexander	Honeoye Falls–Lima	J. Zuegel/W. Seka	Picket Pulse Shaping with Phase and Amplitude Modulation in the Frequency Domain
Stefan Astheimer	Honeoye Falls–Lima	P. B. Radha	Estimation of Magnetic Fields in Direct-Drive Implosions
Christine Balonek	Byron–Bergen	K. Marshall	Improvement of Self-Organization and Selective Reflection Quality in Lyotropic Crystalline Polysaccharide Films
David Dingeldine	Churchville–Chili	J. Knauer	Plasma Energy Measurement with an Open-Cell Metal Foam
Sonya Dumanis	Harley School	V. Smalyuk	
Sid Ghosh	Pittsford–Mendon	P. Jaanimagi	Secondary Electrons from X-Ray Photocathodes
Kyle Gibney	Livonia	C. Stoeckl	Computer-Controlled Neutron Diagnostics
Sharon Jin	Victor	S. Craxton	A Ray-Tracing Model for Cryogenic Target Uniformity Characterization
Jue Liao	Brighton	R. Epstein	Rayleigh–Taylor Growth Rates for Arbitrary Density Profiles Calculated with a Variational Method
Christopher Moody	Spencerport	D. Harding	Characterization of the Absorption Spectrum of Deuterium for Infrared Wavelengths
Phoebe Rounds	Irondequoit	S. Craxton	Multiple-Tripler Broad-Bandwidth Frequency Conversion for Laser Fusion
Micah Sanders	Pittsford–Mendon	N. Bassett	Thin Film Characterization of Al ₂ O ₃ Utilizing Reactive Pulsed dc Magnetron Sputtering
Gurshawn Singh	Rush–Henrietta	J. Marozas	2-D Pulsed Laser Beam Modeling Using PROP
Archana Venkataraman	Brighton	F. Marshall	Characterization of Multilayer Diffractors for Framed Monochromatic Imaging
Joy Yuan	Pittsford–Mendon	M. Guardalben	Noncollinear Phase Matching in Optical Parametric Chirped-Pulse Amplification