

2003 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 2003, 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, laser-beam alignment, analysis of OMEGA implosion experiments, plasma physics modeling, cryogenic target physics, liquid crystal chemistry, molecular modeling, 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, atomic force microscopy, experimental error analysis, 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 27 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. Michael Carges, a former physics

teacher at Pittsford-Mendon High School and currently at Greece Athena 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. Carges was nominated by Joy Yuan and Siddhartha Ghosh, participants in the 2002 Summer Program.

A total of 160 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 year, the program was particularly productive, resulting in the selection of three students (Rohan Kekre, Nadine Lippa, and Anthony Noto) 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. For more information about the program or an application form, please contact Dr. R. Stephen Craxton at LLE.

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High School Students and Projects (Summer 2003)

| Name | High School | Supervisor | Project Title |
|--------------------|---------------------------|----------------------------|--|
| Christine Beaty | Livonia High School | C. Stoeckl | Controlling Scientific Instruments Using JAVA on LINUX |
| Ryan Blair | Canandaigua Academy | R. Boni/ M. Millechia | Characterization of the OMEGA Sixty-Channel UV Spectrometer |
| George Dahl | Allendale Columbia | M. Guardalben | Pulse-Shaping Effects in Optical Parametric Amplifications |
| Margot Epstein | Sodus Central High School | W. Bittle/ J. Depatie | Automated Laser-Beam Steering |
| Wen-fai Fong | Pittsford Sutherland | R. Epstein | Non-LTE Effects on the Speed of Sound in Plasmas |
| Christopher Forbes | Eastridge Senior High | P. Jaanimagi | Energy and Angular Distributions of Secondary Electrons Under High Electric Field |
| Nathaniel Gindele | Brighton High School | J. Knauer | Analyzing an Array of Diamond Photodetector Detectors |
| Rohan Kekre | McQuaid Jesuit | S. Craxton | Tuning Multiple Triplers Using a UV Spectrometer |
| Kathryn Knowles | Churchville-Chili | J. Delettrez | Analysis of Silicon Emission in Rayleigh–Taylor Unstable Imploded Layered Targets |
| Nadine Lippa | Byron-Bergen | A. Schmid/ S. Lukishova | Single Dye Molecule Fluorescence in Liquid Crystal Hosts |
| Anthony Noto | Greece Athena | K. Marshall | Development of Weighted Chirality Indices: Their Use in Modeling Nickel Dithiolene Systems |
| Benjamin Schmitt | Greece Arcadia | F. Marshall | X-Ray Microscope Mirror Characterization |
| Nicole Toscano | Greece Arcadia | V. Smalyuk | Compressed Core Characterization of a Cryogenic D ₂ Target at Peak Neutron Production |
| Cam Tran | Wilson Magnet | K. Marshall | Photochemically Induced Alignment of Liquid Crystals on a Polymer Surface |
| Michael Wozniak | Greece Athena | D. Harding/ S. Craxton | The Effect of Nonuniform Illumination on the Shape of Deuterium Ice Layers |