

2015 SUMMER RESEARCH PROGRAM FOR HIGH SCHOOL JUNIORS

AT THE

UNIVERSITY OF ROCHESTER'S

LABORATORY FOR LASER ENERGETICS

STUDENT RESEARCH REPORTS

PROGRAM DIRECTOR

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During the summer of 2015, 12 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 physics, computational modeling of implosion physics, experimental diagnostics development, liquid crystal chemistry, ultra-intense laser-matter interactions, optical design, tritium capture and storage, and interactive data analysis. 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. By working through several iterations of their project reports, incorporating feedback from their supervisors and the Program Director, the students experience most of the steps involved in preparing a scientific paper for publication.

The students attended weekly seminars on technical topics associated with LLE's research. Topics this year included laser physics, fusion, holography, nonlinear optics, atomic force microscopy, scientific ethics, and attosecond science. 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 26 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 LLE presented its 19th annual William D. Ryan Inspirational Teacher Award. The recipient this year was Mr. Rod Engels, a physics teacher at

Victor Senior High School. This 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. Engels was nominated by William Franceschi and Junhong Sam Zhou, participants in the 2014 Summer Program.

A total of 340 high school students have participated in the program since it began in 1989. The students this year were selected from nearly 70 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. From this year's program, Ishir Seth qualified to attend the Intel Science and Engineering Fair, where he won an award in the Physics and Astronomy category.

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. Application information is mailed to schools and placed on the LLE website in early February with an application deadline near the middle of March. For more information about the program, please contact Dr. R. Stephen Craxton at LLE.

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High School Students and Projects (Summer 2015)

Name	High School	Supervisor	Project Title
James Bonadonna	Honeoye Falls–Lima	K. L. Marshall	Next Generation Liquid Crystal Mixtures for OMEGA Circular Polarizer/Isolator Devices
Christopher Bosso	Penfield	P. B. Radha	Optimizing Picket-Pulse-Shape Polar-Drive Implosion Designs on the National Ignition Facility
Gabriel Evans	McQuaid	W. T. Shmayda	Measuring the Hydrogen Pressure over Palladium Hydride
Ryan Gao	Brighton	M. Barczys	Modeling Damage Propagation on the OMEGA EP Laser
Phoebe Huang	Webster Schroeder	R. S. Craxton	Analysis of Unabsorbed Light from Exploding-Pusher Targets Used for Proton Backlighting on the National Ignition Facility
Jake Kinney	Pittsford Sutherland	R. S. Craxton	Optimization of Backlighter Targets Using a Saturn Ring on the National Ignition Facility
Nathan Knauf	Harley	R. W. Kidder	A Web-Based Interface for Collaborative Multi-User Data Analysis in a Scientific Research Environment
Peter Mizes	Pittsford Sutherland	T. Z. Kosc	Modeling OMEGA Polarization
Eileen Norris	Brighton	S.-W. Bahk	Design of an Imaging Telescope with Variable Magnification and Imaging Distance
Alexander Proschel	Pittsford Sutherland	W. T. Shmayda	Isotopic Exchange over a Platinized Molecular Sieve
Ishir Seth	Brighton	J. P. Knauer	Analysis of CVD Diamonds for Neutron Detection on OMEGA
Xilin Zhou	Webster Schroeder	S. X. Hu	Radiation Reaction of Electrons at Laser Intensities up to 10^{25} W/cm ²