

**2017 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 2017, 11 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 diagnostic development, laser system diagnostics, physical chemistry, cryogenic target characterization, and web-based 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, laser focusing, and pulsed power. 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 LLE presented its 21st annual William D. Ryan Inspirational Teacher Award. The recipient this year was Mrs. Lois Houlihan, a chemistry teacher at Pittsford Mendon 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. Mrs. Houlihan was nominated by Sapna Ramesh, a participant in the 2016 Summer Program.

A total of 364 high school students have participated in the program from its inception in 1989 through 2017. The students in 2017 were selected from approximately 60 applicants. Each applicant submitted an essay describing his or her interests in science and technology, a copy of his or her 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 scholars (formerly known as “semifinalists”) and finalists in the prestigious Regeneron (formerly Intel) Science Talent Search. This tradition of success continued this year with the selection of Nikhil Bose and Yujia Yang as two of the 300 Regeneron Scholars chosen from over 1800 applicants nationwide.

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 web site 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.

This program was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-NA0001944.

Table I: High School Students and Projects—Summer 2017.

Name	High School	Supervisor	Project Title
Viknesh Baskar	Webster Schroeder	J. P. Knauer and C. J. Forrest	Ion Temperature Analysis of Neutron Time-of-Flight Data
Nikhil Bose	Pittsford Sutherland	M. J. Guardalben	Compensation for Self-Focusing on the OMEGA EP Laser by Use of Frequency Conversion
Benjamin Chabak	Byron Bergen	J. P. Knauer and C. J. Forrest	Design and Analysis of Cherenkov Radiation Detectors
Meshach Cornelius	Gates Chili	T. Walker and G. Brent	Characterization and Detection of the Deteriorization of Electrical Connectors in a Flash-Lamp System
Griffin Cross	Pittsford Sutherland	W. T. Shmayda	Study of the Hydrogen Palladium System
Matthew Galan	Fairport	R. W. Kidder	Data Services for Scientific Analysis on OMEGA and OMEGA EP
Claire Guo	Penfield	A. Bose and R. Epstein	Analysis of Hot Spot Asymmetries Using Synthetic X-Ray Images
Joyce Luo	Pittsford Mendon	K. L. Marshall	Ambient-Temperature Ammonia Removal Process for Sol-Gel Anti-Reflective Coating Solutions
Jonathan Moore	Pittsford Sutherland	M. D. Wittman and A. Kalb	Predetermination of DT Fuel Mass in Cryogenic Target Capsules from Any Viewing Angle
Arian Nadjimzadah	Brighton	W. T. Shmayda	Modifying Stainless Steel Surfaces by Electropolishing
Yujia Yang	Brighton	R. S. Craxton	Improving the Uniformity of <i>Revolver</i> Designs for the National Ignition Facility