LLE's Summer High School Research Program

During the summer of 2018, 13 students from Rochester-area high schools participated in the Laboratory for Laser Energetics' Summer High School Research Program. This marks the 30th year of the program, which started in 1989. The goal of the 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 technical staff. The projects were related to current research activities at LLE and covered a broad range of areas of interest including computer modeling of implosion physics, experimental diagnostic modeling, cryogenic target characterization, physical chemistry, computational chemistry, laser beam modeling, laser flash-lamp diagnostics, web-based data analysis, and the adaptation of a technique developed to visualize laser damage to high-school life-science education (see Table 156.IV).

The students attended weekly seminars on technical topics associated with LLE's research. Topics this year included laser physics, fusion, holography, nonlinear optics, the National Ignition Facility, scientific measurement techniques, 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 29 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. The students' written reports will be made available on the LLE Website and bound into a permanent record of their work that can be cited in scientific publications.

Three hundred and seventy-seven high school students have now participated in the program. This year's students were selected from approximately 50 applicants.

At the symposium LLE presented its 22nd annual William D. Ryan Inspirational Teacher Award to Mrs. Jennifer Vibber, a mathematics teacher at Penfield High School. This award is presented to a teacher who motivated one of the participants in LLE's Summer High School Research Program to study science, mathematics, or technology and includes a $1000 cash prize. Teachers are nominated by alumni of the summer program. Mrs. Vibber was nominated by Claire Guo, a participant in the 2017 program. Claire wrote, "Mrs. Vibber is not the standard, everyday math teacher," citing her "Out of the Classroom Learning" method, in which she filmed 10- to 20-min videos of herself discussing and filling in notes for the lesson of the day. In class, Mrs. Vibber answered questions about the video and helped implement the concepts into practice problems. Claire found that this teaching method reduced stress and inspired her to learn more about math. She added, "Mrs. Vibber lent a hand to all of her students in class, during her free periods, and after school. Not only did she go over lessons and worksheets, but she also offered multiple quiz and test retakes to ensure that every student understood the material. Every time I visited Mrs. Vibber outside of class…I always walked in knowing that she would be patient, understanding, and thorough in answering my questions… Mrs. Vibber took out the frustrating and confusing aspects of mathematics, which allowed me to successfully implement concepts learned in math class into physics, chemistry, and engineering classes." Claire was "incredibly inspired by Mrs. Vibber's passion for mathematics. From her unending love for logarithms, to her genius math and calculus jokes on worksheets…Mrs. Vibber makes being a stressed high schooler taking college-level mathematics fun and enjoyable. As the head coach of the Penfield Math League team,

Mrs. Vibber made every competition memorable." Claire valued Mrs. Vibber's support beyond her math classes. Referring to painful circumstances that have occurred in Penfield High School over the years, she wrote, "Mrs. Vibber has been a source of strength for all students and has taken action to spread positivity and love in our school."

Table 156.IV: High School Students and Projects—Summer 2018.

Name	High School	Supervisor	Project Title
Aditya Bhargava	Victor	M. J. Guardalben	Measurement Accuracy of the Harmonic Energy Diagnostic on OMEGA EP
Steven Booth	Brighton	W. A. Bittle and V. Anand	Current Characteristics of Pulse-Forming Networks Driving High-Energy Flash Lamps
Carwyn Collinsworth	Brighton	M. D. Wittman and D. H. Edgell	Real-Time X-Ray Analysis of Liquid-DT Fill Level in Fill-Tube Capsules to Control Final Solid-Layer Thickness
Matthew Cufari	Pittsford Sutherland	P. B. Radha and O. M. Mannion	Modeling Charged-Particle Spectra to Diagnose Asymmetries in OMEGA Implosions
Audrey DeVault	Penfield	C. J. Forrest	Evaluation of Neutron Time-of-Flight Spectra from Deuterium–Deuterium Fusing Plasmas in Inertial Confinement Fusion on OMEGA
Katherine Glance	Pittsford Sutherland	W. T. Shmayda and M. Sharpe	Investigations of the Hydrogen-Palladium and Deuterium-Palladium Systems
Katherine Kopp	Victor	S. G. Demos	Microscopy with Ultraviolet Surface Excitation in Life Science Education
Hannah Lang	Rush Henrietta	K. L. Marshall	Computational Chemistry Modeling of Photoswitchable Liquid Crystal Alignment Materials
Maia Raynor	Brighton	W. T. Shmayda and C. Fagan	Oxidation of Hydrogen over Copper Zinc Alloy
Margaret Rudnick	Pittsford Mendon	K. L. Marshall	Protective Polymer Coatings for Laser Optics
Aidan Sciortino	Wilson Magnet	R. W. Kidder	A Containerized Approach for Data Analysis on Omega
Anirudh Sharma	Webster Schroeder	R. S. Craxton	Optimization of Cone-in-Shell Targets for an X-Ray Backlighter on the National Ignition Facility
Alan Tu	Pittsford Sutherland	A. B. Sefkow	Complex Ray Tracing and Cross-Beam Energy Transfer for Laser-Plasma Simulations