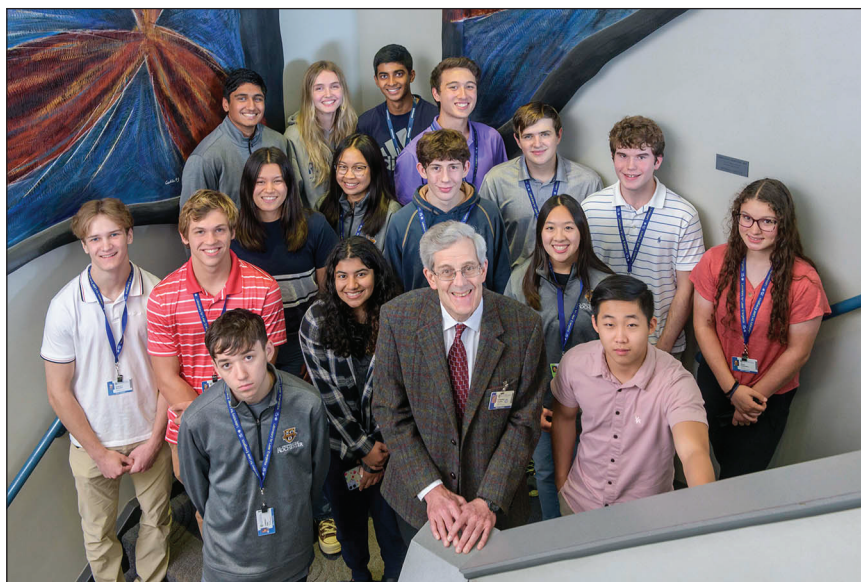


LLE's Summer High School Research Program

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During the summer of 2022, 16 students from Rochester-area high schools participated in the Laboratory for Laser Energetics' Summer High School Research Program (Fig. 1). This was the 33rd year of the program, which started in 1989. The 2020 program was unfortunately canceled because of the pandemic. In 2021, LLE held a fully virtual program for students who had applied and been interviewed for the 2020 program, and in 2022 LLE was able to return to a normal, in-person program.



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Figure 1

Front Row: Cameron Ryan, Alisha Upal, Dr. Stephen Craxton, Grace Wu, Rick Zhou; Middle Row: Jackson McCarten, John Giess, Elizabeth Norris, Jenny Zhao, Samuel Gray, David Villani, Jayden Roberts, Olivia Fietkiewicz; Back Row: Arjun Patel, Sara Davies, Vinay Pendri, and Micah Kim.

The goal of LLE's program is to excite a group of highly motivated 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 experimental

diagnostic development, computer modeling of implosion physics, physical and computational chemistry, laser physics, optical engineering, terahertz radiation, future laser system design, and scientific data management (see Table I).

The students attended weekly seminars on technical topics associated with LLE's research. Topics this year included laser physics, fusion, nonlinear optics, fission energy, pulsed power, fiber optics, and LLE's cryogenic target program. The students also received safety training, learned how to give scientific presentations, and were introduced to LLE's computational resources.

Table I: High School Students and Projects—Summer 2022.

Name	High School	Supervisor	Project Title
Sara Davies	Pittsford Sutherland	R. S. Craxton	Direct-Drive Uniformity Calculations for a Future High-Gain Laser Facility
Olivia Fietkiewicz	Mercy	S. Bucht	Measuring the Mode Field Diameter of Single-Mode Fibers Using the Knife-Edge Technique
John Giess	McQuaid	V. N. Goncharov and K. M. Woo	Mitigating Hydrodynamic Instabilities in the Deceleration Phase of Inertial Confinement Fusion
Samuel Gray	Brighton	W. T. Shmayda and E. Dombrowski	Characterizing a Cryosorption Pump for Collecting Tokamak Exhausts
Michah Kim	Home School	D. W. Jacobs-Perkins	Design, Fabrication, and Testing of a 3-D-Printed Optomechanical Assembly for the MIFEDS Coil Characterization Station
Jackson McCarten	Webster Schroeder	B. N. Hoffman and K. R. P. Kafka	Viability Testing of Polymer Coating for Optical Cleaning Applications
Elizabeth Norris	Brighton	M. D. Wittman	Determining the Absorption Efficiency of a Flow-Through Pd-Bed as a Function of Initial $^4\text{He}:\text{D}_2$ Ratio and Flow Rate
Arjun Patel	Brighton	D. Chakraborty and R. Sobolewski	Terahertz Time-Domain Characterization of Biological Tissues Modeled Using COMSOL Multiphysics
Vinay Pendri	Pittsford Mendon	K. L. Marshall	Computational Modeling of Electron Density Polarization in Liquid Crystals Using Time-Dependent Density Functional Theory
Jayden Roberts	Brockport	S. T. Ivancic	Investigation of Microwave-Induced Chemical Etching
Cameron Ryan	McQuaid	R. W. Kidder	Containerized Application Management for Cloud-Based Scientific Analysis
Alisha Upal	Pittsford Sutherland	R. S. Craxton	Development of a National Ignition Facility Laser Configuration with X-Ray Backlighting of a Foam Ball Target
David Villani	Harley School	M. J. Guardalben	Energy Prediction on the OMEGA EP Laser System Using Neural Networks
Grace Wu	Pittsford Mendon	I. A. Begishev	Measurement of the Refractive Index of KDP and ADP Crystals at Low Temperatures
Jenny Zhao	Pittsford Mendon	K. L. Marshall and N. D. Urban	Chiroptical Properties and Mesophase Stability of Saturated Chiral Dopants for High-Peak-Power Liquid Crystal Device Applications
Rick Zhou	Brighton	W. T. Shmayda and M. Sharpe	Measuring the Performance of Molecular Sieve Driers

The program culminated on 24 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.

Four hundred and fifteen high school students have now participated in the program. This year’s students were selected from just under 40 applicants.

At the symposium, LLE presented its 24th annual William D. Ryan Inspirational Teacher Award to Mrs. Dawn Knapp, a mathematics teacher at Victor 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. Knapp was nominated by Semma Alfatlawi, a participant in the 2021 program. In her nomination letter, Semma recalled her first encounter with Mrs. Knapp: “As I enter her room for the first time, I am immediately greeted with elation and a smile. I look around at all the perseverance posters and math jokes... her voice echoing through the room as she excitedly welcomes her new students... and immediately conclude that this is going to be a life-changing class. I have never seen another teacher like Mrs. Knapp.” She observed that Mrs. Knapp noticed her yearning for math knowledge and “broadened it like no one had before.” She found that “the combination of her devotion to teaching and fascination with math makes her an immediate role model to all her students.” She cited open discussions in class about math problems that “brought laughter and human connections along with it, and showed me how community and education go hand in hand to reward people through cooperation as well as increasing intelligence and the ability to problem solve.” In conclusion, Semma stated: “Thinking about my experiences with Mrs. Knapp never ceases to brighten my day... I will carry the life lessons that Mrs. Knapp has taught me as I continue to grow, and will never forget how much a warm smile and excitement for education can brighten the future.”

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