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## LLE's Summer High School Research Program

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 technical 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, liquid crystal chemistry, ultra-intense laser-matter interactions, optical design, tritium capture and storage, and interactive data analysis (see Table 144.XI).

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. 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 forty high school students have now participated in the program since it began in 1989. This year's students were selected from nearly 70 applicants.

At the symposium LLE presented its 19th annual William D. Ryan Inspirational Teacher Award to Mr. Rod Engels, a physics teacher at Victor Senior 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. Mr. Engels was nominated by Willie Franceschi and Sam Zhou, participants in the 2014 program. Willie found that Mr. Engels taught physics "in a way that captivated the attention of his students." He described Mr. Engels' classes as memorable. He said, "Before enrolling in his AP physics class, I had planned on studying science and had little interest in physics. It was through Mr. Engels that I discovered how interesting physics could be." He concluded, "The Inspirational Science Teacher Award is a chance for a truly gifted and inspiring teacher, Mr. Engels, to be commended for the sweeping impact he has had on not only myself, but all the students in his classes." Sam described Mr. Engels' class as "the most fun I have ever had," finding that Mr. Engels "had a way of making all of his lectures and demonstrations interesting. ... His instruction was clear and entertaining, which made it very easy to stay attentive in his class and helped many of us retain the information presented." Mr. Engels also received strong support from Ms. Yvonne O'Shea, principal of Victor Senior High School, who stated, "He is a life-long learner and students love his teaching style, full of real life examples and applications."

Table 144.XI: High School Student 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 Polarizers   |
| Christopher Bosso  | Penfield             | P. B. Radha    | Optimizing Picket Pulse Shape Polar Drive Implosion Designs for the National Ignition Facility                            |
| Gabriel Evans      | McQuaid              | W. T. Shmayda  | Measuring the Hydrogen Pressure over Palladium Hydride  |
| Ryan Gao           | Brighton             | M. Barczys     | Damage Propagation on Final UV Optics in 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   | Exploring Human Factors for Collaborative Multi-User Analysis and Configurations 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 Variable 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 the Omega Facility  |
| Xilin Zhou         | Webster Schroeder    | S. X. Hu       | Radiation Reaction of Electrons at Laser Intensities up to $10^{24}$ W/cm <sup>2</sup>                                    |