High-School Projects at the Laboratory for Laser Energetics (2021 Virtual Program)

Semma Alfatawi (Victor) worked on the calibration of a new high-purity germanium (HPGe) detector activation station, which measures the 2.45-MeV nuclear yield from deuterium-deuterium fusion reactions on the OMEGA Laser System. She developed a procedure to record the HPGe signal following the implosion and post-process the gamma spectrum using Matlab.

Felix Huang (Webster Schroeder) wrote numerical tools to calculate the absorption of an external source of x rays in the shell of an inertial fusion implosion. His work contributes to the development of a novel approach to reduce laser imprint and improve the performance of laser-driven implosions by pre-illuminating the shell with x rays from laser-driven foils.

Audrey Kohlman (Churchville-Chili) used the hydrodynamics simulation code *SAGE* to develop a laser beam pointing design for the French Laser Megajoule (LMJ) laser. This design will enable the LMJ. built for indirect drive, to implode direct-drive fusion fuel capsules with a high degree of uniformity. It will form a key part of proposed user experiments planned to begin in 2024.

Meghan Marangola (Brighton) carried out simulations using *SAGE* to optimize the direct-drive irradiation uniformity of a proposed future laser system designed to implode fusion fuel capsules using both direct and indirect drive. She discovered a method to aim the laser beams that provides optimum uniformity. Her work was central to a recent conference presentation.

Tyler Petrillo (Webster Schroeder) used the code *SAGE* to develop a laser pointing design for a planned experiment imploding a large beryllium fusion capsule on the National Ignition facility (NIF). He also modeled a recent N1F shot in which the plastic capsule had substantial thickness variations and found that such variations can greatly increase the implosion nonuniformity.

Leo Sciortino (School of the Arts) researched modern web technology for retrieving scientific data from the LLE archive storage. He provided details and a comparison of methods for accessing scientific image and relational data using the latest advances in server-side programming.

Aditya Srinivasan (Pittsford Sutherland) carried out fully kinetic particle-in-cell simulations to validate a numerical technique for modeling Coulomb scattering in relativistic plasmas. He simulated the stopping power of an electron beam in solid aluminum and electrical conduction in solid copper for a wide range of conditions, obtaining results in good agreement with theoretical predictions.

Andrew Wu (Pittsford Mendon) conducted computational chemistry modeling using density functional theory and the Maier-Meier equation to predict the electro-optical behavior of a series of liquid crystal materials as a function of molecular structure. He found that the predicted values for the dielectric constants match experimental values to within 8-29%.