Laser-plasma interaction in the context of inertial fusion energy

Proposed in collaboration with ELI ERIC

Abstract: This thesis will explore the suppression of Laser Plasma Instabilities in Magnetized Laser Plasma. In 2025, a pulsed power device with a Helmholtz coil pair will be commissioned in P3 using the L4n laser to study magnetized plasmas. Recent research indicates that magnetized plasma reduces backscattered light from laser-plasma instabilities. Suppressing Raman and Brillouin scattering instabilities (SRS and SBS) is expected to enhance coupling efficiency at the ablation front, resulting in stronger shock generation. An available Velocity Interferometer System for Any Reflector (VISAR) and a Streaked Optical Pyrometry (SOP) can be used to obtain optical emission spectra from samples and shock velocities within them. This study will compare SRS and SBS instabilities in magnetized and non-magnetized L4n laser plasma using the VISAR and SOP. Further, this work will develop a tool to derive temperature and density from acquired data in real time, which is of particular interest for the high-repetition rates of experiments at ELI BL.

Type of thesis: dissertation thesis

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