Pre-Heat Optimization for Magnetized Liner Inertial Fusion at Sandia (C: Laser-plasma interaction)

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The size, temporal and spatial shape, and energy content of a laser pulse for the pre-heat phase of magneto-inertial fusion affect the ability to penetrate the window of the Laser-Entrance-Hole and to heat the fuel behind it. High laser intensities and dense targets are subject to laser-plasma-instabilities (LPI), which can lead to an effective loss of pre-heat energy or to pronounced heating of areas that should stay unexposed. While this problem has been the subject of many studies over the last decades, the investigated parameters were typically geared towards traditional laser driven Inertial Confinement Fusion with densities in excess of 10% of the laser's critical density, electron temperatures for 3-5 keV, and laser powers near (or in excess of) 1E15W/cm2. We will describe the progress of laser pre-heat in Sandia's Magnetized Liner Inertial Fusion program[1,2] with the Z-Beamlet laser facility[3] by extending the study of Stimulated Brillouin Scattering and other LPI effects to larger spatial scales with lower densities, temperatures, and powers. The newest results from integrated MagLIF experiments will demonstrate the impact of these improved parameters to the Magneto-Inertial Fusion program at Sandia.

References

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