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4.50 Streaked Backscatter Spectra of the Pre-Heat Laser on MagLIF Targets

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During magnetized liner inertial fusion (MagLIF) experiments at Sandia National Laboratories, a kJ class laser is used to pre-heat the deuterium fuel before compression. Laser-plasma-instabilities (LPI) result from the interaction of the high intensity laser with dense target materials such as the Laser-Entrance-Hole window, fuel and bottom-cap of the liner. The observed LPI scattering modes are stimulated Raman (SRS) and stimulated Brillouin (SBS). For parametric gain >20 , these stimulated processes become parasitic and can block nearly all the laser pre-heat energy. Fortunately, we observe smaller gains. The total backscattered light is $<10\%$. One benefit of observing some backscatter is that the wavelength shift and intensity can be used to diagnose the laser target interaction dynamics. SRS reveals the evolution of the electron plasma density. SBS indicates temperature. We will show how target and laser properties affect the time resolved backscatter spectra with comparisons to Hydra calculations. Sandia is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's NNSA under contract DE-NA0003525.

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