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Two-dimensional temperature spatial profiles and gradients in laser-heated plasmas relevant to MagLIF[1] KYLE CARPENTER, ROBERTO MANCINI, University of Nevada, Reno, ERIC HARDING, ADAM HARVEY-THOMPSON, MATTHIAS GEISSEL, MATTHEW WEIS, STEPHANIE HANSEN, KYLE PETERSON, GREGORY ROCHAU, Sandia National Laboratories — We present measurements of two-dimensional temperature spatial profiles from magnetized and unmagnetized plasma experiments performed at Z relevant to the pre-heat stage of Magnetized Liner Inertial Fusion. The D gas fill was doped with a trace amount of Ar for spectroscopy purposes and time-integrated spatially resolved spectra and narrowband images were collected in both experiments. Individual analysis of the spatially resolved spectra recovers temperature profiles $T_e(z)$ that are resolved along the axial direction of laser propagation but spatially integrated along the instrument's line-of-sight. By including both the spectrum and image data in a multi-objective analysis, we have extracted two-dimensional electron temperature distributions $T_e(r,z)$. The results indicate that, by inhibiting radial thermal conduction, the magnetic field increased T_e, the axial extent of the laser heating, and the magnitude of the radial temperature gradients. Comparisons with simulations reveal that the simulations over-predict the extent of the laser heating and under-predict the temperature. Temperature gradient scale lengths extracted from the measurements also permit an assessment of the importance of nonlocal heat transport.

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