Abstract Submitted
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Computational Design of Short Pulse Laser Driven Iron Opacity Experiments[1] MADISON E. MARTIN, Lawrence Livermore National Laboratory and University of Florida, RICHARD A. LONDON, Lawrence Livermore National Laboratory, SEDAT GOLUOGLU, University of Florida, HEATHER D. WHITLEY, Lawrence Livermore National Laboratory — Opacity is a critical parameter in the transport of radiation in systems such as inertial confinement fusion capsules and stars. The resolution of current disagreements between solar models and helioseismological observations would benefit from experimental validation of theoretical opacity models. Short pulse lasers can be used to heat targets to higher temperatures and densities than long pulse lasers and pulsed power machines, thus potentially enabling access to emission spectra at conditions relevant to solar models. In order to ensure that the relevant plasma conditions are accessible and that an emission measurement is practical, we use computational design of experiments to optimize the target characteristics and laser conditions. Radiation-hydrodynamic modeling, using HYDRA [1], is used to investigate the effects of modifying laser irradiance, target dimensions, and dopant dilution on the plasma conditions and emission of an iron opacity target. Several optimized designs reaching temperatures and densities relevant to the radiative zone of the sun will be discussed.

[1] M. M. Marinak, et. al. Physics of Plasmas 8, 2275 (2001).

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