Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Broadband Mitigation of the Multibeam Two-Plasmon–Decay and Stimulated Raman Scattering Instabilities[1] RUSSELL FOLLETT, JOHN SHAW, DUSTIN FROULA, CHRISTOPHE DORRER, ANDREI MAXIMOV, ANDREY SOLODOV, HAN WEN, JOHN PALASTRO, University of Rochester, JASON MYATT, University of Alberta, JASON BATES, JIM WEAVER, Naval Research Laboratory — Laser–plasma instabilities such as cross-beam energy transfer, stimulated Raman scattering (SRS), and two-plasmon–decay (TPD) present a major challenge for laser-driven inertial confinement fusion (ICF). Quantitatively predicting the severity of these instabilities requires a model that captures the complex, 3-D interaction of multiple laser beams, including effects such as speckle, polarization, and bandwidth. Here, we employ the laser plasma simulation environment (*LPSE*) to investigate the multibeam nature and mitigation of these instabilities with broadband lasers for conditions relevant to direct-drive ICF. While multibeam coupling plays a critical role in both absolute TPD and SRS, the coupling for SRS is weaker. The threshold for both instabilities can be increased significantly by using drive lasers with ˜1% relative bandwidth. A broadband laser based on optical parametric amplification, with sufficient energy and bandwidth to validate these predictions, is currently in development at the Laboratory for Laser Energetics.

[1]This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

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Date submitted: 23 Jun 2020 Electronic form version 1.4