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Presentation Type: Oral

Sorting Category: 7.00 Inertial confinement

Sub-Category: 07.03 Laser-plasma instabilities

Abstract Title: Supression of inflationary stimulated Raman scattering (SRS) by bandwidth on Nd:glass, KrF, and ArF laser systems.

Abstract Body: Stimulated Raman Scattering (SRS) is a parametric instability of concern to inertial confinement fusion (ICF) schemes; since it scatters light away from the target, and accelerates hot electrons towards the cold fuel. In directly-driven ICF schemes we are concerned with the convective growth of SRS; which can have very large gain in the ICF corona, leading to pump-depletion of the laser ahead of the quarter critical density surface. Guzdar et al. [1991] showed that *random phase modulated bandwidth* has no net effect on the gain of convective SRS. Wen et al. [2021] showed that the threshold for inflationary convective SRS can be increased by *sinusoidal frequency-modulated bandwidth.*

In this work, we consider SRS in shock-ignition ICF driven by

three different laser systems: 3ω Nd : glass lasers; KrF lasers; and ArF lasers. Each laser has a different frequency and native bandwidth. The maximum bandwidth from smoothing by spectral dispersion (SSD) on 3ω Nd : glass is 1THz. KrF and ArF lasers have maximum predicted bandwidths of 3THz and 10 THz, respectively [Obenschain et al. 2020]. We use the EPOCH particle-in-cell code to model the shock-ignition coronal plasma in 1D for each of these laser systems. We vary the total bandwidth, and model the light in its realistic functional form.

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Category Type: Computational

Publications Reference: "Broadband mitigation of inflationary stimulated Raman scattering in shock-ignition on Nd:glass, ArF, and KrF lasers." SJ Spencer and Tony Arber (in prep.)

Newsworthy Research? No

Speaker is: Early Career Researcher

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