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Near-field analysis of stimulated Brillouin scattering in the presence of strong cross-beam energy transfer on the National Ignition Facility[1] PIERRE MICHEL, MARY SPAETH, KEN MANES, JEAN-MICHEL DI NICOLA, WREN CARR, JOHN MOODY, DAVID TURNBULL, LAURENT DIVOL, RICHARD BERGER, BRIAN MACGOWAN, Lawrence Livermore National Laboratory — Laser beam amplification in plasmas via cross-beam energy transfer (CBET) can lead to increased levels of backscatter due to increased laser intensities. Besides a reduction of laser energy coupling to the target, this can create a risk of optics damage in the case of stimulated Brillouin scattering (SBS). Because the SBS wavelength is very close to that of the incident laser, it can back-trace the path of the laser inside the targets, and can return a well-collimated beam of light, which increases the fluence on the optics compared to stimulated Raman scattering (SRS). In this presentation, we present a near-field analysis of the SBS light for a shot where CBET amplification of some beams by a factor ∼4-5 led to optics damage on six transport mirrors. Experimental results are compared to three-dimensional simulations, which highlight the role of speckles in seeding and collectively amplifying the SBS light. In particular, the study reveals that the SBS light largely retains the polarization of the incident laser beam, has a nearly plane wave front and can be even more collimated than the incident laser beam; the latter feature is detrimental for optics damage as it further increases the fluence, but could also be a useful feature for a Brillouin backward laser amplifier.

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