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Laser pulse bandwidth broadening via stimulated forward Brillouin scattering R. TRINES, R. BINGHAM, P. NORREYS, STFC Rutherford Appleton Laboratory, Didcot, UK, B. BRANDÃO, L.O. SILVA, J.E. SANTOS, GoLP/Instituto de Plasmas e Fusão Nuclear, IST, Lisbon, Portugal — One of the major limitations for implementing direct drive on the National Ignition Facility is the reduced bandwidth (220 GHz) now available for beam smoothing purposes. A bandwidth of around 1 THz is needed to reduce the Brillouin backscattering growth rate by 30% for typical NIF parameters [1]. Here we present a novel method to increase the bandwidth of the incoming laser pulse via explicit stimulation of the Brillouin forward scattering process. A similar process has already been demonstrated for stimulated Raman forward scattering [2]. The incoming laser beam with frequency ω_0 is accompanied by a low-intensity beam (1-2 % of the main beam intensity) at the frequency of the first Stokes sideband for Brillouin forward scattering: $\omega_1 = \omega_0 - \omega_B$ with $\omega_B \sim 0.001\omega_0$. The beating between these beams drives the Brillouin forward scattering instability and causes several orders of (anti-)Stokes side bands to emerge, leading to an effective spectral broadening. In addition, the long wavelength ion-acoustic wave corresponding to Brillouin forward scattering will reduce the growth of the short wavelength ion-acoustic wave corresponding to Brillouin backscattering. [1] B. Brandão, L.O. Silva, J.E. Santos, R. Bingham, Phys. Plasmas, submitted (2010). [2] R. Trines et al., Europhys. Lett. 66, 492 (2004).

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