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Short-Pulse Amplification by Strongly-Coupled Stimulated Brillouin Scattering[1] MATTHEW EDWARDS, QING JIA, JULIA MIKHAILOVA, NATHANIEL FISCH, Princeton University — We examine the feasibility of strongly-coupled stimulated Brillouin scattering as a mechanism for the plasma-based amplification of sub-picosecond pulses. Fluid theory and particle-in-cell calculations are used to compare the relative advantages of Raman and Brillouin amplification over a broad range of parameters, with a focus on determining the maximum amplified pulse intensities and minimum durations that can be achieved. Amplification of short-wavelength pulses is considered in detail, with particular emphasis on the practical development of plasma-based x-ray amplifiers. Our results suggest that Brillouin scattering may allow amplification of shorter wavelength light than Raman scattering, but that at optical frequencies better performance is generally realized with Raman amplification, as strongly-coupled Brillouin scattering has limited capacity for amplifying sub-picosecond pulses.

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