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On the saturation of stimulated Raman scattering in laser amplification[1] E.S. DODD, J. REN, T.J.T. KWAN, M.J. SCHMITT, LANL — The use of stimulated Raman scattering (SRS) in plasmas has been proposed as an alternative to the CPA technique for laser pulse amplification and compression [1]. Initial experiments demonstrated the amplification and compression of laser pulses in plasma to an unfocused intensity of $\sim 10^{16}$ W/cm^2 [2], however the amplification was saturated at this level and was accompanied by deleterious spatial and temporal incoherence. The reasons for this incoherence have not been well understood. A physical picture has been developed with results from PIC simulations using the LSP code where spontaneous SRS in the pump modifies the plasma conditions, and which in turn significantly weakens the coupling strength for seed amplification. This led to the development of a novel experimental method to significantly increase the amplified power in the short-pulses via SRS.

[1] G. Shvets, N. J. Fisch, A. Pukhov, and J. Meyer-ter-Vehn, Phys. Rev. Lett. 81 4879 (1998).
[2] J. Ren, W.-F. Cheng, S.-L Li, and S. Suckewer, Nat. Phys. 3 732 (2007). LA-UR-12-22734

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