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Progress in laser pulse amplification by stimulated Raman scattering in a plasma[1] Y. PING, R. KIRKWOOD, R. RYGG, S. WILKS, N. MEEZAN, O. LANDEN, LLNL, N. FISCH, V. MALKIN, E. VALEO, Princeton, J. WURTELE, Berkeley, C. NIEMANN, UCLA — Amplification and compression of short laser pulses via Raman scattering in a plasma is a promising scheme for reaching ultrahigh laser powers beyond the limit of solid-state-based laser systems. We report the recent progress in the development of a plasma amplifier for a 1-5 ps seed and 1ns pump in a 3 mm plasma with the temperature and density needed for efficient compression of the pulse when the interaction length is increased (ie. Te $\sim$ 275 eV, ne $\sim$ 1 x 10^{19} /cc, Kirkwood et. al, Phys. Plasmas 2007). A high-quality amplified pulse has been observed when the pump intensity is kept below 10^{14} W/cm^2, while beam-spray onset is consistent with a few percent of the pump energy being above the filamentation threshold. A maximum output energy of 16mJ has been achieved. These results are being used to benchmark simulations and are critical for scaling up the Raman compression to large laser systems.

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