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Thomson Scattering from Electron Plasma Waves in a Raman Plasma Amplifier A. DAVIES, D. HABERBERGER, J. BROMAGE, J.D. ZUEGEL, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester, R. TRINES, Rutherford Appleton Laboratory, R. BINGHAM, U. of Strathclyde, J. SADLER, P.A. NORREYS, U. of Oxford, L.O. SILVA, Instituto Superior Tecnico, Lisbon, Portugal — Electron plasma waves (EPW's) can be used to transfer significant energy from a long-pulse laser to a short-seed pulse. Raman amplification has the potential to amplify intense pulses beyond the capabilities of current laser technology ($\sim 10^{22}$ W/cm^2) because of the plasma's ability to sustain large-amplitude plasma waves. Having complete knowledge of the EPW amplitude is essential to establishing optimal parameters for efficient Raman amplification. With Thomson scattering it is possible to measure the spatial and temporal distribution of the EPW amplitude and experimentally determine the effect of the EPW profile on Raman scattering. Moving beyond the initial proof-of-principal experiments at the submillijoule level, to amplifying a 75-mJ, 100-fs seed with a 75-J pump has the potential to produce PW-scale laser pulses with Raman amplification. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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