Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Observation of relativistic, collective Thomson scattering from electron plasma waves JAMES ROSS, University of California, San Diego, SIEGFRIED GLENZER, LAURENT DIVOL, JOHN PALASTRO, Lawrence Livermore National Laboratory, BRADLEY POLLOCK, GEORGE TYNAN, University of California, San Diego, DUSTIN FROULA, Lawrence Livermore National Laboratory — We present collective Thomson-scattering measurements of light scattered from electron plasma fluctuations with relativistic phase velocities. Phase velocities (v/c) between 0.06 and 0.12 have been achieved in a N2 gas jet plasma by varying the gas jet backing pressure. These plasmas are heated by a 330 J, 527 nm laser beam resulting in plasmas with electron temperatures ranging from 200 to 700 eV and electron densities ranging from 1×10^{19} cm^{-3} to 7×10^{19} cm^{-3}. For these conditions, the classical Thomson-scattering description is inadequate to analyze the measured spectra due to the large phase velocities. A fully relativistic treatment of the Thomson-scattering form factor has been developed and shows excellent agreement with the experimental data. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and was partially funded by the Laboratory Directed Research and Development Program under project tracking code 08-LW-070.

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Date submitted: 21 Jul 2009 Electronic form version 1.4