Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

**Heat-Flux Measurements in Laser-Produced Plasmas Using Thomson Scattering from Electron Plasma Waves** R.J. HENCHEN, V.N. GONCHAROV, D. CAO, J. KATZ, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester, W. ROZMUS, University of Alberta, Edmonton, Canada — An experiment was designed to measure heat flux in coronal plasmas using collective Thomson scattering. Adjustments to the electron distribution function resulting from heat flux affect the shape of the collective Thomson scattering features through wave-particle resonance. The amplitude of the Spitzer–Härm electron distribution function correction term ($f_1$) was varied to match the data and determines the value of the heat flux. Independent measurements of temperature and density obtained from Thomson scattering were used to infer the classical heat flux ($\mathbf{q} = -\kappa\nabla T_\mathrm{e}$). Time-resolved Thomson-scattering data were obtained at five locations in the corona along the target normal in a blowoff plasma formed from a planar Al target with 1.5 kJ of 351-nm laser light in a 2-ns square pulse. The flux measured through the Thomson-scattering spectra is a factor of ∼5 less than the $\kappa\nabla T_\mathrm{e}$ measurements. The lack of collisions of heat-carrying electrons suggests a nonlocal model is needed to accurately describe the heat flux. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

R.J. Henchen
Laboratory for Laser Energetics, U. of Rochester

Date submitted: 18 Jul 2017 Electronic form version 1.4