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Classical Heat-Flux Measurements in Coronal Plasmas from Collective Thomson-Scattering Spectra R.J. HENCHEN, S.X. HU, J. KATZ, D.H. FROULA, W. ROZMUS, Laboratory for Laser Energetics, U. of Rochester — Collective Thomson scattering was used to measure heat flux in coronal plasmas. The relative amplitude of the Thomson-scattered power into the up- and downshifted electron plasma wave features was used to determine the flux of electrons moving along the temperature gradient at three to four times the electron thermal velocity. Simultaneously, the ion-acoustic wave features were measured. Their relative amplitude was used to measure the flux of the return-current electrons. The frequencies of these ion-acoustic and electron plasma wave features provide local measurements of the electron temperature and density. These spectra were obtained at five locations along the temperature gradient in a laser-produced blowoff plasma. These measurements of plasma parameters are used to infer the Spitzer–Härm flux ($q_{\mathrm{SH}} = -\kappa \nabla T_{\mathrm{e}}$) and are in good agreement with the values of the heat flux measured from the scattering-feature asymmetries. Additional experiments probed plasma waves perpendicular to the temperature gradient. The data show small effects resulting from heat flux compared to probing waves along the temperature gradient. 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

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