

Abstract Submitted
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Fully relativistic form factor for Thomson scattering in unmagnetized plasmas¹ J.P. PALASTRO, J.S. ROSS, B. POLLOCK, E.A. WILLIAMS, L. DIVOL, D.H. FROULA, S. GLENZER, Lawrence Livermore National Laboratory — We derive a fully relativistic form factor for Thomson Scattering in unmagnetized plasmas valid to all orders in the normalized electron velocity, $\beta=v/c$. The form factor is compared to a previously derived expression where the lowest order electron velocity, β , corrections are included [J. Sheffield, “Plasma scattering of electromagnetic radiation,” Academic Press (1975)]. The β expansion approach is sufficient for electro-static waves with small phase velocities such as ion-acoustic waves, but for electron plasma waves the phase velocities can be near luminal. At high phase velocities, the electron screening acquires relativistic corrections including effective electron mass, relative motion of the electrons and electromagnetic wave, and polarization rotation. These relativistic corrections alter the scattered emission of thermal plasma waves, which manifest as changes in both the peak and width of the observed Thomson scattered spectra.

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