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Thermal Contributions to Relativistic Transparency DAVID STARK, CHINMOY BHATTACHARJEE, University of Texas, Institute of Fusion Studies, ALEXEY AREFIEV, FELIPE ASENJO, Institute of Fusion Studies, SWADESH MAHAJAN, University of Texas, Institute of Fusion Studies — When subjected to high-intensity laser pulses in an electron-proton plasma, electrons are accelerated to relativistic velocities and cause relativistic self-induced transparency; i.e., the waves propagate through a previously overdense plasma. One should expect similar effects if the electron fluid was high temperature (independent of what caused the temperature). Here we study relativistic transparency in a relativistic hot plasma described by the Maxwell-Juttner distribution function. Using a PIC code, we simulate a low-intensity laser pulse incident on a thermal plasma with linear density ramp using a 1-D/3-V setup; we therefore observe the wave's behavior at different densities. Fourier transforming our data isolates the incident laser frequency, and an analytical model of this signal traveling through the geometry allows us to calculate the new effective critical densities from our simulations. This produces a measure of the effective critical density as a function of the temperature. These results are helpful in isolating the contribution of thermal relativistic motion from that of the net motion of the particles.

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