Nonthermal and Plasmon Effects on Elastic Electron-Ion Collisions in Hot Quantum Lorentzian Plasmas

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The nonthermal and plasmon effects on elastic electron-ion collisions are investigated in hot quantum Lorentzian plasmas. The modified interaction model taking into account the nonthermal screening and plasmon effects is employed to represent the electron-ion interaction potential in hot quantum Lorentzian plasmas. The eikonal phase and differential collision cross-section are obtained as functions of the impact parameter, collision energy, spectral index, and plasma parameters by using the second-order eikonal analysis. It is shown that the plasmon effect suppresses the eikonal phase and collision cross-section for $0 < \beta$ ($\equiv \hbar \omega_0/k_B T < 0.6$) and, however, enhances it for $0.6 < \beta < 1$, where ω_0 is the plasma frequency and *T* is the plasma temperature. It is also shown that the nonthermal character of the quantum Lorentzian plasma suppresses the elastic electron-ion collision cross-section.

Key words: Nonthermal Effects; Plasmon Effects; Quantum Lorentzian Plasmas.