

ION CORE EFFECT ON SCATTERING PROCESSES IN DENSE PLASMAS

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Among the plasma diversity, a non-ideal dense plasma is particularly difficult object to study due to the presence of strong inter-particle correlations and quantum degeneracy effects in the system. Understanding of properties of a non-ideal dense plasma with a high concentration of heavy ions is important for modern astrophysics [1, 3, 5, 6]. In addition, such a plasma is created in controlled thermonuclear fusion experiments [1–4]. The method of effective potentials is one of the often-used approaches to compute structural, transport and thermodynamic properties of plasmas [7]. We note that the fundamental difference between this work and research conducted in the world is that the effective potentials proposed by the take into account collective screening at large distances due to weakly bound electrons and ions with a small charge, and strongly correlated heavy ions, as well as the quantum-mechanical effects of diffraction and symmetry at small distances due to partial quantum degeneracy of electrons. Moreover, along with the above characteristics, the project will also take into account the core effect (finite size) of heavy ions, which is important for describing electron scattering by a heavy ion. In this work the impact of the of the ion core effect on the scattering phase shifts, the partial (total) cross-section, and transport cross-section due to modification of the screening were considered. The results obtained for the scattering processes are compared with the results of the Born approximation with the data obtained in terms of classical scattering of particles interacting by the Yukawa potential [8, 9].

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