

Oscillatory Screening Effects on Elastic Collisions in Dense Electron-Ion Quantum Plasmas

Yo-Han Koo^a and Young-Dae Jung^{a,b}

^a Department of Applied Physics, Hanyang University, Ansan, Kyunggi-Do 426-791, South Korea

^b Atomic and Molecular Data Research Center, National Institute for Fusion Science, Toki, Gifu, 509-5292, Japan

Reprint requests to Y.-D. J.; E-mail: ydjung@hanyang.ac.kr

Z. Naturforsch. **64a**, 237 – 241 (2009); received April 4, 2008 / revised September 15, 2008

The oscillatory screening effects on elastic electron-ion collisions are investigated in dense quantum plasmas. The eikonal method with the modified Debye-Hückel potential is employed to obtain the scattering phase shift and scattering amplitude. In addition, the total elastic collision cross section is obtained by the optical theorem with the forward scattering amplitude in quantum plasmas. It is shown that the modified Debye-Hückel screening in quantum plasmas produces the oscillatory behaviour of the scattering phase shift. In addition, the minimum position of the phase shift is receded from the target ion with decreasing the quantum wave number. It is also found that the oscillatory screening effect suppresses the differential cross section. The total cross section is also found to be decreased due to the oscillatory screening effect. In addition, it is shown that the total cross section decreases with an increase of the quantum wave number.

Key words: Oscillatory Screening; Quantum Plasmas.