

ELASTIC AND INELASTIC PROCESSES IN THE NONIDEAL SEMICLASSICAL PLASMA ON THE BASIS OF THE DYNAMIC POTENTIAL

Shalenov E.O., Dzhumagulova K.N., Ramazanov T.S.*

KazNU, Almaty, Kazakhstan

**shalenov.erik@mail.ru*

Collisional characteristics of the electron-atom scattering in the dense semiclassical plasma were calculated within the dynamic model of interaction. This model takes into account the quantum mechanical diffraction effect and dynamic screening which depends on the velocity of the colliding particles. On the basis of the Calogero equation the phase functions and the phase shifts were calculated. Phase shifts and cross sections obtained on the basis of the dynamic potential are larger than those obtained on the basis of the static model and converge with them at small values of the kinetic energy of colliding particles. Excitation of hydrogen atom by the electron impact of dense semiclassical hydrogen plasma were studied on the basis of the effective models of the electron-atom interactions taking into account the effect of screening as well as the quantum mechanical effect of diffraction. The calculations of the excitation cross sections were carried out on the basis of the phase-function method. It was shown that increasing in coupling leads to decrease in excitation cross section. In work [1] an effective interaction of potential of the semiclassical dense plasma particles, taking into account the effects of diffraction and static screening was proposed. However, if the velocities of the colliding particles is larger then the thermal velocity, these fast particles do not have time to polarize the surrounding plasma. So, screening of their charge weakens. Such screening, depending on the velocity of the interacting particles, is called as dynamic screening. It is widely used to study the properties of the strongly coupled plasmas. In work [2, 3] a way of the dynamic screening accounting was proposed. In this method the static Debye length is replaced by some one, which takes into account the dynamic screening. We applied this screening for the potential from work [1]. On the basis of obtained dynamic model the important characteristics of the elastic and inelastic processes were investigated, for example, the differential, total and transport scattering cross section and excitation cross section.

-
1. T. S. Ramazanov, K. N. Dzhumagulova, and Y. A. Omarbakiyeva. Effective polarization interaction potential charge-atom for partially ionized dense plasma // Phys. Plasmas 12, 092702 (2005).
 2. Kremp D., Schalgel M., Kraeft W.-D. Quantum Statistics of Nonideal Plasmas. Springer.Berlin. 2005, Chap.8.

3. R. Redmer. Physical properties of dense, low-temperature plasma // Physics Reports 282, 35-157(1997).