

Microscopic and Dynamical Properties of ICF/WDM Plasmas

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Investigation of physical properties of dense plasmas is one of the important topics in the physics of inertial confinement fusion, warm dense matter and high-power lasers physics. Due to the big difference between the mass of ions and electrons the considered plasma is dense and non-isothermal. It is known that the interaction potentials between particles are also of importance for correctly calculation of plasma properties taking into account peculiarities and parameters of investigated plasma [1]. In the case of ICF plasma effective potentials should take into account both quantum and collective (screening) effects for dense, nonideal, nonisothermal plasma. In order to describe the interactions between particles several effective potentials are used. These potentials take into account quantum mechanical, screening and polarizations effects in dense plasmas [2]. The effective potentials between particles in dense nonisothermal plasmas are derived on the basis of the method of dielectric response functions and multipole expansion. The effective dynamically screened potential of a classical ion in a stationary flowing quantum plasma at finite temperature is investigated [3]. The Coulomb logarithm for dense semiclassical fully and partially ionized plasmas has been derived. Stopping power and dynamical processes of dense ICF plasma have been studied by the Coulomb logarithm [4]. Thermodynamic and transport properties of dense plasma have been studied on the basis of proposed effective potentials [5,6]. Calculations of ions energy losses in dense ICF plasma for different values of the temperature and plasma density were carried out. The comparison with data of other theoretical and experimental works has been done.

References

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