

Ionization potential depression and in-medium wave equation in dense plasmas

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The properties of a bound electron system immersed in a plasma environment are strongly modified by the surrounding plasma. The modification of an essential quantity, the ionization energy, is described by the electronic and ionic self-energies including dynamical screening within the framework of the quantum statistical theory. Introducing the ionic dynamical structure factor as the indicator for the ionic micro-field, we demonstrate that ionic correlations and fluctuations play a critical role in determining the ionization potential depression [1]. This is in particular true for mixtures of different ions with large mass and charge asymmetry. The ionization potential depression is calculated for dense aluminum plasmas as well as for CH plasmas and compared to the experimental data and more phenomenological approaches used so far. The solution of the two-particle in-medium wave function gives also access to calculate the optical properties such as spectral line profiles. In this way the unified description of the Inglis-Teller effect and ionization potential depression is possible [2].

REFERENCES

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