

The influence of ion dynamics effects on spectra of multielectron ions

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In the present paper, the influence of ion dynamics effects on the shape of spectral lines of multielectron ions in a hot dense plasma is developed. The model allowing to calculate the line shape taking into account the thermal motion of ions is presented on the basis of the LINEDM model [1], formulated under the assumption of quasi-staticity of plasma ions, and the frequency fluctuation model (FFM) of the ionic microfield [2]. A modification of the FFM is proposed, which specifies the frequency of jumps in the amplitude of the ionic micropole. Numerical calculations of the line shape of the helium-like argon ion as an admixture in the deuterium plasma were performed and agreement with the results of other authors was reached. Experimental data on the spectra of titanium and chlorine obtained in laser experiments are interpreted using the developed method. The possibility of diagnostics of plasma density and temperature by the shape of the dip in the center of spectral lines without unshifted Stark components is discussed.

[1] Loboda P, Litvinenko I, Baydin G, Popova V and Koltchugin S 2000 *Laser Part. Beams* **18** 275–289

[2] Talin B, Calisti A, Godbert L, Stamm R, Lee R and Klein L 1995 *Phys. Rev. A* **51** 1918