

Shifts of Lyman and Balmer lines and excitation cross sections in dense plasma

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Spectra of hydrogen-like ions are essential for plasma diagnostics. Lyman and Balmer lines reveal plasma density, temperature, and composition [1]. In dense plasmas, many-body interactions and screening cause energy level and line shifts [2]. These findings are crucial for interpreting spectra and excitation cross sections in laboratory and astrophysical plasmas. We study line shifts of the Lyman and Balmer series (up to $n = 5$) in hydrogen-like plasmas using the effective potential [3], which includes quantum non-locality and electronic non-ideality [4]. Dependencies on plasma density and temperature are analyzed; calculated H_α shifts agree with experimental data. Transition cross sections are also derived. The authors acknowledge support from the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan under Grant number AP19679049.

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