Analysis of L-spectra of multiply charged iron ions formed in experiments with intense femtosecond laser pulses

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The paper considers the possibility of using L-spectra of multiply charged iron ions to study the effect of magnetic reconnection in laboratory astrophysical experiments carried out on modern laser complexes of nano- and pico-second duration at moderate laser radiation flux densities on the target. A brief overview of commonly used experimental schemes is given. Atomic kinetic calculations have been performed for the spectra from the L-shells of Ne- and F-like iron ions (Fe, Z=26), which demonstrate the high sensitivity of the spectra to changes in plasma parameters. An analysis of the range of applicability of various diagnostic approaches to assessing the electron temperature and laser plasma density is carried out. It is shown that transition lines in Ne-like ions are a universal tool for measuring plasma parameters, both in the region of laser interaction with the target and in the reconnection zone.