

# Effects of the radiative recombination on the intensity and polarization of the Ly-alpha emission of hydrogen-like ions

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## Abstract :

The intensity ratio of the Ly - alpha(1) ( $2p(3/2) \rightarrow 1s(1/2)$ ) to Ly - alpha(2) ( $2p(1/2) \rightarrow 1s(1/2)$ ) photon emission is analyzed for hydrogen-like Fe(25+) ions if their excitation arises in a plasma not only from the electron impact but also due to the radiative recombination (RR) of initially bare Fe(26+) ions. Under such conditions, the intensity ratio and the (degree of) linear polarization of the Ly - alpha(1) line are explored for collisions with an electron beam over a wide range of kinetic energies up to 50 keV. Apart from the direct population of the  $2p(1/2,3/2)$  levels via the RR of bare ions, the contributions from radiative cascades and higher multipoles are taken into account by applying a fully relativistic theory for the motion of the electrons and the electron-photon coupling. Our calculations show an overall small effect of the RR upon the degree of the Ly - alpha(1) polarization as well as the Ly - alpha(1)/Ly - alpha(2) intensity ratio under usual plasma conditions. However, the effects from the RR of initially bare ions may become significant at electron beam energies similar to 7-10 keV, for plasma conditions far away from ionization equilibrium with a relatively large proportion of bare Fe ions, as it may be realized in electron-beam ion trap experiments.

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