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To cite this article: D Banaś *et al* 2012 *J. Phys.: Conf. Ser.* **388** 062044

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## Enhanced radiative recombination of $U^{92+}$ ions with cooling electrons for the K-shell

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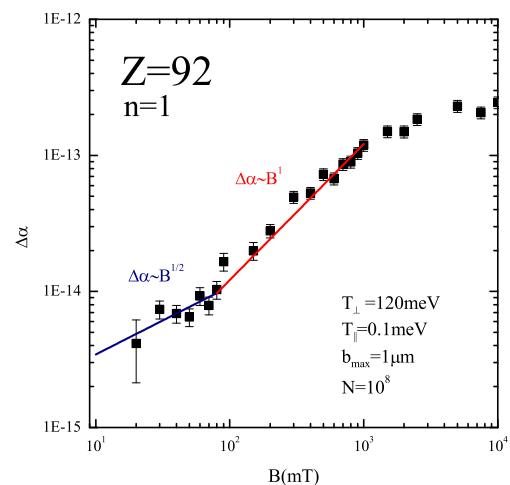
**Synopsis** Observed enhancement of K-shell radiative recombination (RR) of bare uranium ions with cooling electrons is interpreted in terms of distant transverse collisions in magnetized electron-cooler plasma described within the semiclassical geometrical model (SGM), which was recently proposed. The Monte Carlo simulations based on the proposed approach explains the enhancement measured in RR of  $U^{92+}$  ions with cooling electrons for the K-shell.

Recently we have proposed [1] new interpretation of the RR enhancement using the developed semiclassical geometrical model (SGM) which adopts the standard quantum mechanical RR cross sections to introduce a simplified concept of fully "absorbing" RR sphere. Within this model we demonstrate that the enhancement of the RR is caused by "transverse" collisions with impact parameters in the  $\mu\text{m}$  range, with cut-off value depending on a strength of the guiding B-field in the electron cooler.

The proposed SGM model reproduces the scaling of the RR excess rates observed at experiments at the TSR [2] and, moreover, predicts strong enhancement for low n-states, which was observed in our x-ray experiment on RR for the K-shell [3]. It should be noted that for stronger magnetic fields this model predicts linear dependence on the B-field, i.e.  $\Delta\alpha \propto B$ , which was suggested in earlier experiment at the GSI [4] (see Fig. 1). For a better description of the RR enhancement we have performed the Monte Carlo simulations based on the SGM approach which predicts more realistic B-field dependence and impact parameter cut-off. It is important to note, that the absolute value of the RR enhancement predicted by the SGM is close to the observed one for the K-shell [3]. Additionally, the Monte Carlo simulations involving the angular distributions of x-rays demonstrate that the proposed approach describes well the RR enhancement measured in x-ray experiment on recombination of  $U^{92+}$  ions with cooling electrons.

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This work was supported by the Polish Ministry of Science and Higher Education under Grant No. N N202 463539.



**Figure 1.** The B-field dependence of the excess of the total RR rate in the magnetized electron cooler as obtained using the Monte-Carlo simulations based on the SGM model.

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