

X-ray studies of atomic processes involving highly charged ions at EBIT/S

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The electron beam ion traps and sources (EBIT/S) producing highly charged ions (HCI) offer unique experimental conditions to study various atomic processes [1], including electron impact ionization/excitation, recombination and radiative and nonradiative deexcitation of trapped and extracted HCI from EBITs. Here the experiments on X-ray emission from EBIT plasma involving highly charged Xe_{q+} (q up to 40) ions are discussed, in particular, in context of radiative (RR) and dielectronic (DR) recombination of ions with electrons (see Fig. 1). In experiments with extracted slow Xe_{q+} ions interacting with metallic beryllium the relaxation of Rydberg hollow atoms (RHA) [2], formed at a surface, was studied. We demonstrate experimentally that in ultrafast relaxation of RHA the two-electron processes, such as interatomic Coulombic decay (ICD) [3,4] and internal dielectronic excitation (IDE) [5], play important role. The present results clearly demonstrate that that x-ray spectroscopy, applied to measure the radiation emitted from HCI produced at, allows to reveal fine details of various atomic processes involving highly excited heavy ions.

References

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