

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

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

*Ł. Jabłoński, D. Banaś and M. Pajek*

*Institute of Physics, Jan Kochanowski University, 25-406 Kielce, Poland*

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  $\text{Xe}^{q+}$  ( $q$  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  $\text{Xe}^{q+}$  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*

1. H. Winter and F. Aumayr, J. Phys. B 32, R39 (1999).
2. J.P. Briand et al., Phys. Rev. Lett. 65, 159 (1990).
3. L.S. Cederbaum et al. Phys. Rev. Lett. 79, 4778 (1997).
4. R.A. Wilhelm et al., Phys. Rev. Lett. 119, 103401 (2017).
5. R. Schuch et al., Phys. Rev. Lett. 70, 1073 (1993).

## Presenting Author

Marek Pajek

## Presenting Author Affiliation

Institute of Physics, Jan Kochanowski University

## Presenting Author Gender

Male

## Country

Poland

## Presenting Author Email Address

pajek@ujk.edu.pl

**Primary author:** PAJEK, Marek (Institute of Physics, Jan Kochanowski University)

**Co-authors:** Dr BANAŚ, Dariusz; Mr JABŁOŃSKI, Łukasz (Institute of Physics, Jan Kochanowski University)

**Presenter:** PAJEK, Marek (Institute of Physics, Jan Kochanowski University)

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