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**Laboratory astrophysics with ion-beams: Cross sections for dielectronic recombination, photoionization and electron-impact ionization from heavy-ion storage-rings and synchrotron light-sources**

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Laboratory experiments yield vitally needed benchmarks of atomic data for plasma modeling. An effort to provide rate coefficients for dielectronic recombination (DR) and electron impact ionization (EII) of highly charged atomic ions is being carried out at the Heidelberg heavy-ion storage ring TSR[1]. Popular compilations of DR data sometimes underestimate low-temperature DR rate coefficients by orders of magnitude as has already been suspected e.g. for Fe-M shell ions on the basis of the modeling of x-ray spectra from active galactic nuclei[2]. Even modern theoretical calculations often deviate strongly from our experimental results. This is due to the fundamental difficulty to calculate low-energy DR resonance positions of complex ions with sufficient accuracy. For these ions, storage-ring DR experiments are the only reliable source for low-temperature DR data. Astrophysically relevant results from storage-ring EII measurements and photon-ion experiments at synchrotron light sources will also be presented.

[1]E. W. Schmidt et al., ApJL 641 (2006) L157; A&A 492 (2008) 265; M. Lestinsky et al., ApJ 698 (2009) 648 and references therein.
[2]H. Netzer, ApJ 604 (2004) 551; S. Kraemer et al., Apj 604 (2004) 556.