Contribution ID: **19** Type: **not specified**

Atomic Physics Experiments with Multiply Charged Ions in TSR@ISOLDE

Tuesday, 28 April 2015 11:10 (25 minutes)

With online radioactive beams or with a standalone ion source, and with a suitable injector, the TSR storage ring can be used to study multiply charged ions of many elements and in many charge states. This makes the storage ring a unique tool for studies at the borderline of atomic and nuclear physics, also serving astrophysics and fusion energy research. Recent achievements in this research field will be discussed, focusing on merged beams experiments and metastable atomic lifetime measurements on multicharged ions.

The ionization balance in hot astrophysical or fusion-energy plasmas crucially depends on electron impact ionization rates and photorecombination rates, in particular dielectronic recombination. Both processes are governed by excited many-electron configurations and a large number of resonances produced by them in the electron collision continuum. Merged-beams electron-ion collision studies, making use of the storage ring to ensure the relaxation of long-lived metastable beam components, have started on complex many-electron charge states of astrophysical important ions such as Fe, Si and Mg and on even more complex (open f-shell) configurations of W, important for fusion-energy plasmas.

Using photoemission or collisions as a probe, also the lifetimes of long-lived metastable states in multicharged ions can be investigated. For nuclides of Ti and S, isotopic dependences in atomic state lifetimes were observed, providing a signature of hyperfine-induced radiative decay. Hyperfine-induced decay rates could sensitively probe nuclear magnetic moments for a number of other nuclides where they are still uncertain. These examples illustrate atomic physics studies on multicharged ions that could complement the future experimental program of TSR@ISOLDE.

Primary author: WOLF, Andreas (Max Planck Institute for Nuclear Physics)

Presenter: WOLF, Andreas (Max Planck Institute for Nuclear Physics)

Session Classification: Session 4