

### High precision electron-ion collision experiments at the Heidelberg Storage Ring TSR

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Merged beam setups like at the heavy-ion storage ring TSR in Heidelberg are very powerful tools to measure cross sections of electron-ion collision processes such as dissociative recombination in molecular ions or dielectronic recombination in atomic ions as function of the collision energy. Ions at energies of  $\sim 1\text{MeV}/\text{amu}$  are stored in the ring by magnetic fields for times of up to 100s. Extending the known technique [1], a new electron target [2], working together with the electron cooler, is used since two years to improve the electron energy resolution, now reaching down to  $kT_{\perp} \approx 0.5\text{meV}$ . It was used to measure low-energy cross sections for molecular and atomic ions with very high, unprecedented resolution. In addition, negative product ions were observed with a scintillation detector.

We will give examples on recent measurements on dissociative recombination. In particular, the cross section of  $\text{HD}^+$  dissociative recombination was remeasured and previously unresolved structures were found in the range of  $E_d = 0 - 200\text{meV}$ . These allow a detailed comparison with theoretical model calculations (MQDT) [3] with the further goal of assigning the measured structures in the cross section to resonances due to the involved intermediate states in the indirect dissociative recombination process.

We will also give examples of recent results on dielectronic recombination of multiply-charged iron ions relevant for both low and high temperature astrophysical plasma [4,5].

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