A new ion-photon reaction setup for ASTRID2

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A new experimental setup dedicated to studies of atomic molecular ions under XUV irradiation from the upcoming ASTRID2 synchrotron radiation facility [1] at Aarhus University is presented (see Fig. 1). The central part of the setup is composed of a Radio-Frequency ring electrode ion trap [2] combined with a Quadrupole Mass Spectrometer, both located on a high voltage platform in a ultra high vacuum environment. All trapped ions can be irradiated with XUV radiation from ASTRID2 or with laser light along the trap axis.

In particular, the possibility of injecting ions from an initially fast moving beam into the RF trap without the use of buffer gas is described [3]. Thus, the chosen ring electrode geometry of the RF-trap gives rise to an oscillating electric field *along* the direction of the incoming ions, and it is demonstrated both experimentally and through an analytical model and numerical simulations that the energy exchange between the injected fast ions and this longitudinal field facilitates the ion trapping at low energy in the trap.

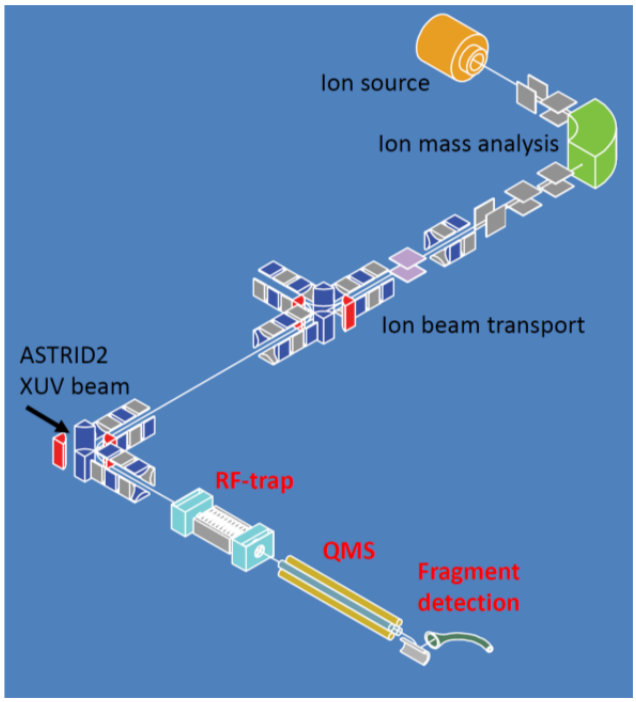

Figure 1: Schematic drawing of the new experimental station for studies of XUV induced reactions in atomic and molecular ions for the new ASTRID2 synchrotron radiation facility.

The complete functioning of the setup, i.e. ion trapping, irradiation, and fragment detection is demonstrated with a photodissociation experiment on Cl_2^- at 532 nm.

References:
[1] http://www.isa.au.dk/facilities/astrid2/astrid2.asp
[2] D. Gerlich, Adv. Chem. Phys. **LXXXII**, 1 (1992)
[3] A. Svendsen *et al.*, to appear in Phys. Rev. A.