4.9 INTERCOMPARISON OF STORAGE RINGS: HD^+ AT ASTRID, CRYRING AND TSR

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4.9.1 Introduction

HD^+ is a molecule that has been studied extensively. The different storage rings, ASTRID in Aarhus, CRYRING in Stockholm and TSR in Heidelberg, have reported results that differed in details [1]. Especially, the magnitude of the high-energy peak (between 5 and 20 eV) and the cross section just before this peak were not in agreement among the rings. Variation have been explained by differences in stripping of atoms in high Rydberg states in the dipole magnet following the cooler section and by differences in the implementation of the consequences of the target geometry (toroidal correction). This study tries to settle the result and to establish an estimate for the reliability of absolute cross section determinations by heavy ion storage rings.

4.9.2 Results

The ion beam energy has been chosen to be 1 MeV/amu. The results are in good agreement, and are illustrated in the figure below.

The result from CRYRING and TSR is very close in the whole range except in the valley region where the toroidal correction plays an important roll. Ignoring the systematic shift between ASTRID and CRYRING, the overall agreement is very good except in the second high peak at 16 eV where the ASTRID data is about 20% higher. As mentioned earlier, the valley region shows differences between CRYRING, TSR and ASTRID but reveals remarkable fine structure reproduced at CRYRING and TSR.

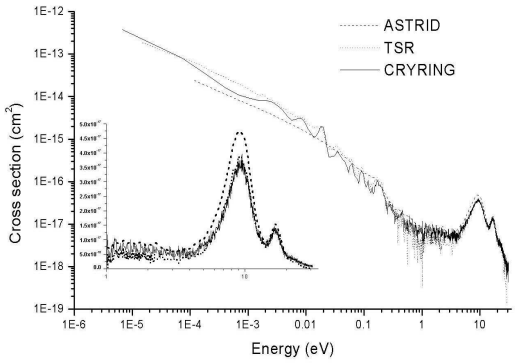

Fig. 1. Illustration of the cross sections of HD^+ as measured for the different storage ring

Preliminary conclusions indicate that there is excellent agreement between the rings in how the data are treated, eg. the space charge correction and drag force effects. However differences still remain in the toroidal correction procedure.

4.9.3 References

[1] L.H. Andersen, P. J. Johanson, D. Kella, H. B. Pedersen, and L. Vejby-Christensen Phys. Rev. A **55** (1997) 2799.