ABSOLUTE CROSS SECTION FOR THE RESONANT PHOTODETACHMENT OF He^-

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In the course of preparation of a new apparatus for two-electron photodetachment studies, we reexamined the $1s2p^2\ ^4P^e$ resonance in the single photodetachment of the He^- ground state. Although numerous calculations [1, 2, 3] and experiments [4, 5, 6] have come to good agreement, some discrepancy remains regarding the absolute value of the cross section.

In our crossed beam set-up, a 4keV beam of He^- ions is produced by charge exchange with cesium vapor. A double deflection ensures their separation from positive ions and neutrals. The short lived components (J=1/2, 3/2) may however autodetach on their way to the interaction region, reducing the negative ion current and increasing the flux of neutral atoms to be separated by an electrostatic quadrupole deflector. A CW Ti-Saphire laser is used to scan the resonance located around 1 μm. The measured resonance energy, 1233.0 ± 0.1 meV, is in perfect agreement with the accurate value of Walter *et al* [5].

The absolute cross section measurement is based on the animated cross beam method [7], which was demonstrated for photodissociation by Blangé *et al* [8]. The laser beam is scanned across the ion beam in order to cover all possible overlap conditions, while the neutral flux is recorded through calibrated secondary emission measurement. The absolute cross section is then obtained by simple integration of the envelope of the signal as a function of beam offset.

The present value of $3.9 \pm 0.3 \times 10^{-15}$ cm^2 falls in better agreement with the value of Ramsbottom and Bell [2], i.e. 3.5755×10^{-15} cm^2, than the previous measurements of Walter *et al* [5] yielding a larger value of $5.8 \pm 2 \times 10^{-15}$ cm^2. The method may be applied to pulsed laser beams, and we intend to measure such absolute cross sections for single and double photodetachment involving higher-lying resonances.

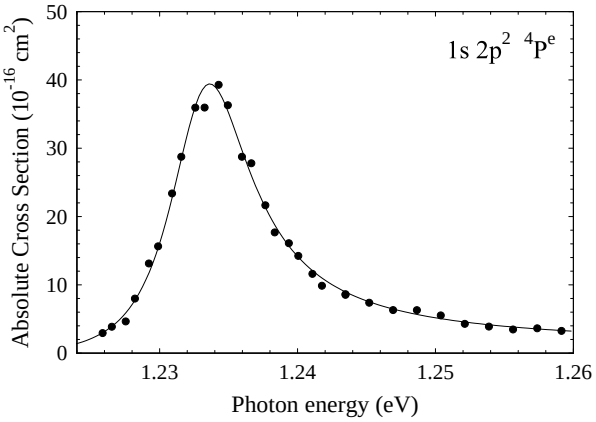

Fig. 1. Absolute photodetachment cross section - full line: fit according to resonance parametrization of Peterson *et al.*

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