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Coplanar asymmetric angles and symmetric energy sharing triple differential cross sections for 200 eV electron-impact ionization of Ar (3p)

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Synopsis We have measured triple differential cross sections (TDCSs) for electron-impact ionization of the 3p shell of Ar at 200 eV incident electron energy. The experiments have been performed in coplanar asymmetric energy sharing geometry. The experimental results are compared with the theoretical models of three body distorted wave (3DW) and distorted wave Born approximation (DWBA).

Cross sections for electron-impact ionization have been measured and calculated since the early days of collision physics since understanding the kinetics and dynamics of collisions is relevant to many practical applications.

The agreement between theoretical predictions and experiment has been improving especially for light atomic targets. Recently, the challenge for the theory is to extend new accurate methods for many electron atoms [1]. It has been recently shown by theory that describing multiple interactions between projectile and target, i.e. higher order effects, are important for these targets at intermediate energies [2-3]. Very recently [4], very good agreement between experiment and both the perturbative 3DW and non-perturbative BSR (*B*-spline *R*-matrix with pseudostates) was found for 64 eV ionization of Ne [4] in full 3 dimensions.

In this study, we measured TDCSs for 200 eV incident electron energy and equal energy sharing for outgoing electrons with $E_{sc}=E_{ej}=92.12$ eV for ionization of the inner shell Ar (3p) orbital. The kinematical arrangement used in the experiment is termed the coplanar asymmetric geometry, in which the scattered electron is detected at a fixed forward angle θ_{sc} in coincidence with an ejected electron detected at varying angles θ_{ej} . (Obviously we do not know which electron is scattered and which one is ejected but we use this terminology only to distinguish between the two final state electrons.) The experimental results are compared with recent DWBA and 3DW calculations (Figure 1). Although the DWBA and 3DW results are very similar, the 3DW is in noticeably better agreement with experimental data. The results will be discussed at the conference in detail.

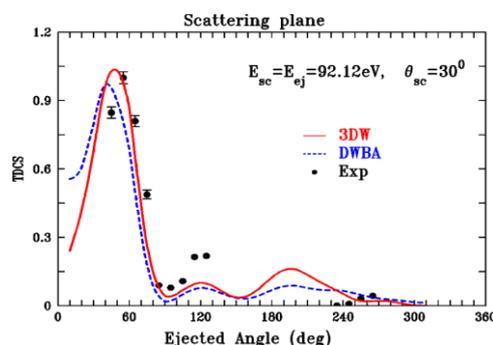


Figure 1. Experimental and theoretical TDCS results for Ar (3p) ionization at 200 eV electron impact.

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