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Editors:

B. Marinković and Z. Petrović

Institute of Physics
Belgrade, Yugoslavia

MINIMA IN DIFFERENTIAL CROSS SECTIONS FOR ELASTIC ELECTRON SCATTERING ON ARGON ATOM

D. Filipović*, V. Pejčev†, R. Panajotović and B. Marinković

Institute of Physics, 11001 Belgrade, P.O. Box 57, Yugoslavia

Differential cross sections (DCS) for scattering of electrons on atoms and molecules are the subject of our investigations. Binary electron-atom collisions are realized in our measurements by using an electron spectrometer and crossed-beam technique, both presented earlier [1].

In this work we concentrate our attention to the shape of DCS for elastic scattering of electrons on argon atoms. These DCS were determined by measuring angular distributions of elastically scattered electrons. After correction on effective scattering geometry, statistical meaning of typically five results obtained in different experimental conditions, and normalization to corresponding result by Srivastava et al. [2] at an angle θ, we obtained our DCS values. Incident electron energies were: 10, 20, 25, 30, 40, 50, 60, 75, 80, 90 and 100 eV. The energy resolution was approximately 50 meV. Scattering angles from 20° to 150° made the range wide enough to contain two local minima and local maximum between them in the DCS at chosen energy region. Special care was given to improve angular resolution and true scattering angle determination. Angular resolution was better then ±2°.

Comparison of the present DCS with DCS available in the literature shows satisfactory general agreement in shape. To establish a more sensitive test of agreement we compared positions of first minimum (Fig. 1.) and second minimum (Fig. 2.). This test shows existence of the first minimum atall given energies, in opposite to result by Nahar and Vadehra [3] around E=10 eV. Position of the second minimum falls off from approximately 140°

Present adresses:

* Faculty of Physics, University of Belgrade, 11001 Belgrade, P.O. Box 550, Yugoslavia

† Faculty of Physical and Mathematical Sciences, University of Kragujevac, 34000 Kragujevac, Yugoslavia

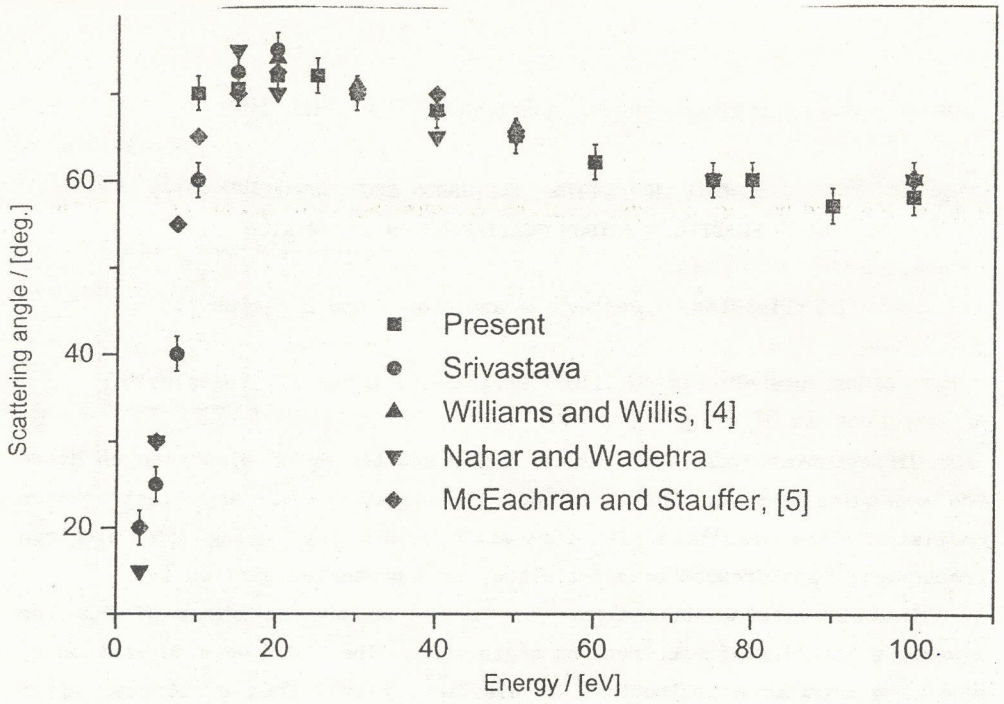

Figure 1: Position of first minimum of e⁻/Ar elastic scattering

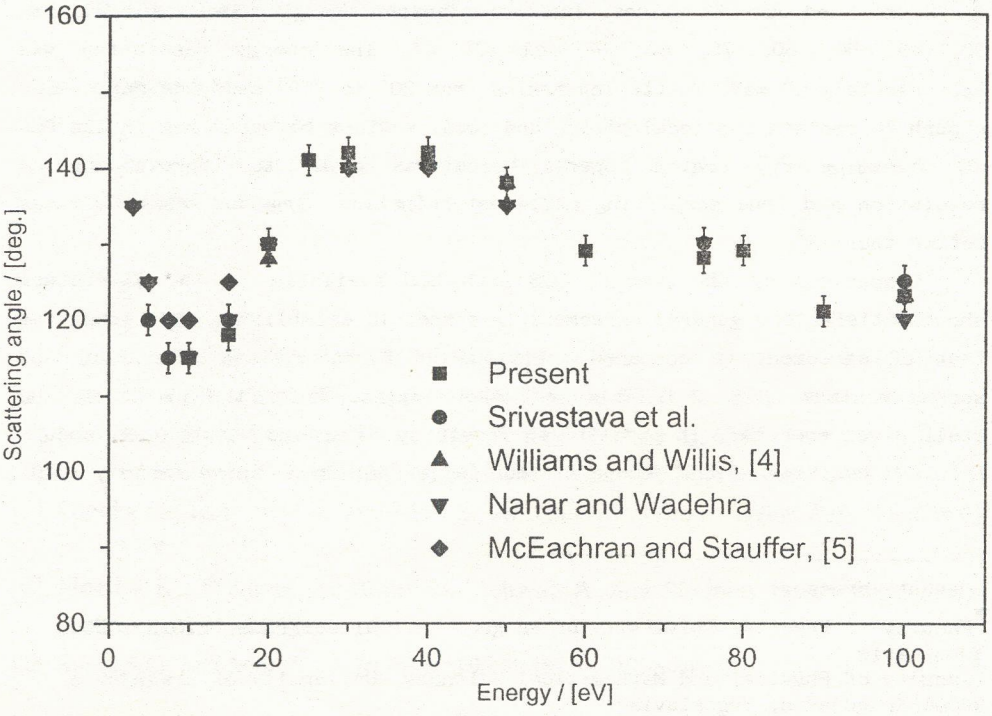

Figure 2 : Position of second minimum of e⁻/Ar elastic scattering

(at 30 eV) to approximately 115° (at E=10 eV). Agreement is not always satisfactory, specially with theoretical results. Position of the local maximum will be discussed on the conference, also.

This way of presentation is also important for better understanding the collision processes around DCS minima, at scattering angles where polarization of scattered electrons changes significantly in values, and in the sign, as well.

Beside the way of determination of the minima positions versus impact energy, presented here, we designed new mode of operation of the electron spectrometer with this measurement processed automatically.

Acknowledgment

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