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# DIFFERENTIAL CROSS SECTIONS FOR INELASTIC SCATTERING OF INTERMEDIATE ENERGY ELECTRONS BY ARGON ATOMS*

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Our aim is to determine differential cross sections for inelastic scattering of intermediate impact energy of electrons. Since we calibrate inelastic to elastic scattering at the same impact energy, we studied carefully the elastic scattering also. Argon atom is a convenient target for beginning, because there are available data to compare with. We employed electron spectrometer to run the experiment and preliminary data had been presented on the last SPIG[1]. Our data are completed now and we will show on the conference absolute values of differential cross sections for elastic and inelastic scattering of electrons.

The angular distributions for elastic scattering have been measured at: 10,15,20,25,30,40,50,60,75,80,90 and 100 eV impact energies and in the angular range from 20 to 150 degrees. The surface of elastic cross sections in the measured range of the angle and impact energy is shown in Figure 1. Each measurement of angular distribution has been repeated several times and the mean values have been corrected for the effectiv path length[2]. The obtained curves are normalized to data of Srivastava et al.[3] in order to get the absolute values. Data are also compared with available experimental and theoretical results and that comparision will be presented at conference.

For the impact energies: 16,20,30,40,50 and 80 eV, inelastic cross sections have been determined for the transitions given in Table 1., in the angular range $10^{o}$ to $150^{o}$.

The first four inalastic features at 20 eV impact energy are shown in Figure 2., together with experimental data

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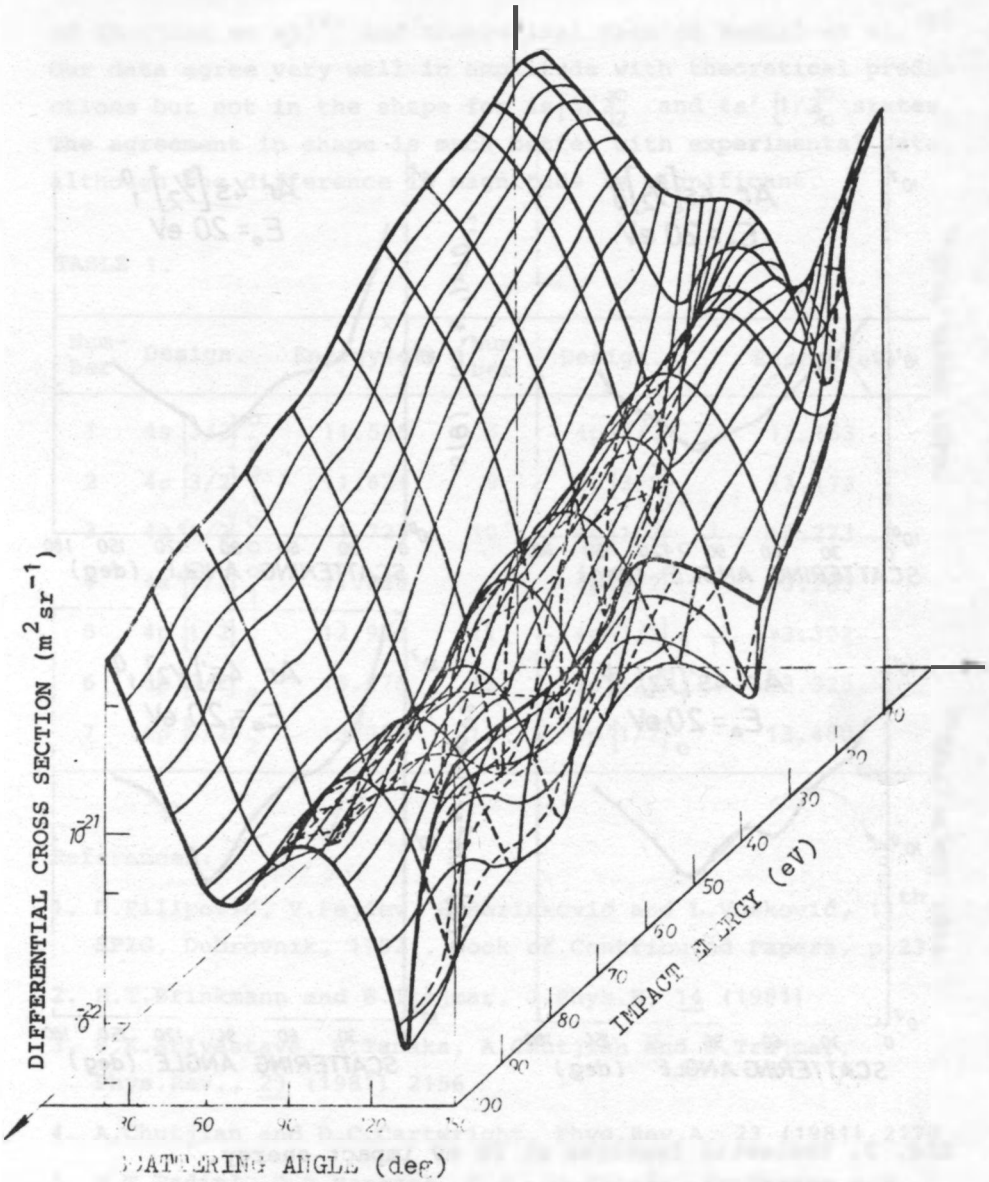


Fig. 1. Surface of the elastic cross sections for electron scattering by argon atoms

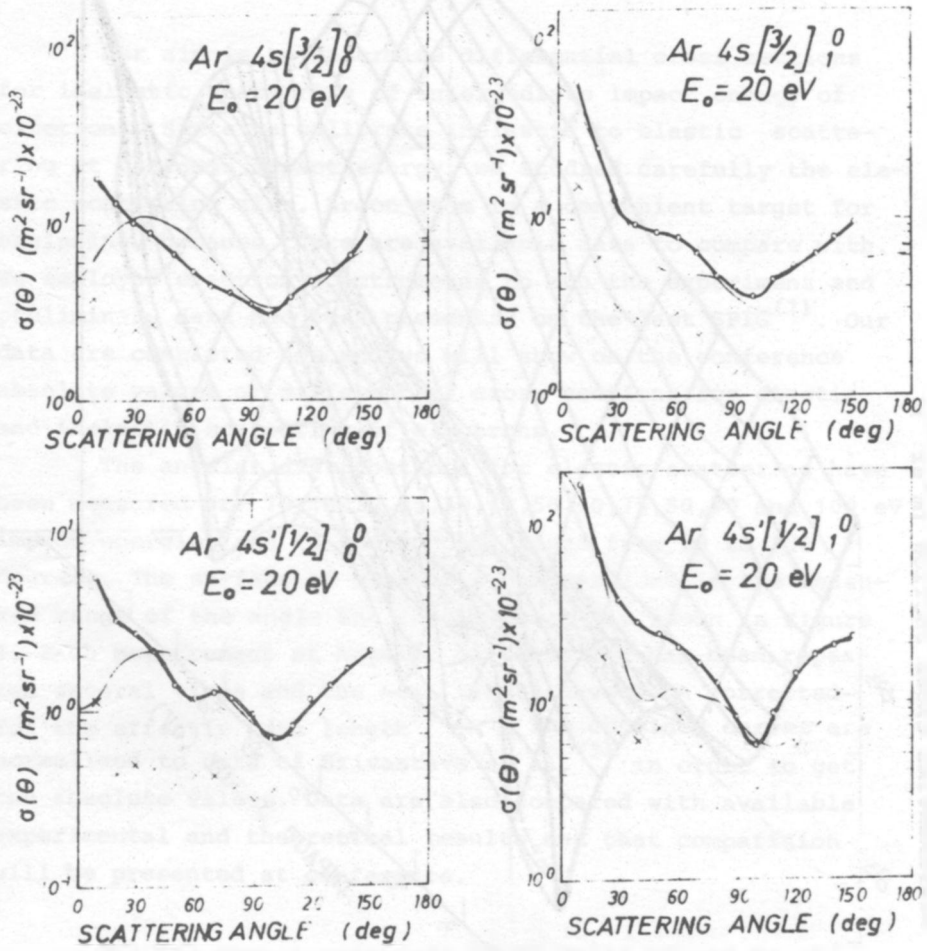


Fig. 2. Inelastic features at 20 eV impact energy. Solid line with circles (-o-) are present data, crosses (x) experimental values of Chutiian and Cartwright (Ref. ), solid line (—) theoretical results of Padial et al. (Ref.5)

of Chutjian et al.[4] and theoretical data of Padial et al.[5] Our data agree very well in amplitude with theoretical predictions but not in the shape for $4s\,[3/2]^{o}_{2}$ and $4s'\,[1/2]^{o}_{0}$ states. The agreement in shape is much better with experimental data, although the difference in magnitude is significant.

TABLE 1.

| Number | Design. | Energy(eV) | Number | Design. | Energy(eV) |
|---|---|---|---|---|---|
| 1 | $4s\,[3/2]^{o}_{2}$ | 11.548 | 8 | $4p\,[3/2]_{1}$ | 13.153 |
| 2 | $4s\,[3/2]^{o}_{1}$ | 11.624 | 9 | $4p\,[3/2]_{2}$ | 13.172 |
| 3 | $4s'\,[1/2]^{o}_{0}$ | 11.723 | 10 | $4p\,[1/2]_{0}$ | 13.273 |
| 4 | $4s'\,[1/2]^{o}_{1}$ | 11.828 | | $4p\,[3/2]_{1}$ | 13.283 |
| 5 | $4p\,[1/2]_{1}$ | 12.907 | 11 | $4p\,[3/2]_{2}$ | 13.302 |
| 6 | $4p\,[5/2]_{3}$ | 13.076 | 12 | $4p\,[1/2]_{1}$ | 13.328 |
| 7 | $4p\,[5/2]_{2}$ | 13.095 | 13 | $4p'\,[1/2]_{0}$ | 13.480 |

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