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ELECTRON IMPACT EXCITATION OF THE 3s3p ^{3}P STATE OF MAGNESIUM ATOM

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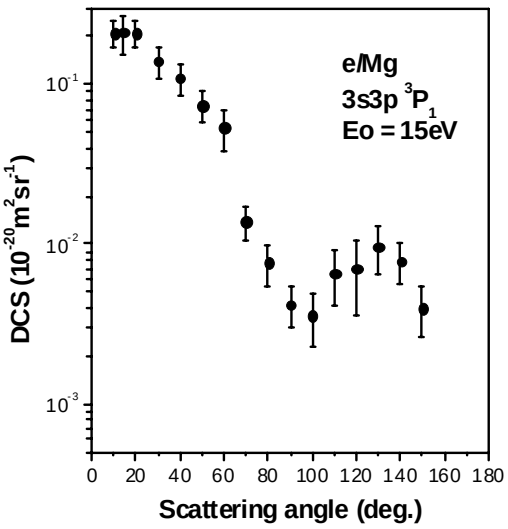
ABSTRACT Electron collisions with metal vapour atoms have been investigated by means of electron spectrometry utilizing crossed beam technique. Special attention is devoted to the second raw (IIA and IIB) elements of Periodic Table due to their electronic configuration. In the present contribution the differential cross sections (DCSs) for electron excitation of the first triplet P state of magnesium atom is presented. Optically allowed states have been already studied by the same group [1,2].

Energy loss spectra are recorded with 120 meV energy resolution. DCSs are measured at impact energies of 10, 15, 20, 40 and 60 eV and compared with available calculations [3] and other experiments [4]. The relative 3s3p ^{3}P to 3s3p $^1P_1$ ratios are obtained from energy loss spectra and absolute cross sections for the triplet state are determined from the absolute values of the singlet P state. DCSs are extrapolated to zero and 180^o scattering angles and integrated in order to get integral, momentum transfer CS.



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ELECTRON SCATTERING BY Ag ATOM AT SMALL SCATTERING ANGLES

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Interactions of electrons with silver atoms have been studied experimentally in the intermediate impact electron energy range from 10 to 100 eV. Here we present results of measurements of differential cross sections (DCSs) for excitation of $4d^{10}5p\ ^2P_{1/2,3/2}$ state of Ag atoms at small scattering angles up to 10^o and corresponding generalized oscillator strengths (GOS). In the crossed-beam arrangement where electron beam has been perpendicularly crossed by effusive atom beam the scattered electrons have been analysed in high resolution spectrometer ESMA which consists of the molybdenum hemispherical selectors in monochromator and analyser [1]. The well collimated effusive Ag vapour beam has been produced by heating oven crucible containing silver atoms. All the elements of the system are placed inside a high vacuum chamber.

The real zero position of the scattered signal has been determined from the symmetry at positive and negative scattering angles. The inelastically scattered electron current intensities are detected as a function of scattering angle up to 10^o and then converted to relative DCSs using the effective path length correction factors [2] determined for the present experimental conditions. The absolute values are obtained through the normalization procedure to the optical oscillator strength (OOS) [3]. This technique relies on the fact that the generalized oscillator strength tends to the optical oscillator strength as momentum transfer squared K^2 tends to zero. Normalized generalized oscillator strengths (GOS) for the observed transitions versus the squared momentum transfer (K^2) at 10, 20, 40, 60, 80 and 100 eV electron impact energies are shown in Fig.1. Other details as well as DCS results will be presented at the conference.

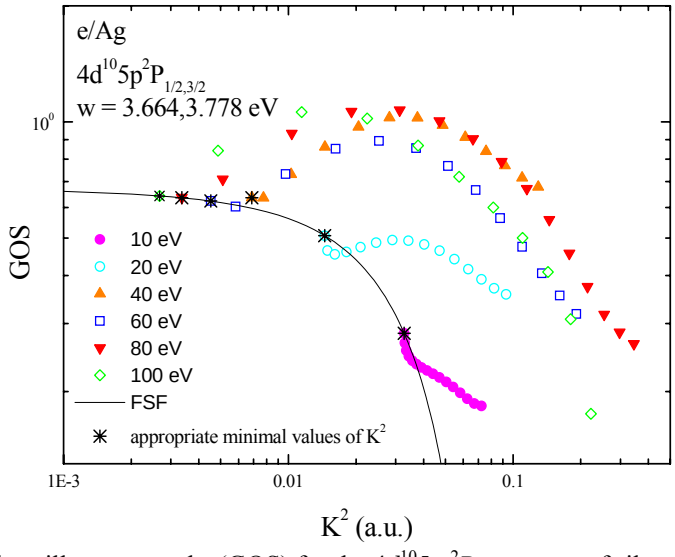

Fig 1. Generalized oscillator strengths (GOS) for the $4d^{10}5p\ ^2P_{1/2,3/2}$ state of silver versus momentum transfer squared (K^2).

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