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and Atomic Collisions

**VOLUME I**

**ABSTRACTS of  
CONTRIBUTED  
PAPERS**

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Continuing our investigation of the inelastic electron scattering in magnesium [1] we have extended our interest at electron impact excitation of the  $3s3d\ ^1D_2$  state. Papers related with excitation of the  $3s3d\ ^1D_2$  state in magnesium are rare. Differential cross sections (DCSs) for  $3s3d\ ^1D_2$  excitation were measured by Williams and Trajmar [2] at 10, 20 and 40 eV electron impact energies. Mitroy and McCarthy [3] calculated DCS using five-state close coupling (CC5) approximation. Kaur *et al.* [4] used the relativistic distorted-wave (RDW) approximation; and Srivastava *et al.* [5] used RDW-approximation in single-configuration ground state (SCGS) and multi-configuration ground state (MCGS) approach for calculation of the  $3s3d\ ^1D_2$  DCS.

The apparatus used in the measurements is a for the conventional cross-beam spectrometer. DCSs for the  $3s3d\ ^1D_2$  state were determined from  $4^\circ$  to  $150^\circ$  scattering angles on the basis of the  $(3s3d)^1D_2/(3s3p)^1P_1$  intensity ratios, in energy-loss spectra and DCSs for the  $3s3p\ ^1P_1$  state were reported in [1]. The  $3s3d\ ^1D_2$  state in energy-loss spectra is completely resolved from other close states ( $3s4s\ ^1S_0$  and  $3s4p\ ^1P_1$ ). The measurements were carried out at the temperature 780 K. Angular resolution of the spectrometer is estimated to be  $1.5^\circ$ , and the overall system energy resolution is 120 meV. The energy scale was calibrated against the  $3s3p\ ^1P_1$  excitation threshold of Mg at 4.346 eV.

In order to compare our experimental  $(3s3d)^1D_2/(3s3p)^1P_1$  intensity ratios with other available results we calculated this ratio for Williams and Trajmar [2] measurement and MCGS [5] and CC5 [3] calculations. These ratios are presented at figure 1. It appears that there is good agreement among all results at small scattering angles (up to  $60^\circ$ ). At higher scattering angles agreement in magnitude between both theories and both measurements is relatively good. The agreement is better in shape and

minima and maxima positions of the ratios. From presented result we can conclude that both measurements and the theoretical calculations should be improved toward better agreements.

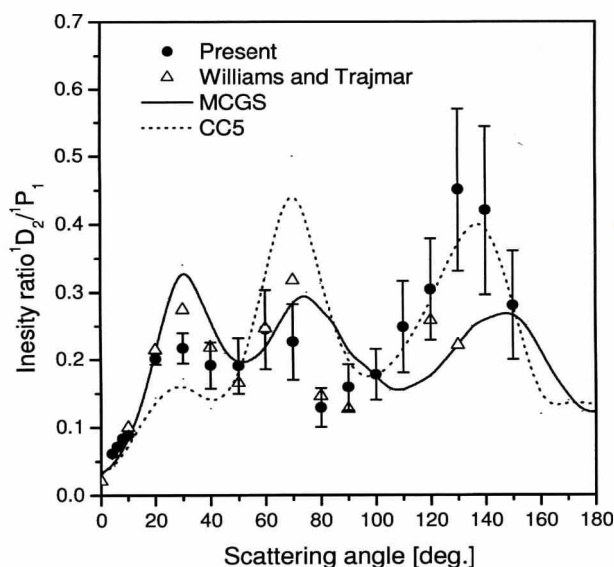


Fig. 1 Intensity ratio  $^1D_2/^1P_1$  versus scattering angle at  $E_0=20$  eV impact energy.

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