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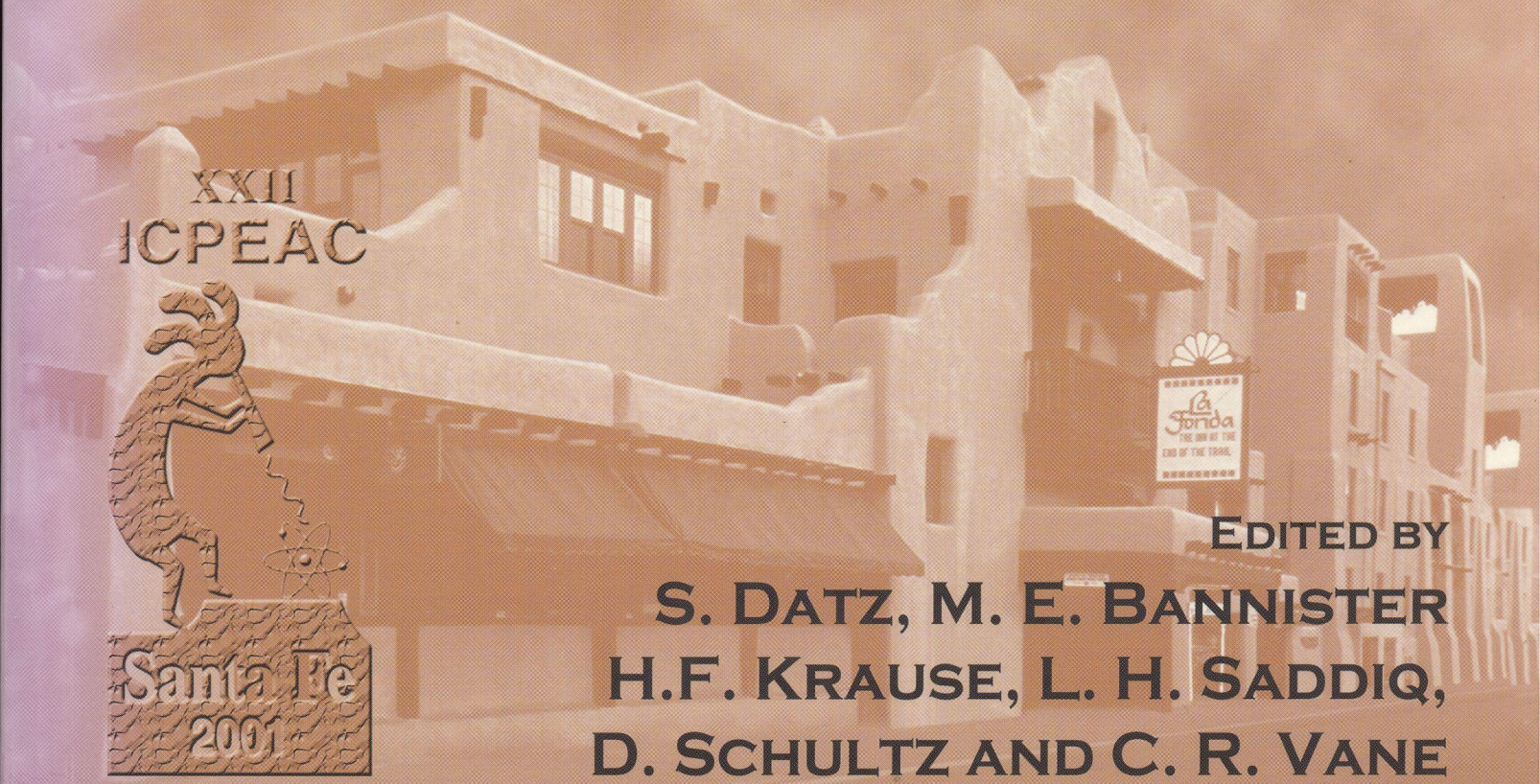

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GENERALIZED OSCILLATOR STRENGTHS FOR e-Zn SCATTERING AT SMALL ANGLES

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After presenting relative differential cross section (DCS) measurements for elastic electron scattering by zinc[1], here we present generalized oscillator strengths (GOS) for the 4^1P and 5^1P states of zinc excited by electron impact. There exist very few data on electron excitation of zinc atom, experimental data of DCS by Williams and Bozinis [2] (1975) at single energy of 40 eV, and theoretical paper by Kaur *et al* [3] (1997), who calculated DCSs, Sherman functions and Stokes parameters for three incident electron energies (10, 20 and 40 eV) for the 4^1P and $4^3P_{0,1,2}$ states, in the relativistic distorted-wave approximation scheme. The experiment we performed is of the crossed- beam type and it has been described elsewhere [4]. The zinc vapour beam was produced in titanium oven at temperatures from 430 to 470 °C. The overall energy resolution of about 100 meV has been enough to resolve all excited states (below the ionization limit). The angular resolution was 1.5^o with the positioning accuracy of 0.2^o.

Firstly, we have measured angular distribution of scattered electrons that lost 5.8 eV, that correspond to the 4^1P state in energy loss spectrum. The measurements have been performed at each 2 degrees from -10^o to $+10^o$. From the symmetry of the obtained angular distribution, exact zero position was determined and angular scale was corrected. Then, angular distributions were multiplied by effective path length correction factor according the results of Brinkman and Trajmar [5] (1981) modified for background pressure (80 Pa) and collisional cross section for zinc atoms (2.6×10^{-19} m^2). So obtained differential cross sections were converted to relative GOS. Absolute scale was reached through normalization to the optical oscillator strength (OOS) by utilizing forward scattering function (fsf) (Avdonina *et al* 1997)[6]. A value of 1.41, result by Lurio *et al* [7] was used. GOS for the 4^1P state is presented in figure 1.

Secondly, we have measured intensity ratio between the 4^1P and 5^1P states in the energy loss spectrum at one scattering angle. The procedure for obtaining GOS for the 5^1P state was the same as for the 4^1P. But now we have absolute values of GOS from which we could determine optical oscillator strength for this transition. To our knowledge, there is no available data for OOS for the 5^1P transition to the ground state.

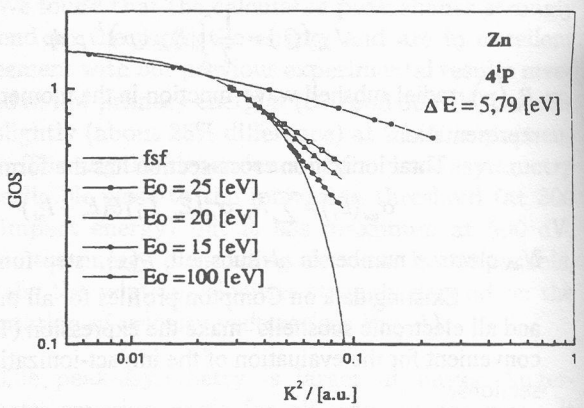

Figure 1. Generalized oscillator strengths for electron excitation of the 4^1P state of zinc atom, at 15, 20, 25 and 100 eV impact energy.

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