Coincidence studies of electron impact excitation of Zn atoms

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In recent years there has been a growing interest in zinc as a replacement material for toxic mercury in discharge lamps [1]. However, insufficient knowledge of both the Zn properties and mechanisms of the collisional excitation of the atomic states of interest has been a serious obstacle to improving the Zn bulb technology. Due to limited experimental and theoretical data on electron scattering from zinc atoms, recently some attention has been focused in this direction [2,3,4].

The electron-photon coincidence experiment in the coherence analysis version was used to obtain the most detailed information about impact excitation of zinc atoms to 4^1P_1 state. The present work is a continuation of our research on electron impact excitation of Zn atom [2,3] and a part of broader studies concerning the atoms with two valence electrons outside relatively inert core like Ca [5], Cd [6,7] and He [8]. Geometry of the experiment which was typical for the coherence analysis technique and the experimental set-up and procedures were described in our earlier work [2].

Stokes and Electron Impact Coherence Parameters (EICPs) for electronic excitation of 4^1P_1 state of zinc atoms has been measured for incident electron energy of 60 eV. Examples of graphical representations of angular distributions of the electron charge cloud of the excited 4^1P_1 state of Zn corresponding to the values of the EICPs for angles 10° and 20° are presented in Figure 1.

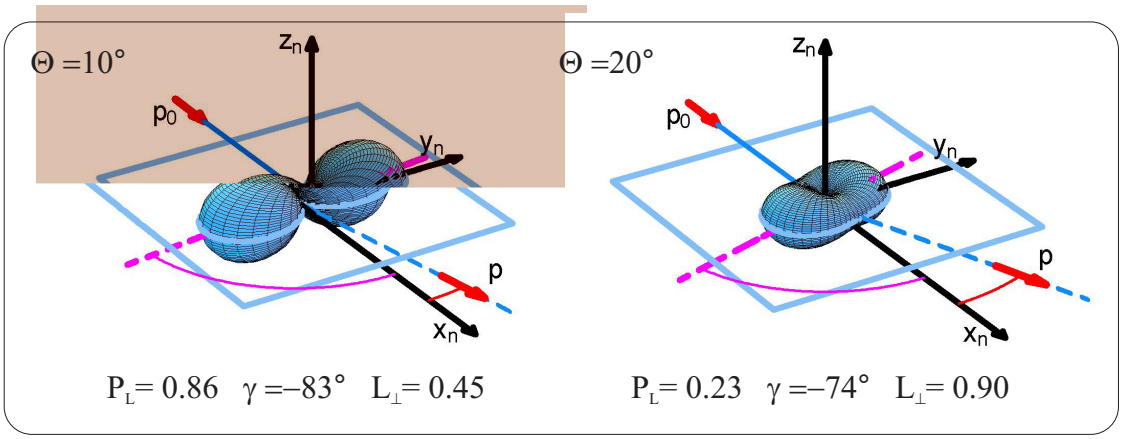

Figure 1: *Graphical representations of angular distribution of electron charge cloud corresponding to the measured EICPs for Zn 4^1P_1 excitation by 60 eV electrons for scattering angles 10 ° and 20 °.*

References

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