Second order Born effects in the perpendicular plane ionization of Xe (5p) atoms

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Studies on atomic collisions have been a field of intense activity in atomic physics. The study of charged particle impact ionization has received a lot of attention from experimental and theoretical work in the past three decades. The electron-impact single ionization, called \((e, 2e)\) processes, has become a powerful tool to investigate the dynamics of the ionization process. Ionization is a technique which is used as a tool to probe target wave functions. The calculation of triple differential cross section opens up a whole new area of theoretical study and offers a direct insight into the subtleties of spin-dependence and other purely relativistic effects etc. Since the first coincident measurement of \((e, 2e)\) process on atoms by Erhardt et al\[1\] and Amaldi et al [2] extensive theoretical and experimental investigations have been done to measure the TDCS.

Recently Purohit et al. [3] reported the results of TDCS for the perpendicular plane ionization of Ne and Ar atoms. We report in this communication the differential cross section (DCS) results for the perpendicular plane ionization of xenon atoms at incident electron energies 40 eV , 30 eV, 20 eV, 10 eV and 5 eV above ionization potential. The cross sections have been calculated in the modified distorted wave Born approximation formalism including the second order Born (SBA) amplitude. We compare the \((e, 2e)\) TDCS result of our calculation with the very recent measurements of Nixon and Murray [4] and relativistic DWBA-G results of Illarionov and Stauffer [5]. We will discuss the role of second order interaction in the ionization of Xe atoms.

References