

Probing collision dynamics of atoms, ions and molecules via electron impact ionization

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Ionization of targets such as atoms, ions, and molecules by charged projectiles such as electrons / positrons has been studied from a long time and has various applications; few may be listed as diagnostics of fusion plasmas, modeling of physics and chemistry related to atmosphere, understanding the effect of ionizing radiation on biological tissues etc. The detailed information about this kind of collision processes are obtained from cross sections. Particularly, the triple differential cross section (TDCS) obtained through the coincidence study has been of interest since the pioneering work of Ehrhardt group [1]. Coincidence study of TDCS has been of particular interest since it provides full information about the collision dynamics and momentum vectors of all the free particles involved in the ionization are determined.

Good amount of ionization cross section studies have been reported for the atomic targets [2]. From last decade the molecular targets have also been studied for the ionization processes [2, 3] as well as electron momentum spectroscopy studies [4]. We report the results of our recent work on calculation of electron impact ionization cross sections for atomic (Ar, Xe, W, Be) [5, 6], ionic (charged states of Be and W) [7] and molecular (N₂, H₂O and CO₂) [8] targets. We will review briefly the status of charged particle ionization processes from targets with introductory idea about the theoretical formalism involved and results for the electron impact ionization of atomic / ionic / molecular targets will be discussed.

References:

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