Binary-encounter-dipole model for positron impact direct ionization

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Kim and Rudd [1] developed a parameter-free binary-encounter-dipole (BED) model for electron impact ionization of atoms and molecules. They combined the modified Vrien's symmetric binary encounter theory [2] including interference between the direct and the exchange terms and the Bethe theory [3] for fast incident electrons. This model has been shown to be remarkably accurate for ionization of atoms, ions, and molecules [4]. Different modified versions of BED have been proposed in order to expand the applicability of this theoretical approach, see e.g. [5]. However this model has not been tested accurately for positron impact direct ionization so far. BED can be used to calculate positron impact cross sections with simple exclusion of the exchange and the interference terms. The recent progress in the development of positron beam techniques, see e.g. [6] allowed for accurate measurements of positron direct ionization cross-sections. The current database of experimental cross-sections is rich enough in order to carry out comparative studies for semi-empirical models such as BED. In this work the applicability of BED model is tested for positron direct ionization of several targets (H, He, H_2, Ne).

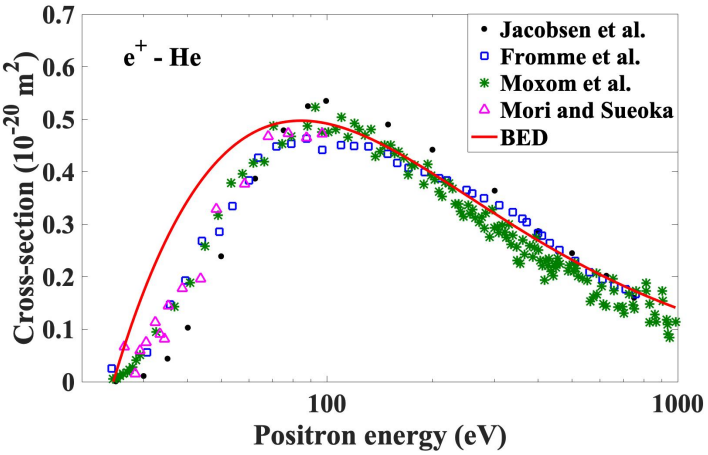

Figure 1 *Positron impact direct ionization cross-sections for helium. BED compared with experimental data by Jacobsen et al. [J. Phys. B: At. Mol. Opt. Phys. 28, 4691 (1995)], Fromme et al. [Phys. Rev. Lett. 57, 3031 (1986)], Moxom et al. [Can. J. Phys. 74,367 (1996)], and Mori and Sueoka [J. Phys. B: At. Mol. Opt. Phys. 27, 4349 (1994)].*

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