Calculation of the total cross section for the ionization of H, He, Ne and Ar atoms by bare ions at the high energy range

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(Received 24 September 2018; in final form 20 January 2019)

Abstract
In the present work, the total cross-section for the ionization of H, He, Ne and Ar atoms by H\(^+\), He\(^{2+}\) and Li\(^{3+}\) ions has been calculated. In these calculations, a binary encounter approximation in the form of a two-body process between projectile ions and atomic electrons at the high energy range has been implemented. In order to enter the nuclear role of the target atom, the atomic electron velocity distribution function for H, He, Ne and Ar atoms was calculated and the average cross-section was obtained. In these calculations, the Hartree Fock wave functions were used to describe the ground state of He, Ne and Ar atoms. Also, in the calculations related to atomic helium, a single-parameter wave function was used. Finally, the findings were compared with the available experimental and theoretical results.

Keywords: ionization, total cross section, binary encounter approximation, velocity distribution function, Hartree Fock wave function

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