



Iranian Journal of Physics Research, Vol. 17, No. 3, 2017

## Theoretical study of anti-hydrogen atom production by charge rearrangement process with anti-proton-positronium atom impact

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(Received 24 April 2016 ; in final form 24 December 2016)

### Abstract

In the present work the calculation of differential and total cross section for production of anti-hydrogen atom in the ground and some excited states has been done by various rearrangements of Hamiltonian and using of electronic and electron-antiproton interaction potentials as plane wave Born and coulomb distorted wave Born approximations in intermediate and high impact energy ranges. In this calculations the positronium atom was considered in the ground state and the probability of forming anti-hydrogen atom at the ground and the  $2s, 2p$  excited states was examined. At last, the achieved differential and total cross section results were compared with different available experimental and theoretical datas. The results show that the approximation of plane wave Born in the charge rearrangement channel, unlike the excitation channel found better results compared with Coulomb distorted wave Born approximation.

**Keywords:** anti-Hydrogen, positronium, differential cross section, coulomb wave function

For full article, refer to the Persian section