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Theoretical study of antihydrogen formation reactions in the three body e-e+$\bar{p}$ system via Faddeev-Merkuriev equations in total orbital momentum representation

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Theoretical study of antihydrogen formation reactions in the three body e-e+$\bar{p}$ system via Faddeev-Merkuriev equations in total orbital momentum representation

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We present the results of calculations of low-energy reaction in the three body e-e+$\bar{p}$ system with the emphasis on the process of the antihydrogen formation from the ground and excited states of the positronium. This reaction is important for some of the current antimatter experiments [1, 2]. The multi-channel scattering calculations are based on a new highly efficient method of solving the Faddeev-Merkuriev equations in total orbital momentum representation [3]. We discuss the effects that originate from the long-range dipole interaction between the excited atom and the spectator particle [4, 5]. Among them are the Gailtis-Damburg oscillations in the total and partial cross sections.

1. G. Testera et al. (AEgIS Collab.), Hyperfine Interact. 233, No. 1-3, 13 (2015).
2. P. Pérez et al., Hyperfine Interact. 233, No. 1-3, 21 (2015).
3. V.A. Gradusov et al., Commun. Comput. Phys. 30, No. 1, 255 (2021).
4. M. Gailitis, J. Phys. B: Atom. Mol. Phys. 9, 843 (1976).
5. M. Gailitis and R. Damburg, Sov. Phys. JETP 17, No. 5, 1107 (1963).

The speaker is a student or young scientist

Yes

Section

1. Nuclear structure: theory and experiment

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