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A Four-Body Theoretical Approach to Proton Impact Ionization of Helium MATT FOSTER, JERRY L. PEACHER, DON H. MADISON, MICHAEL SCHULZ, NATALIYA MAYDANYUK, AHMAD HASAN, University of Missouri-Rolla — Very recently, experimental measurements have been made for single ionization of helium by 75 keV proton impact for fixed ejected electron energies and different momentum transfers. These experiments further demonstrate the fact that the fundamental physics governing a simple collision process is still not well understood. The fully quantum mechanical model 3DW-EIS (three-distorted-wave-eikonal-initial-state), which worked well for higher energy C^{6+} ionization of helium, does not give good agreement with absolute experiment for this case. However, the 3DW-EIS model treats the collision as a three-body process (projectile, ion, ejected electron). This suggests that a three-body model may not be appropriate for lower collision energies. Consequently, we will present a complete four-body model which takes all two particle Coulomb interactions (six in total) into account on equal footing.

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