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Three-Body Dynamics in Single Ionization of Atomic Hydrogen by 75 keV Proton Impact

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Synopsis We have measured and calculated doubly differential cross sections for ionization of atomic hydrogen using 75-keV proton impact for fixed projectile energy losses as a function of scattering angle.

We have measured and calculated doubly differential cross sections for ionization of atomic hydrogen using 75-keV proton impact for fixed projectile energy losses as a function of scattering angle. This collision system represents a pure three-body system and thus offers an accurate test of the theoretical description of the few-body dynamics without any complications presented by electron correlation in many-electron targets. Comparison between experiment and several theoretical models reveals that the projectile-target nucleus interaction is best described by the operator of a second-order term of the transition amplitude. Higher-order contributions in the projectile-electron interaction, on the other hand, are more appropriately accounted for in the final-state wave function.

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