

Abstract Submitted  
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**Ionization and excitation in collisions between antiprotons and H(1s) atoms** THOMAS WINTER, Pennsylvania State University — Coupled-state cross sections have been determined for ionization and excitation to states up to H(3d) in collisions between 1 keV to 16 MeV antiprotons and H(1s) atoms<sup>1</sup> using the same two-center, as well as one-center, Sturmian bases as for proton projectiles.<sup>2</sup> A detailed comparison and strong contrast at lower energies is made with results for equi-energy proton projectiles, while at high energies all cross sections are tied explicitly to the first-Born limit to better than 1%. The use of a double-center basis for antiproton projectiles, in spite of there being no capture channels, was first suggested and carried out by Toshima with a large Gaussian basis<sup>3</sup>; it provides both additional variational freedom and allowance for antiproton-centered effects, including charge-cloud depletion. Results will be compared with recent theoretical results<sup>4</sup> and earlier results, including experimental ionization cross sections.<sup>5</sup>

<sup>1</sup>T. G. Winter, Phys. Rev. A (in press).

<sup>2</sup>T. G. Winter, Phys. Rev. A **80**, 032701 (2009).

<sup>3</sup>N. Toshima, Phys. Rev. A **64**, 024701 (2001).

<sup>4</sup>M. McGovern, D. Assafrão, J. R. Mohallem, C. T. Whelan, and H. R. J. Walters, Phys. Rev. A **79**, 042707 (2009).

<sup>5</sup>H. Knudsen, U. Mikkelsen, K. Paludan, K. Kirsebom, S. P. Møller, E. Uggerhøj, J. Slevin, M. Charlton, and E. Morenzoni, Phys. Rev. Lett. **74**, 4627 (1995).

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