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Positronium Collisions with Atoms and Molecules¹

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Electron exchange and correlations play an important role in low-energy positronium (Ps) collisions with atom and molecules since the static potential for Ps interaction with a neutral system is zero. In particular the electron exchange is responsible for the observed similarity between electron and Ps collision cross sections when they are plotted as functions of the projectile velocity [1]. We have performed Ps scattering calculations for several atomic and molecular targets using the free electron gas model for exchange and correlation potentials [2]. Our results confirm experimental observations, although at low energies theoretical collision cross sections are often higher than the experimental results. The similarity between electron and Ps scattering extends to low-energy resonances observed in electron and Ps collisions with nitrogen molecules [3,4]. This work was done in collaboration with Robyn Wilde. [1] S. J. Brawley, S. Armitage, J. Beale, D. E. Leslie, A. I. Williams, and G. Laricchia, *Science* **330**, 789 (2010). [2] I. I. Fabrikant and R. S. Wilde, *Phys. Rev. A* **97**, 052707 (2018). [3] M. Shipman, S. J. Brawley, L. Sarkadi, and G. Laricchia, *Phys. Rev. A* **95**, 032704 (2017). [4] R. S. Wilde and I. I. Fabrikant, *Phys. Rev. A* **97**, 052708 (2018).

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