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Zeeman Relaxation in Cold Aluminum–Helium and Antimony–Helium Collisions YAT SHAN AU, COLIN CONNOLLY, EUNMI CHAE, TIMUR TSCHERBUL, JOHN DOYLE, Harvard University — We present the combined experimental and theoretical study of aluminum–helium and antimony–helium collisions at 800mK. Zeeman relaxation in atom–helium collisions can serve as a probe of the atom–helium interaction potentials. The relaxation mechanisms are different for the two species. In the case of aluminum, due to a spherical electron distribution, Zeeman relaxation is expected to be slow in the pure $^2P_{1/2}$ ground state. However, during a collision the anisotropic $^2P_{3/2}$ excited state is mixed with the ground state, causing rapid relaxation. Our results further confirm the theoretical model previously developed for indium and gallium. In the case of antimony, despite being nominally a spherical S–state ($^4S_{3/2}$), spin–orbit coupling mixes states with nonzero angular moment into the ground state, and hence introduces electronic anisotropy into its interaction with helium. This work extends our understanding of cold collisions in pnictogens.

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