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Cold collisions of OH with He EDMUND MEYER, MANUEL LARA, JOHN BOHN, JILA and Dept. of Physics, Univ. of CO, Boulder — Cooling polar molecules is the next big step in achieving control of the microscopic world. The rich structure of diatomic molecules, as compared to atoms, presents a new level of difficulty in attaining such a feat. Possibilities for state-changing collisions can be fairly high due to small nuances in the structure of the molecule. Most studies up till now focus on cold collisions (mK range) between He and molecules in Σ symmetries, meaning zero electronic orbital angular momentum about the internuclear axis. The interest in He is due to the advancement and success of buffer gas cooling. Our understanding of energy transfer in cold collisions will be broadened by considering molecules in other symmetries. To this end, we consider cold collisions of a molecule in Π symmetry, meaning one unit of electronic orbital angular momentum. The way in which energy is shuffled in this type of molecule is funadamentally different than previous studies due to the change in Hund's case from (b) to (a). We present the first calculations of cold collisions of He with diatomic molecules in Π symmetries including the effects of hyperfine structure. We focus primarily on the collisions between He and OH, which is a molecule of much interest to both the experimental and theoretical groups working in the field of cold collisions of molecules.

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