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Controlling the Stereodynamics of Cold Molecular Collisions<sup>1</sup> N. BALAKRISHNAN, University of Nevada, Las Vegas, NV 89154, J. F. E. CROFT, Department of Physics, University of Otago, Dunedin, New Zealand, MENG HUANG, HUA GUO, University of New Mexico, Albuquerque, NM 87131 — We report numerically-exact quantum scattering calculations for low-energy collisions of quantum-state prepared HD with H<sub>2</sub>. Excellent agreement is obtained with recent measurements of Perreault et al. for the angular distribution of scattered HD at a collision energy of ~ 1 K. By state-preparation of the HD molecules, control of the angular distribution of scattered HD was demonstrated. The stereo-dynamic control is achieved by the ability to choose a single or a coherent superposition of quantum states. We present a first-principles simulation of the experiment which enables us to attribute the main features of the observed angular distribution to a single L = 2 partial-wave shape resonance.

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