Abstract Submitted
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Cold and ultracold H_2-H_2 collisions on high accuracy ab initio potentials[1] N. BALAKRISHNAN, S. FONSECA DOS SANTOS, Department of Chemistry, University of Nevada Las Vegas, NV 89154, R.C. FORREY, Penn State University, Berks Campus, Reading, PA 19610, P.C. STANCIL, University of Georgia, Athens, GA 30602, P. JANKOWSKI, Department of Quantum Chemistry, Institute of Chemistry, Nicolaus Copernicus University, PL-87-100 Torun, Poland, K. SZALEWICZ, Department of Physics and Astronomy, University of Delaware, Newark, Delaware 19716 — We report quantum calculations of rovibrational transitions in H_2 + H_2 collisions on different ab initio potential surfaces (PESs). The PESs employed include the six-dimensional interaction potential of Hinde [1] and a hybrid potential constructed from the Hinde potential and the high accuracy 4-dimensional PES of Patkowski et al. [2]. Results show that vibrational relaxation cross sections are sensitive to details of the potentials at low energies but the sensitivity is significantly suppressed for quasiresonant transitions that involve small energy gaps and that conserve the total rotational angular momentum of the colliding molecules. Additionally, we present results for $H_2(v = 2)$ + $H_2(v = 0)$ collisions and explore competition between vibration-vibration (VV) transfer leading to $H_2(v = 1)$ +$H_2(v = 1)$ products and vibration-translation (VT) transfer yielding $H_2(v = 1)$ + $H_2(v = 0)$ products. Results show that the VV process dominates over the VT process, in agreement with available experimental data. [1] Robert J. Hinde, J. Chem. Phys. **128**, 154308 (2008). [2] K. Patkowski, W. Cencek, P.Jankowski, K. Szalewicz, J. B. Mehl, G. Garberoglio, and A. H. Harvey, J. Chem. Phys. **129**, 094304 (2008).

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