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Simple model for molecular scattering[1] NIRAV MEHTA, Department of Physics and Astronomy, Trinity University, CHRISTOPHER TICKNOR, Theoretical Division, Los Alamos National Laboratory, KADEN HAZZARD, Department of Physics and Astronomy, Rice University — The collisions of ultracold molecules are qualitatively different from the collisions of ultracold atoms due to the high density of bimolecular resonances near the collision energy. We present results from a simple N-channel scattering model with square-well channel potentials and constant channel couplings (inside the well) designed to reproduce essential features of chaotic molecular scattering. The potential depths and channel splittings are tuned to reproduce the appropriate density of states for the short-range bimolecular collision complex (BCC), which affords a direct comparison of the resulting level-spacing distribution to that expected from random matrix theory (RMT), namely the so-called Wigner surmise. The density of states also sets the scale for the rate of dissociation from the BCC to free molecules, as approximated by transition state theory (TST). Our model affords a semi-analytic solution for the scattering amplitude in the open channel, and a determinantal equation for the eigenenergies of the short-ranged BCC. It is likely the simplest finite-ranged scattering model that can be compared to expectations from the approximations of RMT, and TST. The validity of these approximations has implications for the many-channel Hubbard model recently developed

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