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Universality and chaotic dynamics in reactive scattering of ultracold KRb molecules with K atoms[1] MING LI, Temple University, CONSTANTINOS MAKRIDES, JQI and NIST Gaithersburg, ALEXANDER PETROV, SVETLANA KOTOCHIGOVA, Temple University, JAMES F. E. CROFT, NADUVALATH BALAKRISHNAN, University of Nevada, Las Vegas, BRIAN K. KENDRICK, Los Alamos National Laboratory — We study the benchmark reaction between the most-celebrated ultracold polar molecule, KRb, with an ultracold K atom. For the first time we map out an accurate *ab initio* ground potential energy surface of the K_2Rb complex in full dimensionality and performed a numerically exact quantum-mechanical calculation of reaction dynamics based on coupled-channels approach in hyperspherical coordinates. An analysis of the adiabatic hyperspherical potentials reveals a chaotic distribution for the short-range complex that plays a key role in governing the reaction outcome. The equivalent distribution for a lighter collisional system with a smaller density of states (here the Li_2Yb trimer) only shows random behavior. We find an extreme sensitivity of our chaotic system to a small perturbation associated with the weak non-additive three-body potential contribution that does not affect the total reaction rate coefficient but leads to a significant change in the rotational distribution in the product molecule. In both cases the distribution of these rates is random or Poissonian.

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