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Über-Resonant Scattering of Ultracold Molecules[1] MICHAEL MAYLE, BRANDON P. RUZIC, JOHN L. BOHN, JILA, University of Colorado Boulder and National Institute of Standards and Technology — Compared to purely atomic collisions, ultracold collisions involving molecules have the potential to support a much larger number of Fano-Feshbach resonances due to the huge amount of ro-vibrational states available. For example, for Rb+KRb collisions we expect tens to hundreds resonances within one Gauss of magnetic field, depending on the partial wave of the collision. In order to handle such ultracold atom-molecule collisions, we formulate a theory that incorporates the ro-vibrational Fano-Feshbach resonances in a statistical manner while treating the physics of the long-range scattering, which is sensitive to such things as hyperfine states, collision energy and any applied electromagnetic fields, exactly within multichannel quantum defect theory. Uniting these two techniques, we can assess the influence of "über-resonant" scattering in the threshold regime, and in particular its dependence on the hyperfine state selected for the collision. This allows us to explore effects such as the onset of so-called Ericson fluctuations, which are well-known in nuclear physics but completely new in the ultracold domain.

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