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A quantum defect theory of near-threshold molecular Feshbach resonance states PAUL JULIENNE, NIST, CHENG CHIN, University of Chicago, EITE TIESINGA, NIST — The framework provided by multichannel quantum defect theory (MQDT) [1,2] provides an excellent way to classify the near-threshold molecular vibrational states associated with magnetically tunable Feshbach resonances of two cold atoms. The separation of energy and length scales between long- and short-range interactions permit the definition of a dimensionless resonance strength parameter that determines, along with the analytic properties of the long-range potential, near threshold scattering and bound state properties. The MQDT bound state equations based on the long-range potential [2] yield a simple theory for near-threshold bound states. While resonance strengths span order of magnitude in practice, near-threshold molecular bound states fall into two broad classes, those where the bound state has primarily entrance channel character or those where it has primarily closed channel character as magnetic field is tuned over the width of the resonance. Most resonances tend to be closed channel dominated, including the very broad ^{7}Li resonance near 720 G, whereas the ^{85}Rb, ^{6}Li, and ^{40}K resonances successfully used in many quantum degenerate gas experiments are open channel dominated. See also [3]. 1. F. H. Mies, J. Chem. Phys. 80, 2514(1984) 2. F. H. Mies and M. Raoult, Phys. Rev. A 62, 012708(2000) 3. T. Köhler, K. Góral, and P. S. Julienne, Rev. Mod. Phys.78, 1311 (2006)

Paul Julienne
NIST

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