

Abstract Submitted  
for the DAMOP10 Meeting of  
The American Physical Society

**Analysis of ultracold Rb + Yb collisions** STEPHEN MAXWELL, EITE TIESINGA, PAUL JULIENNE, NIST/JQI — We present predictions for s-wave scattering lengths and bound state energies for all 14 isotopic combinations of Rb and Yb. Groups at NIST/JQI (Porto *et al.*) and in Düsseldorf (Görlitz *et al.*) are currently pursuing experiments using this system. The Düsseldorf group has recently observed phase separation at thermal temperatures of the co-trapped  $^{87}\text{Rb} + ^{174}\text{Yb}$  system, indicating a very strong interaction. In contrast, they observed low thermalization rates in co-trapped  $^{87}\text{Rb} + ^{170}\text{Yb}$ , indicating a very weak interaction. These two data points provide bounds on scattering lengths. The universal properties of van der Waals potentials, using our estimate of the  $C_6$  coefficient, and mass scaling then allows a determination of the number of bound states in the potential, all s-wave scattering lengths, and energies of weakly-bound states. The calculated scattering lengths range from very large and positive to very large and negative, with every qualitatively different regime in-between represented.

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Date submitted: 22 Jan 2010

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