Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Energy structure of weakly bound molecules near Feshbach resonances CHENG CHIN, The University of Chicago, PAUL JULIENNE, EITE TIESINGA, National Institute of Standards and Technology — Recent experiments on ultracold molecules created near a Feshbach resonance have allowed high precision measurements on molecular binding energy near the continuum. To date, measurements on molecules such as $^6Li_2$, $^{40}K_2$, $^{87}Rb_2$, $^{133}Cs_2$ and 40K-87Rb have been reported and provided the critical information to pin down the long-range interaction parameter of atoms and to test atomic scattering theories. We show that binding energies of molecules near the continuum can be well-approximated based on simplified interaction models, such as the van der Waals potential or a square-well potential. These simplified models allow for self-consistent, analytic expressions for molecular binding energies and scattering lengths near Feshbach resonances. We report excellent agreement between our results and the full multi-channel calculation within and beyond the quantum threshold regime. Examples include $^6Li_2$, $^{40}K_2$, $^{133}Cs_2$ and 40K-87Rb. In the latter two cases, we will present the comparison in the regime where several resonances overlap.

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Date submitted: 04 Feb 2008 Electronic form version 1.4