Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Universal three-body parameters in heteronuclear atomic systems[1] YUJUN WANG, JIA WANG, JOSE D'INCAO, CHRIS GREENE, Department of Physics and JILA, University of Colorado — Following the recent experimental and theoretical identifications of a universal three-body parameter in ultracold bosonic gases, we have calculated three-body parameters in heteronuclear three-atom systems near Feshbach resonances between distinguishable atoms. It is found that the three-body parameters, or the ground Efimov state energies, are universally determined by a combination of the long-range van der Waals interactions and the homonuclear scattering length. The positions of all the Efimov features in three-atom scattering processes in these heteronuclear systems can therefore be uniquely known. We show three-body parameters for some combinations of commonly-used alkali atoms in ultracold experiments with a wide range of homonuclear scattering lengths, and give an intuitive picture for understanding the universality in the Born-Oppenheimer limit where one of the atoms is much lighter than the others. Such knowledge of three-body parameters can be conveniently used to precisely calibrate the positions of the magnetic Feshbach resonances in ultracold experiments.

[1]Supported by the National Science Foundation and AFOSR-MURI

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Date submitted: 27 Jan 2012 Electronic form version 1.4