Abstract Submitted
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Non-universal binding energies of weakly bound Feshbach molecules[1] PAUL JULIENNE, Joint Quantum Institute, NIST and the University of Maryland, JEREMY HUTSON, Durham University, GERHARD ZURN, ANDRE N. WENZ, THOMAS LOMPE, SELIM JOCHIM, Heidelberg University — It is well-known that two atoms weakly bound into a Feshbach molecule have a universal binding energy proportional to $1/a^2$ when the s-wave scattering length a becomes large compared to a characteristic scale length of the long range potential. Analytic formulas giving the correction to universality in terms of the ratio of a to the scale length for a van der Waals potential have been given by Gribakin and Flambaum [1] and by Gao [2]. We examine the domain of validity of such corrections for several species with different potentials and masses using accurate numerical quantum mechanical calculations for single and coupled channels representations of the interatomic interactions. In particular, we examine Feshbach molecules comprised of two ^{6}Li fermionic atoms in different spin states. We use new measurements with the two lowest spin states of this species to construct an improved model for very weak binding energies down to a few kHz and consequently obtain a more accurate value of the precise magnetic field at which the s-wave scattering length has its singularity.

[1] G. F. Gribakin and V. V. Flambaum, Phys. Rev. A 48, 546 (1993).
[2] B. Gao, J. Phys. B 37, 4273 (2004).

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