Abstract Submitted
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Accurate, predictive model of ultracold three-body recombination of Cs atoms[1] P. JULIENNE, Joint Quantum Institute, YUJUN WANG, Joint Quantum Institute (present Kansas State U) — We describe an accurate numerical model to calculate the three-body recombination and atom-dimer scattering rates of three ultracold atoms. The model uses scaled length and energy units based on the long-range van der Waals potential and accurately represents the multichannel two-body physics when a magnetic field is tuned due to a Feshbach resonance. Only pairwise atom-atom interactions are assumed; these are characterized by a van der Waals long range potential with an inner wall chosen to give the known background scattering length of the resonance. The model sets up the multichannel interactions to correspond to the known dimensionless pole strength s_{res} of the resonance [1] and has no adjustable parameters except the number of bound states in the two-body potentials. The calculated three body recombination rate coefficient for three Cs atoms agrees very well with the measured one [2] as the scattering length is tuned across its full range of variation, including the range where the scattering length is small and two minima occur in the recombination coefficient. The model additionally predicts the observed position of the atom-dimer resonance.

[1] C. Chin, et al., Rev. Mod. Phys. 82, 1225 (2010).
[2] Kraemer, et al., Nature 440, 315 (2006).

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