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Multichannel study on three-body physics near Feshbach resonances[1] YUJUN WANG, PAUL S. JULIENNE, Joint Quantum Institute, University of Maryland and NIST — We study three-body physics for ultracold atoms in hyperspherical coordinates with multichannel two-body potentials that closely mimic the realistic atomic interactions. By using this numerical technique, we are able to study the dependence of three-body universality on realistic parameters for isolated Feshbach resonances. In particular, we show how three-body recombination rates change with the background scattering length and the resonance width, as well as their dependence on the depth of the model potential in different spin channels. For both homonuclear and heteronuclear systems, we have found universal behavior in three-body recombination even under some conditions where three-body physics was previously considered nonuniversal. As examples, we analyze the line shapes of atomic losses caused by three-body recombination in Cs/Rb and Cs/Li ultracold mixtures, and show their implication in two-body calculations for determining Feshbach resonances with higher precision.

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Yujun Wang
Joint Quantum Institute, University of Maryland and NIST

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