Abstract Submitted
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A coherent superposition of dimers and trimers YAAKOV YUDKIN, ROY ELBAZ, Bar-Ilan University, P. GIANNAKEAS, Max Planck Institute, CHRIS H. GREENE, Purdue University, LEV KHAYKOVICH, Bar-Ilan University — Feshbach dimers and Efimov trimers, being insensitive to the short range inter-particle interactions, display a variety of universal properties. Standard experimental techniques for the study of Efimov physics have essentially been limited to the study of loss features due to inelastic collisions subject to variable initial conditions. Such an approach is best suited for the negative scattering length region, where the shallow trimer states dissociate into the free atom continuum. In contrast, for positive scattering lengths the presence of Feshbach dimers shifts the dissociation of trimers into the atom-dimer continuum and Efimov resonances remain inaccessible for direct observations. Here we develop a novel experimental approach which turns the presence of Feshbach dimers into an advantage. We use the dimers as a local reference for the Efimov trimers by creating a coherent superposition of both states. The measurement of its coherent evolution provides information on the binding energy of trimers with unprecedented precision. Even more importantly, it yields access to previously inaccessible parameters of the system such as the Efimov trimers' lifetime and the elastic processes between atoms and the constituents of the superposition state.

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