

Abstract Submitted
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Observation of an Efimov spectrum in an atomic system MATTEO ZACCANTI, BENJAMIN DEISSLER, CHIARA D'ERRICO, MARCO FATTORI, MATTIA JONA-LASINIO, LENS and University of Florence, Italy, STEFAN MÜLLER, University of Stuttgart, Germany, GIACOMO ROATI, MASSIMO INGUSCIO, GIOVANNI MODUGNO, LENS and University of Florence, Italy — In 1970 the Russian physicist V. Efimov predicted a puzzling quantum mechanical effect that is still of great interest today. He found that three particles subjected to a resonant pairwise interaction can join into an infinite number of loosely bound states even though each particle pair cannot bind. Interestingly, the properties of these aggregates, such as the peculiar geometric scaling of their energy spectrum, are universal, i.e. independent of the microscopic details of their components. Despite an extensive search in many different physical systems, including nuclei, atoms and molecules, Efimov spectra have long eluded observation. Here we report on the first discovery of two bound trimer states of potassium atoms very close to the Efimov scenario, which we reveal by studying three-particle collisions in an ultracold gas with tunable interaction. Our observation provides the first evidence of an Efimov spectrum and allows a direct test of its scaling behavior, shedding new light onto the physics of few-body universal systems.

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