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## Beller Lectureship Award: Evidence for Efimov quantum states in an ultracold gas of cesium atoms[1]

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A landmark theoretical result in few-body quantum physics is Efimov's prediction of a universal set of bound trimer states appearing for three identical bosons with a resonant two-body interaction. Since the formulation of Efimov's problem in the context of nuclear physics 37 years ago, it has attracted great interest in many areas of physics. However, the observation of Efimov trimer states has remained an elusive goal. In an ultracold gas of cesium atoms cooled to temperatures in the nanokelvin range, we observe signatures of Efimov states. Exploiting the special interaction properties of ultracold cesium, we control the two-body scattering length by application of a variable magnetic field. In three-body collisions at large negative scattering lengths, we observe a pronounced decay resonance. This resonance results from three free atoms coupling to an Efimov trimer state. At a positive two-body scattering length, we observe a scattering resonance in atom-dimer collisions, which we interpret as atoms colliding with dimers to couple to a trimer state. Our results confirm central theoretical predictions of Efimov physics and represent a starting point to explore the universal properties of resonantly interacting few-body systems. We discuss further prospects of Efimov physics in ultracold gases.

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