Speaker : M. Mark

Exploring Efimov physics in ultracold atomic and molecular quantum gases

Abstract

I will report on our experiments with ultracold, optically trapped cesium atomic and molecular gases to investigate Efimov's prediction of the existence of a universal set of weakly bound trimer states. Cesium atoms offer the possibility to magnetically tune the scattering length. By using Feshbach resonances we can efficiently produce ultracold trapped dimer molecules. In atom-atom-atom [1] as well as atom-dimer [2] collisional studies we observe resonantly enhanced loss rates as a function of the scattering length. These loss resonances indicate the existence of an Efimov trimer state. We have recently set-up the technique of resonantly modulated magnetic field spectroscopy which in the future might allow to directly observe Efimov states.

[1] T. Kraemer, M. Mark, P. Waldburger, J. G. Danzl, C. Chin, B. Engeser, A. D. Lange, K. Pilch, A. Jaakkola, H.-C. Naegerl and R. Grimm, Nature 440, 315 (2006).
[2] S. Knoop, F. Ferlaino, M. Mark, M. Berninger, H. Schoebel, H.-C. Naegerl, and R. Grimm, manuscript in preparation (2008).