

# DIESE WOCH

## PHYSIKALISCHES KOLLOQUIUM

des Fachbereichs Physik  
der Johann Wolfgang Goethe-Universität Frankfurt

Mittwoch, den 06.11.2013, 16 Uhr c.t.  
Großer Hörsaal, Raum \_0.111,  
Max-von-Laue-Str. 1

**Prof. Dr. Selim Jochim**  
Physikalisches Institut,  
Universität Heidelberg

*„ One, two, three, many:  
Exploring quantum systems one atom  
at a time“*

Experiments with ultracold gases have been extremely successful in studying many body systems, such as Bose Einstein condensates or fermionic superfluids. These are deep in the regime of statistical physics, where adding or removing an individual particle does not matter.

For a few-body system this can be dramatically different. This is apparent for example in nuclear physics, where adding a single neutron to a magic nucleus dramatically changes its properties. In our work we deterministically prepare generic model systems containing up to ten ultracold fermionic atoms with tunable short range interaction.

In our bottom-up approach, we have started the exploration of such few-body systems with a two-particle system that can be described with an analytic theory. Adding more particles one by one we enter a regime in which an exact theoretical description of the system is exceedingly difficult, until the particle number becomes large enough such that many-body theories provide an adequate approximation.

Our vision is to use our deterministically prepared tunable few- body systems as a microscopic building block to prepare model systems that might help to gain insight into complex many-body systems in condensed matter or even QCD.

Die Dozenten der Physik

# Kolloquium