

MAR11-2010-001655

Abstract for an Invited Paper  
for the MAR11 Meeting of  
the American Physical Society

**Deterministic preparation and control of a tunable few-fermion system<sup>1</sup>**

GERHARD ZUERN, Heidelberg University

Systems consisting of only few interacting fermions play a fundamental role in nature with atoms and atomic nuclei being the most prominent examples. In our experiments with ultracold atoms we have recently been able to prepare and control few-atom quantum states consisting of 1-10 fermions. We prepare such a system using ultracold <sup>6</sup>Lithium atoms in an optical dipole trap in which the interparticle interaction can be tuned over a wide range using a Feshbach resonance. By spilling all atoms occupying higher energy quantum states we can deterministically prepare samples from 1-10 particles in the ground state with fidelities exceeding 90%. In my talk I will present our first experiments controlling the interaction between particles in the ground state of the trap.

<sup>1</sup>Work done in collaboration with Selim Jochim, University of Heidelberg.