

Invited speakers for the SFB meeting October 2014

Resonant Spin Dynamics in Dipolar Condensates

Mariusz Gajda

Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

I will discuss the spin dynamics of two magnetic atoms trapped in an external trap. Assuming that initially the atoms are in their orbital ground state I will discuss in details all possible "elementary" processes of spin flipping. Dipole-dipole interactions couple spin degrees of freedom of the two particles to their quantized orbital motion. Because of conservation of the total angular momentum if a magnetization of the system changes the system acquires an orbital angular momentum and atoms circulate around the center of the trap. I show that spin dynamics driven by dipolar interactions is possible only when the energies of the initial and the final states are equal. In a case of weak magnetic moments of atoms this condition can be fulfilled utilizing a resonant external magnetic field, which tunes energies of involved states via the linear Zeeman effect. I will illustrate the resonant dynamics comparing the theoretical predictions to some results of experiments on Chromium atoms.

Atomtronics

Dana Anderson

JILA and University of Colorado Boulder, Boulder, USA

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Unveiling the order of the high temperature superconductors

Subir Sachdev

Harvard University, Boston, USA

A central mystery posed by the Cu-based high temperature superconductors has been the nature of their electronic state at low hole density. I will survey the remarkable progress made by recent experiments towards solving this mystery, with the first discovery of a density wave with a *d*-form factor. Aspects of this discovery were anticipated by theory, and I will discuss the current status of our understanding of the physics of high temperature superconductivity.