EINLADUNG
ZUM LASER- UND QUANTENOPTIKSEMINAR

Am Freitag, 22.06.2012, um 10:00 Uhr
Raum 46/387-388

Es spricht:  Dr. Bruno Laburthe-Tolra
Université Paris Nord

Thema:
“Dipolar Chromium BECs”

Bose-Einstein condensates (BECs) made of 52Cr atoms reveal new phenomena, due to relatively strong dipole-dipole interactions. For example, in a Cr BEC, the long-ranged and anisotropic dipolar interactions lead to an elongation of the BEC along the axis of the dipoles [1], a modification of collective excitations [2], and an anisotropic speed of sound [3].

In this talk, I will focus on the effect of dipolar interactions on the properties of multi-component (spinor) Cr condensates at very low magnetic fields. Due to its anisotropy, the dipole interaction introduces magnetization-changing collisions, which frees the magnetization of the gas. We have thus observed a demagnetization of the BEC when the magnetic field is quenched below a critical value $B_c$ corresponding to a phase transition between a ferromagnetic and a nonpolarized ground state. The phase transition is due to an inter-play between spin-dependent interactions and the linear Zeeman effect [4]. We have also studied the thermodynamic properties of spinor Cr atoms, and we have observed that above $B_c$, the ferromagnetic nature of BECs leads to the spontaneous magnetization of the cloud when BEC is reached [5].

I will also describe the control of magnetization-changing collisions in optical lattices. We investigate a scheme in which dipolar relaxation is resonant when the energy released in dipolar relaxation matches a band excitation resonance [6]. This scheme, which may produce correlated pairs of rotating states in each lattice site, can be viewed as the equivalent of the Einstein-de-Haas effect. Although rotation is not yet produced in our experiment, I will present first experimental results of these dipolar resonances, which show a pronounced anisotropic behaviour.


Der Gast wird betreut von Prof. H. Ott
GÄSTE SIND HERZLICH WILLKOMMEN!