CO.CO.MAT

**Francesca Ferlaino**
(Institut für Experimentalphysik, Universität Innsbruck, Austria)

## Exploring Dipolar Physics with Strongly Magnetic Quantum Gases

Ultracold atomic quantum gases have exceptional properties and offer an ideal test-bed to elucidate intriguing phenomena of modern quantum physics. The great appeal of such systems stems from the possibility to control almost on demand the interaction between the particles. This interaction is commonly isotropic and short-ranged. However, recent studies have shown that novel exotic atomic elements, possessing unusually large magnetic moments, provide much more complex and rich scenarios, where the fundamental interaction has a non-isotropic nature and a long-range character. Examples of strongly magnetic atomic species are chromium and most atoms of the lanthanide series. Between those, we consider erbium (Er) atoms, a rare-earth metal that has hardly been explored until now. This species is strongly magnetic, comparatively heavy, and has several stable isotopes, among which a fermionic one. Due to these characteristics, we expect the quantum system to be of extreme dipolar character and to exhibit many magnetic Feshbach resonances. Taking advantage of the rich Er energy level spectrum, we establish a novel and simple laser cooling scheme, which leads to about five millions optically trapped Er atoms, providing good starting condition for the last cooling step towards quantum degeneracy.

**27. Januar 2012, 14:00 Uhr**

**Universität Ulm, Raum N24/ 252**
**Albert-Einstein-Allee 11, 89081 Ulm**