# SYDG 2 Ultracold dipolar gases II

Zeit: Donnerstag 14:00–16:30 Raum: HV

**Hauptvortrag** SYDG 2.1 Do 14:00 HV

**Investigation of dipole-dipole interaction in a chromium Bose-Einstein condensate** — •Jürgen Stuhler — 5. Physikalisches Institut, UniversitätStuttgart, Pfaffenwaldring 57, D-70550 Stuttgart

Based on the long-range and anisotropic character of dipole-dipole interactions, many exciting phenomena have been predicted to occur in dipolar quantum gases. To investigate them, we have realized a chromium Bose-Einstein condensate (BEC) of up to 100,000 condensed atoms within a crossed optical dipole trap. The large magnetic moment of chromium gives rise to strong magnetic dipole-dipole interaction (MDDI) that becomes comparable to the isotropic and short-range contact interaction. In agreement with theory of dipolar quantum gases, the MDDI manifests itself in an anisotropic deformation of the expanding Cr-BEC that depends on the orientation of the atomic dipole moments. Using Feshbach resonances to tailor the contact interaction or spinning magnetic fields to tune the MDDI, it is expected that interaction regimes from mainly contact to mainly dipolar can be adjusted.

**Hauptvortrag** SYDG 2.2 Do 14:45 HV

**Spin-3 Chromium Bose-Einstein Condensates** — •Luis Santos — Institut für theoretische Physik III, Universität Stuttgart, Pfaffenwaldring 57, D-70550 Stuttgart

We will discuss the physics of spin-3 Chromium Bose-Einstein condensates. We shall first discuss the ground-state properties, and the possible spin phases at low magnetic fields. Later, we shall discuss the dynamics of the spinor condensate, and in particular the possibility of observing the equivalent of the Einstein-de Haas effect due to spin relaxation induced by the dipole-dipole interaction.

**Hauptvortrag** SYDG 2.3 Do 15:30 HV

**Thomas-Fermi solution for trapped dipolar Bose-Einstein condensate** — •Claudia Eberlein — University of Sussex, Dept of Physics & Astronomy, Falmer, Brighton BN1 9QH,

The Thomas-Fermi equation for a trapped condensed gas with dipole-dipole interactions in addition to s-wave interaction can be solved exactly. The methods of solution are discussed, and several examples of applications are given.

**Hauptvortrag** SYDG 2.4 Do 16:00 HV

**Rotating ultracold dipolar gases** — •Klaus Osterloh — Institut für theoretische Physik, Universität Hannover

Ultracold gases subject to artificial magnetic fields constitute an exciting field of modern theoretical physics, even more exciting, when dipolar interparticle interactions are considered. Their long range character intrinsically allows for strongly pronounced non-local correlations opening up a rich set of competing quantum regimes. On the basis of correlation function analysis and exact diagonalization data, a selection of these regimes is theoretically discussed and explored, the focus being set on fractional quantum Hall states and the variation of the ground state structure on the way from weak to strong correlations.