

Theoriekolloquium

Am **17. November 2011** um **14.15 Uhr** in **W2 1-143** hält

Herr PD Dr. Axel Pelster (HWK Delmenhorst)

einen Vortrag mit dem Titel

Dipolar Bose-Einstein Condensates with Weak Disorder

The talk discusses several illustrative examples where ultracold dilute atomic gases provide important insights into condensed matter physics. We start with reviewing the properties of Bose-Einstein condensates (BECs) with the anisotropic and long-range dipole-dipole interaction. To this end we investigate the influence of quantum fluctuations upon the equilibrium configuration, the low-lying oscillation frequencies, and the time-of-flight dynamics. We find that both atomic magnetic and molecular electric dipolar BECs offer promising scenarios for detecting beyond mean-field effects. Furthermore, we report on recent progress in understanding the properties of ultracold bosonic atoms in potentials with quenched disorder. This notoriously difficult *dirty boson problem* is experimentally relevant for the miniaturization of BECs on chips and can also be studied by tailoring disorder potentials via laser speckle fields. Theoretically it is intriguing because of the competition of localization and interaction as well as of disorder and superfluidity. Finally, we combine both previous topics and consider the impact of weak disorder upon a polarized dipolar BEC at zero temperature. Surprisingly we find that disorder corrections of the superfluid density yield characteristic interaction-induced anisotropies which are not present in the absence of disorder.

gez. Prof. Martin Holthaus