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Dipolar quantum droplets FABIAN BOETTCHER, JAN-NIKLAS SCHMIDT, MATTHIAS WENZEL, MINGYANG GUO, TIM LANGEN, TILMAN PFAU, University of Stuttgart, 5.Physikalisches Institut and IQST — The interplay of the short-range and isotropic contact interaction and the long-range and anisotropic dipolar interaction, allows for many interesting phenomena. In the case of competing interactions the mean-field contribution can get very small so that beyond mean-field effects start to play an important role and can actually stabilize an otherwise collapsing system. In our experiment with dysprosium atoms we observed a phase-transition between a gas and a liquid, characterized by the formation of self-bound droplets. These droplets show a saturation of the peak density with higher number of atoms like other liquids, even though they are 100 million times less dense than liquid helium droplets. With our experiment we can study a single self-bound droplet and measure the critical atom number for the phase transition between liquid droplet and expanding gas, extending for more than an order of magnitude in the atom number. Furthermore we show that the tendency of the system to form self-organized structures allows us to dynamically create states with transient supersolid properties close to the actual ground state.

Fabian Boettcher
University of Stuttgart

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