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A new-generation dysprosium quantum-gas experiment for exploring dipolar many-body physics in two dimensions.

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Dysprosium (Dy), as the most magnetically stable element, offers fascinating prospects for quantum gas research due to its strong anisotropic long-range dipole-dipole interactions competing with tunable short-range contact interactions. These properties have led to the discovery of novel many-body quantum states in recent years, including liquid-like droplets, droplet crystals, and supersolids.

With my new group, the Quantum Fluids Group at Heidelberg University, we have designed and implemented a novel compact experimental setup. In this setup, we successfully produced large quantum degenerate gases of bosonic Dy atoms and achieved fine control of the dipolar and contact interactions. These quantum degenerate gases will later be loaded into tailorable traps and will reach the quasi-two-dimensional regime with the aim to study quantum many-body physics with competing interactions in this regime, both from a steady-state and a dynamical perspective. In my poster at the BEC conference, I will present the design and implementation of our novel experimental setup, report on our most recent achievements, and discuss prospective investigations we plan to undertake.

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