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QUANTUS: IMPLEMENTING ATOM OPTICAL EXPERIMENTS IN THE BREMEN DROP TOWER

Abstract

We report on the current status of the QUANTUS free fall BEC ex- periment at the ZARM drop tower in Bremen.

After the first realization of a BEC in microgravity in 2007, we were able to observe condensates after an unprecedented time of free evolution. The extremely shallow traps possible in microgravity and resulting ultralow tempe- ratures of a few nK allow for further studies ranging from coherence properties of condensates to inertial sensors based on matter waves.

In our talk we will focus on technological challanges of the project and its roll in bringing matter wave optics into space. A drop tower experiment is considered a stepping stone towards the ISS or other platforms as it makes high demands on mechanical stability, power consumption and payload.

After showing the feasibility of such a project we are now working on a second generation apparatus which leads the way to high precision measurements of gravitational forces and eventually a quantum test of Einstein's weak equivalence principle.

These goals are worked on in close cooperation with QUEST and the projects PRIMUS and LASUS.

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