

Cold quantum gases in micro-gravity

Reinhold Walser, Gerrit Nandi, Endre Kajari, Wolfgang P. Schleich

University of Ulm, Abteilung Quantenphysik, D-89069 Ulm, Germany

Targeting the long term goal of a realizing a Bose-Einstein condensate (BEC) in space, several groups within the QUANTUS collaboration [1] currently focus on the implementation of a BEC experiment at the ZARM drop tower in Bremen. In this contribution, we study an ensemble of freely falling degenerate bosons or fermions, confined in a time-dependent harmonic trap [2], with two internal states in the co-rotating frame of the earth. It is possible to transform the many-particle Schroedinger equation to the comoving frame of the drop capsule. This yields an efficient description of the mesoscopic degenerate quantum gas [3]. The QUANTUS project is supported by the DLR (DLR 50 WM 0346).

[1] A. Vogel et al., Appl. Phys. B, Special Issue, Quantum Mechanics for Space, to be published (2006). [2] J. F. Dobson, Phys. Rev. Lett. 73, 2244 (1994). [3] G. Nandi, R. Walser, E. Kajari, and W. P. Schleich, to be submitted to Phys. Rev. A (2006).