

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

MAIUS-B: Towards dual-species matter-wave interferometry in space¹ DENNIS BECKER, MAIKE D. LACHMANN, BAPTIST PIEST, WOLFGANG BARTOSCH, MANUEL POPP, THIJS WENDRICH, ERNST M. RASEL, IQ, Leibniz University Hannover, QUANTUS COLLABORATION — Tests of the universality of free fall using two-species atom interferometers in space are currently of large interest. By increasing the free evolution time in the interferometer due to the microgravity environment the sensitivity can be enhanced significantly. After the successful launch of the MAIUS-1 mission and the first demonstration of Bose-Einstein condensation and coherent matter wave manipulation in space, we now aim for two-species atom interferometers on the sounding rocket missions MAIUS-2 and -3. The new system contains, in addition to Rb-87, K-41 as a second species and will utilize Raman double-diffraction as beam splitters. Here, we give an overview of the planned sounding rocket mission and present the current status of the ongoing ground-based experiments to reach quantum degeneracy of the atomic mixture. We present a ground-based and transportable testbed for the creation of a dual species BEC of Rb-87 and K-41 in the MAIUS-B physics package. The modular design of the laser system allows for independent operation at 780 nm and 767 nm, further enables for grey molasses cooling of potassium, transportation to different testing facilities and easy extension regarding the tests of future experiments like the upcoming ISS multi-user facility BECCAL.

¹The QUANTUS project is supported by the German Space Agency DLR with funds provided by the Federal Ministry of Economic Affairs and Energy (BMWi) under the grant number 50WP1431.

Dennis Becker
IQ, Leibniz University Hannover

Date submitted: 31 Jan 2019

Electronic form version 1.4