## Abstract Submitted for the DAMOP18 Meeting of The American Physical Society

A source for high precision atom interferometry in space<sup>1</sup> MAIKE DIANA LACHMANN, DENNIS BECKER, HOLGER AHLERS, Leibniz-Universitt Hannover, STEPHAN T. SEIDEL<sup>2</sup>, OHB System AG, THIJS WEN-DRICH, Leibniz-Universitt Hannover, HAUKE MNTINGA, ZARM Bremen, JENS GROSSE, DLR-RY, ALINE DINKELAKER, VLADIMIR SCHKOLNIK, Humboldt-Universitt zu Berlin, ANDR WENZLAWSKI, Johannes Gutenberg-Universitt Mainz, ORTWIN HELLMIG, Universitt Hamburg, BENJAMIN WEPS, DLR-SC, ROBIN CORGIER, NACEUR GAALOUL, WOLFGANG ERTMER, ERNST M. RASEL, Leibniz-Universitt Hannover, MAIUS TEAM — Increasing the space-time-area in atom interferometers is one approach towards precise measurements of the universality of free fall. A way to achieve this is to perform the experiments with Bose-Einstein condensates in a weightlessness environment. The successful launch of the rocket mission MAIUS-1 in January 2017 marks a major advancement in this effort for space applications. During the six minutes of microgravity the creation of the first BEC in space, its characterization and the manipulation of it were demonstrated. As the results of the reproducibility and the level of control show this source can be used for high precision atom interferometry measurements in this challenging environment. A new apparatus for the next two MAIUS missions is currently being set up and uses in addition to Rb-87 also K-41 as second species. It is planned to study mixtures as well as sequential and simultaneous interferometry on macroscopic timescales. The developed technology and the studies on ground and during flight support future space missions.

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