Abstract Submitted
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Atom Interferometry on Sounding Rockets with Bose-Einstein Condensates[1] STEPHAN T SEIDEL, DENNIS BECKER, MAIKE D LACHMANN, WALDEMAR HERR, ERNST M RASEL, IQ Hanover, QUANTUS COLLABORATION — One of the fundamental postulates of our description of nature is the universality of free fall, stating that the force exerted upon an object due to gravity is independent of its constitution. A precise test of this assumption is the comparison of the free fall of two ultra-cold clouds of different atomic species via atom interferometry. Since the sensitivity of the measurement is proportional to the square of the propagation time in the interferometer, it can be increased by performing the experiments in microgravity. In order to fully utilize the potential of the experiments the usage of a Bose-Einstein-Condensate as the initial state is necessary, because it is characterized by a small initial size and a low expansion velocity. As a step towards the transfer of such a system into space three sounding rocket missions with atom interferometers are currently being prepared. The launch of the first mission, aimed at the first demonstration of a Bose-Einstein-Condensate in space and an atom interferometer based on it is planned for 2016 from ESRANGE, Sweden. It will be followed by two more missions that extend the scientific goals to the creation of degenerate mixtures and dual-species atom interferometry.

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