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Atom Interferometry on a Sounding Rocket[1] DENNIS BECKER, STEPHAN SEIDEL, MAIKE LACHMANN, ERNST RASEL, IQ Hanover, Germany, QUANTUS COLLABORATION — The universality of free fall is one of the fundamental postulates of our description of nature. The comparison of the free fall of two ultra-cold clouds of different atomic species via atom interferometry comprises a method to precisely test this assumption. By performing the experiments in a microgravity environment the sensitivity of such an atom interferometric measurement can be increased. In order to fully utilize the potential of these experiments the usage of a Bose-Einstein condensate as the initial state of the atom interferometer is necessary. As a step towards the transfer of such a system in space an atom optical experiment is currently being prepared as the scientific payload for a sounding rocket mission. This mission is aiming at the first demonstration of a Bose-Einstein condensate in space and using this quantum degenerate matter as a source for atom interferometry. The launch of the rocket is planned for 2015 from ESRANGE. This first mission will be followed by two more that extend the scientific goals to the creation of degenerate mixtures in space and simultaneous atom interferometry with two atomic species. Their success would mark a major advancement towards a precise measurement of the universality of free fall with a space-born atom interferometer.

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