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MAQRO - Testing the foundations of quantum physics in space
RAINER KALTENBAEK, Vienna Institute for Quantum Science and Technology, Faculty of Physics, University of Vienna, Vienna, Austria, GERALD HECHENBLAIKNER, EADS Astrium Friedrichshafen, Immenstaad, Germany, NIKOLAI KIESEL, Vienna Institute for Quantum Science and Technology, Faculty of Physics, University of Vienna, Vienna, Austria, ULRICH JOHANN, EADS Astrium Friedrichshafen, Immenstaad, Germany, MARKUS ASPELMEYER, Vienna Institute for Quantum Science and Technology, Faculty of Physics, University of Vienna, Vienna, Austria — One of the central objectives of modern physics is to investigate the relation between quantum physics and gravity. Several space missions that will look for deviations from general relativity (violations of the equivalence principle) are currently being planned or are already scheduled to be launched in the near future, e.g., Microscope and STE-Quest. In a complementary approach, we propose a medium-sized mission, MAQRO, to test for deviations from quantum theory. The main scientific experiment of this proposed mission is DECIDE, which is a matter-wave experiment with massive objects. DECIDE would test the predictions of quantum theory in a parameter regime several orders of magnitude beyond what is testable in ground-based experiments today. In that regime, several extensions to quantum theory predict deviations from standard quantum theory (possibly due to quantum gravity) to become observable. Here, we will present the motivation for performing such experiments in space, as well as the technical requirements that have to be met to realize such an experiment.

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