

A Space Test of the Equivalence Principle with MICROSCOPE

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One century ago, Einstein revealed his theory of gravity which shook the foundations of physics. General Relativity (GR) is a revolutionary concept that is not very intuitive for most people. As a pillar of the GR, the weak equivalence principle (WEP) leads to the universality of free-fall historically attached to Galileo Galilei. Because the WEP is a cornerstone of the GR, its test was particularly intensified since the second half of the twentieth century with essentially two types of experiments: the Bessel/Eötvös-Pekár type pendulum developed by the Eöt-Wash group and the Lunar laser ranging measurements. Testing the EP in space was first devised by Chapman and then widely developed by Everitt's team at Stanford University. The basic idea was to take advantage of calm environments in space to access micro-gravity or better say nano-gravity. In 1999, ONERA and OCA proposed a mission with a performance objective easier to achieve than previously imagined. This mission called MICROSCOPE was developed as part of the CNES Myriad microsatellite line. It was launched in April 2016 and ended its operations in October 2018. Onera was in charge of the scientific instrument development. In close cooperation, OCA and ONERA collected useful data which already place the precision of the EP test at some 10^{-14} in 2017 with only 7% of the data.

The final results are very close to being published. Extensive verification work has been carried out since the first publication in order to establish the systematic errors. The data process of glitches in the measurement, produced by satellite cracking, was also a difficult task. While awaiting for the final result paper review, the presentation will provide an overview of the mission with particular emphasis on some results of the data processing strategy.

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