

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Gravity and Fundamental Physics (1)

Author: Mr. Manuel Rodrigues  
Office National d'Etudes et de Recherches Aérospatiales (ONERA), France

## A SPACE TEST OF THE EQUIVALENCE PRINCIPLE BEYOND MICROSCOPE

**Abstract**

The MICROSCOPE mission has revealed its latest results in September 2022 after the 2 years of satellite operations, from 2016 to 2018. Observatoire de la Côte d'Azur and ONERA had led for more than 4 years the science data processing. ONERA was also responsible for the instrument development, production and test. The objective of the MICROSCOPE mission was to test the Equivalence Principle (EP) with  $10^{-15}$  accuracy. The science team succeeded to achieve this challenging performance and showed that the EP remains unviolated with this accuracy in spite of the physicist desire to shake the General Relativity (GR) in its foundations. The results of the mission have also an impact on alternate or extended theories of GR. The Ultra Light Dark Matter has been constrained a little bit more, for example.

The question of the violation of the EP is still a major and open question in Physics and improving again the sensitivity of the test by 2 orders of magnitude seems hard to be achieved with ground experimentations in the near future. The same team proposes thus to improve the MICROSCOPE concept by taking advantage of the experience return that should help to go beyond significantly. In this presentation, we will show some technical enhancement of the satellite operation and of the instrument that make us confident to propose a new mission concept for the EP test at  $10^{-17}$ .