

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

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NAVIGATION AND SCIENCE WITH GALILEO

Abstract

Due to a malfunction during launch (identified as freezing of a fuel pipe of the Fregat upper stage), the Galileo satellites 5 and 6 have been placed on an orbit largely deviating from the specified target orbit. The eccentricity of the initially obtained path was roughly 0.23 resulting into a deviation from the nominal orbit of several thousand kilometers and respective variations of the flight velocity. Efforts for a rescue of the mission are underway leading to a change of orbital parameters for both satellites towards nominal orbit. However, at this point it seems that within the resources at hand, the nominal orbit is not achievable anymore. Although this is a setback for the Galileo program, the situation is a chance for a number of navigation and fundamental science related investigations and experiments which can be performed by using the unique combination of the elliptical orbit situation and the high precision clocks aboard the Galileo platform.

The opening of Galileo 5 and 6 for the scientific community provides the possibility to realizing a navigation and scientific revenue from a mission that most probably cannot fulfill its mission goals. An initial study on the feasibility and performance of relativistic experiments such as the measurement of the gravitational redshift has been started. First results of this study and a road map for the successful conduction of relativistic experiments with Galileo 5 and 6 are discussed in this paper.