

ASTRODYNAMICS SYMPOSIUM (C1)  
Mission Operations (3)

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LAUNCH AND EARLY OPERATIONS OF HERSCHEL AND PLANCK

**Abstract**

In spring 2009 the European Space Agency will launch 2 space observatories: Herschel (with its 3.5 m mirror the largest space telescope ever) will collect long-wavelength infrared radiation and will be the only space observatory to cover the spectral range from far-infrared to sub-millimetre wavelengths. Planck will look back at the dawn of time, close to the Big Bang, and will examine the Cosmic Microwave Background radiation (CMB) to a sensitivity, angular resolution and frequency range never achieved before. This paper will present the Flight Dynamics and Mission Analysis challenges and the flight results from the initial phase of these missions. Both satellites will be launched on the same Ariane 5 and will travel to the L2 Lagrange point of the sun-earth-system 1.5 million km from the Earth in the opposite direction of the sun. There they will be injected into Lissajous orbits, for Herschel with the dimension of typically 750,000 km x 450,000 km, for Planck 300,000 km x 300,000 km. In order to reach these Lissajous orbits it is mandatory to perform large trajectory correction manoeuvres during the first days of the mission. Herschel will have its main manoeuvres on the first day, on the second day and on day 12. Planck has to be navigated on the second day and on day 12, the L2 orbit insertion manoeuvre is planned on day 50. If these slots are missed, fuel penalties would rapidly increase. This poses a heavy load on the operations teams because both spacecrafts have to be thoroughly checked out and put into the correct modes of their attitude control systems during the first hours after launch. The sequence of events will be presented and explained and the orbit determination results as well as the manoeuvre planning will be emphasised.