Training Opportunity for Swiss Trainees

Reference	Title	Duty Station
CH-2019-OPS-OAG	**Gaia Spacecraft Operations and Propellant Usage**	ESOC

Overview of the unit's mission:

This training opportunity placement is in the Mission Operations Department's Astronomy and Fundamental Physics Division. This division is tasked with preparing the ground segment and operations teams for the launch and operations of ESA's science missions in the area of Astronomy and Fundamental Physics and later performing the flight operations themselves. Missions assigned to the division inlcude Gaia, XMM, Integral, Euclid and Plato. The training opportunity is within the Flight Control Team of the Gaia mission.

The Gaia Mission

The Gaia mission is a cornerstone ESA Science mission tasked with detecting and accurately mapping the positions of 1 billion stars to unprescedented accuracy. Gaia was launched in December 2013 and is planned to be operated for at least 7 years in an L2 lissajous orbit, 1.5 million kms from Earth. Data is downlinked through daily contact with ground using an X-band GMSK link with a rate of up to 650Gbits/day. More information on the Gaia Mission, space and ground segment design can obtained using the following links (http://sci.esa.int/gaia/) (http://www.esa.int/Our_Activities/Operations/Gaia_operations).

Overview of the field of activity proposed:

The Gaia mission operates in a dynamic and thermal performance envelope beyond that of classical space missions. The mission has very high stability requirements w.r.t. temperature, vibration and attitude and as such has allowed the detection of disturbances that would escape notice on other missions (e.g. micro meteoroid impacts detected through attitude disturbances and thermal variations in the structure).

The Gaia spacecraft attitude is maintained by a cold gas micro-propulsion system that primarily counteracts the sun radiation pressure. Micro-propulsion systems are also foreseen for use on future astronomy missions such as Euclid and Lisa.

The Gaia control software for the spacecraft attitude takes as its input rate measurements from the payload instrument and attitude inputs from the star tracker which are used to follow a pre-programmed scan law by applying thrust to the micro-propulsion system. Any discrepancy in the input to the software results in a rotational rate error being calculated by the control software and a counteracting thrust being applied. The main part of the proposed project is to study the attitude control system to identify and quantify all the drivers of propellant usage. The output of this analysis may result in some proposals for improvement of operational parameters to reduce propellant usage.

The task will also involve general training on spacecraft operations and the onboard systems. The successful applicant will familiarise themselves with the operational facilities used within the mission and may perform additional tasks related to spacecraft mission operations.

Required education:

Applicants should have just completed a University course at Masters Level (or equivalent) in an Engineering or scientific field.

Candidates must be fluent in English or French, the official languages of the Agency.

Candidates should have good interpersonal and communication skills and should be able to work in a multi-cultural environment, both independently and as part of a team.