31st IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Space Science Missions (2)

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LARES 2 MISSION: THE CONSOLIDATION OF ITALIAN HERITAGE IN LASER RANGED SATELLITES

Abstract

Italy boasts a long tradition in the field of laser ranged missions, since the contribution to the LAGEOS satellite up to the more recent LARES mission, funded by the Italian Space Agency (ASI) and launched in 2012 onboard the European Space Agency (ESA) VEGA rocket maiden flight. To exploit a similar launch opportunity, the satellite LARES 2 was selected by ESA as primary payload of the new enhanced VEGA C. The main scientific objective of the LARES 2 mission is to increase the accuracy in measuring the drag of the inertial system due to the rotation of the large Earth mass or frame-dragging (also known as the Lense-Thirring Effect). Thus, it could be used for a measurement of the Earth's gravito-magnetic field that is an order of magnitude more accurate than in the literature, deriving from the LAGEOS, GP-B and LARES satellites in orbit. The mission has been funded and managed by ASI, leading a team composed by University of Rome La Sapienza, in charge for the design and scientific aspects, the National Institute of Nuclear Physics (INFN) which manufactured, integrated and tested the satellite, and the national firm OHB-Italy that developed the system to hold on the satellite during the launch and then released it into the final orbit. The project was kicked off in 2017, with the refinement of the mission profile and the cannon-ball satellite design upgraded from LARES, in order to increase the desired accuracy: satellite body geometry and material, as well as number and type of Corner Cube Retroreflectors (CCRs) have been tailored to the specific mission conditions. The readiness of the flight model has been achieved in spring 2022 and, after an intense launch campaign for the final testing and

integration with the launcher, LARES 2 satellite has been successful deployed onto the desired orbit at 5800 km altitude and 71 inclination, in the morning of 13th July 2022. A few hours after the separation, the laser signal reflected by LARES2 was first detected by the Matera Laser Ranging Observatory, at the ASI "Giuseppe Colombo" Space Center, thus initiating its operative phase. The launch offered also the opportunity to several European cubesats: among them, the ASI Astrobio and GreenCube small satellites have been released and operated, to complete their assigned experiments.