EPSC

EPSC-DPS Joint Meeting 2019
15–20 September 2019 | Geneva, Switzerland

LICIACube: technical solutions to monitor an asteroid space impact

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Abstract

The scientific community and the international space agencies are focusing their attention on the Near-Earth Objects (NEO) that could impact the Earth in the near future. The Double Asteroid Redirection Test (DART) mission is part of the plan developed by NASA for Planetary Defense program. DART is a spacecraft acting as a kinetic impactor that will deflect the orbit of a binary asteroid by crashing itself into the moonlet of the Didymos binary system, the effects of the impact will be observed from ground-based telescopes. In order to increase the accuracy of the deflection measurement, the ASI 6U Light Italian CubeSat for Imaging of Asteroid (LICIACube) will be carried as DART piggyback and released by the main probe in proximity of the target, in order to capture images of the impact effects. LICIACube is an Italian Space Agency project, whose design, integration and test has been assigned to the aerospace company Argotec. The primary objective of the LICIACube is to capture photographs of DART impact ejecta plume over a span of times and phase angles in order to confirm the DART impact on the secondary body of the Didymos binary asteroid system and to observe the ejecta plume dynamics. After the deployment from the DART spacecraft, LICIACube will perform braking manoeuvres, to increase the relative velocity with respect to DART spacecraft. allowing LICIACube to perform the scientific phase and fulfill the mission objectives. Following this phase, the LICIACube satellite will continue on its path for few months, transferring scientific data and performing radio-science experiments. Scientific objectives can be accomplished by using the autonomous navigation algorithm and the imaging capabilities provided by the baseline platform, based on the heritage of the Argotec company. The images acquired by LICIACube will help the Italian involved scientific community to obtain relevant discoveries about the binary asteroid system. The scientific team is enriched by University of Bologna team, supporting the orbit determination and the satellite navigation, and Polytechnic of Milan, for mission analysis support and optimization. The LICIACube mission will be a challenging opportunity for the entire Italian technical and scientific community for the implementation of a deep space mission, based on a small scale but highly technological platform.

Introduction

1.1 Sub-section

2. An additional section

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Acknowledgements

References