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- Ongoing and Upcoming Mission Highlights
- Key International and Policy Developments
- Near-Earth Object (NEO) Discovery
- NEO Characterization
- Deflection / Disruption Modeling & Testing
- Space Mission & Campaign Design
- Impact Effects & Consequences
- Disaster Management & Impact Response
- Public Education and Communication
- The Decision to Act: Political, Legal, Social, and Economic Aspects

AFTER DART:

**SPECTROSCOPIC CHARACTERIZATION OF THE DIDYMOS SYSTEM**

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**ABSTRACT**

Near-Earth objects (NEOs), due to their proximity to our planet, represent one of the most accessible bodies in the whole Solar System. Their investigation, other than providing vital information to planetary formation and water delivery, is compelling due to the hazard these bodies pose to human civilization.

To this purpose, the NASA Double Asteroid Redirection Test (DART) has been approved to be the first demonstration of kinetic impactor as an asteroid hazard mitigation. The DART spacecraft successfully crashed on the secondary member of the Didymos system (Dimorphos) on September 26th 2022 at 23:14 UTC. Hosted as a piggyback and released fifteen days before the DART impact there was also the Light Italian Cubesat for Imaging of Asteroids (LICIACube), a 6U cubesat space mission supported by the Italian Space Agency (ASI). LICIACube with its two scientific cameras (LUKE & LEIA) has testified the impact and characterized the system and the ejecta plume in the aftermath of DART event with an incredible level of detail. The ESA Hera mission, to be launched in 2024, will continue the characterization of the binary system.

Taking advantage of the unprecedented brightness of Didymos near the DART collision and close approach in 2022 ( $V_{mag}=14.7$ ) we decided to characterize the system with spectroscopic ground-based observations at different rotational phases. New data were particularly needed in the near-infrared, where the only spectrum available in literature showed an unusual shallower spectrum compared to a typical silicate asteroid. In the framework of a large worldwide campaign of characterization we obtained a series of NIR spectra from Telescopio Nazionale Galileo (TNG) with NICS, and a series of complete UVNIR spectra taken at VLT, with X-Shooter.

Remote characterization of the system is crucial to assess the heterogeneity of the surface composition, waiting for the Hera arrival in 2027. We will present these new data in the light of (what little) we knew from literature data. We will compare spectra taken before and after the impact in search of potential changes induced by the DART event, and also look for long-term variability. Finally, we will put ground-based observations in the context of laboratory data and LICIACube images.

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**Comments:**

*Preferred oral contribution.*

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