Didymos Gravity Science Investigations through Ground-based and Inter-Satellite Links Doppler Tracking

P. Tortora et al., EGU21-14898

Experiment objectives:

• Measure the asteroids’ gravity to constraint their interior structure.
• Characterize the post-impact mutual orbit and rotational states.

Method:

Physical parameters estimated reconstructing the trajectory of Hera and Cubesats.

Measurements:

• **Ranging** and **Doppler** (Hera-Earth radio link)
• **OPNAV**: Hera optical images.
• **Inter-Satellite Link (ISL)** (Hera-Cubesats radio link)

Results:

• Dimorphos’ GM and $J_2$ within 0.1% and 10%
• Didymos gravity, up to degree 3

Highly stable microwave carrier

**HERA**
- Coherent transponder (X-band)
- ISL (S-band)

**Dimorphos** (~160 m)

**Juventas**
- ISL (S-band)

**Didymos** (~800 m)

Scheduled Range/Doppler Tracking