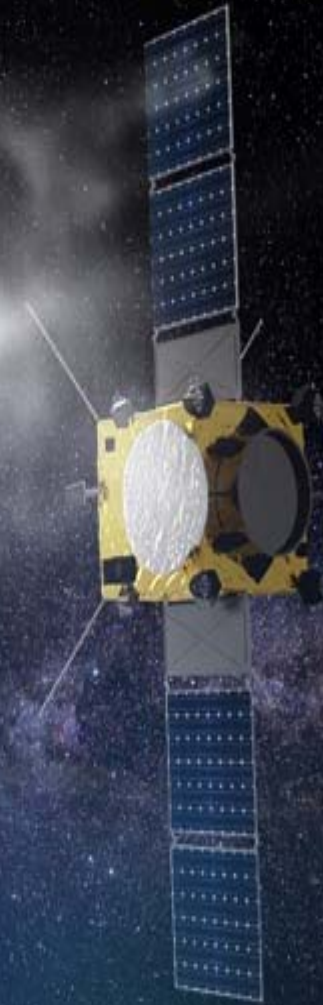


Hera mission objectives and payload



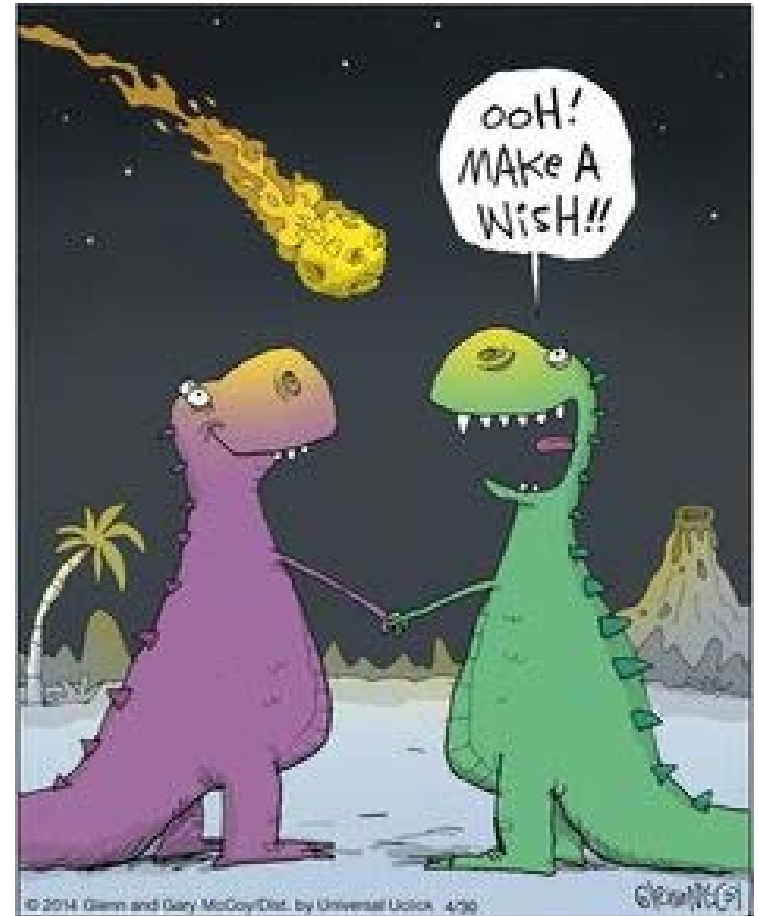
Michael Küppers, ESA/ESAC

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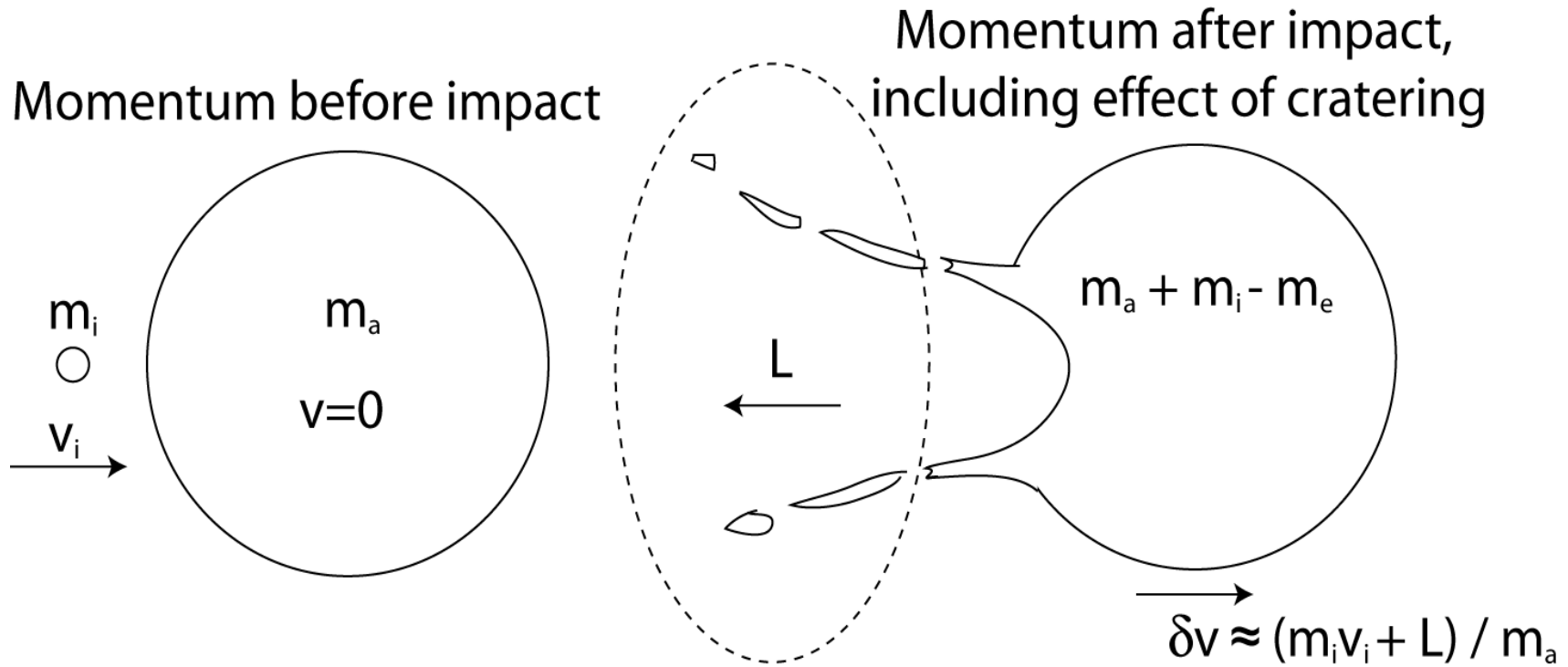


Hera Mission Objectives (General Considerations)

- Hera is an asteroid deflection mission
 - ❑ All primary objectives are related to the asteroid deflection theme
- As a bonus, several other fields can profit from the mission
 - ❑ Technology demonstration
 - ❑ Asteroid Resource Utilisation (“Mining”)
 - ❑ Science
- As science is a bonus, it needs to be doable within the existing mission constraints
 - ❑ Unless it is a dedicated contribution of ESA’s Science Directorate



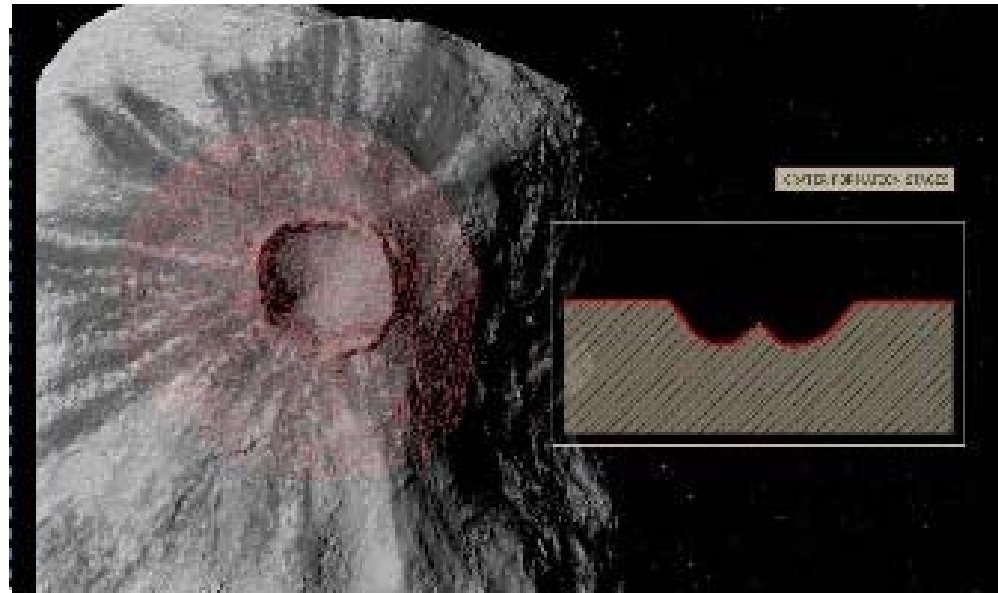
Mission Objective 1: Mass of Didymoon



Measurement: Series of images of Didymos (200 images in 10 days from 10 km) and altimeter measurements capturing the “wobble” of Didymos due to the gravity of Didymoon. Supported by radio science and cubesats.



Mission Objective 2: Shape and Volume of the Impact Crater



Measurement: High-resolution imaging of crater (10 cm/pixel), possibly of all of Didymoon to detect crater ejecta, fractures, antipodal crater etc. Different viewing geometries.

Bonus: Spectra of unweathered material provide direct comparison of asteroid with analogue meteoroid material.

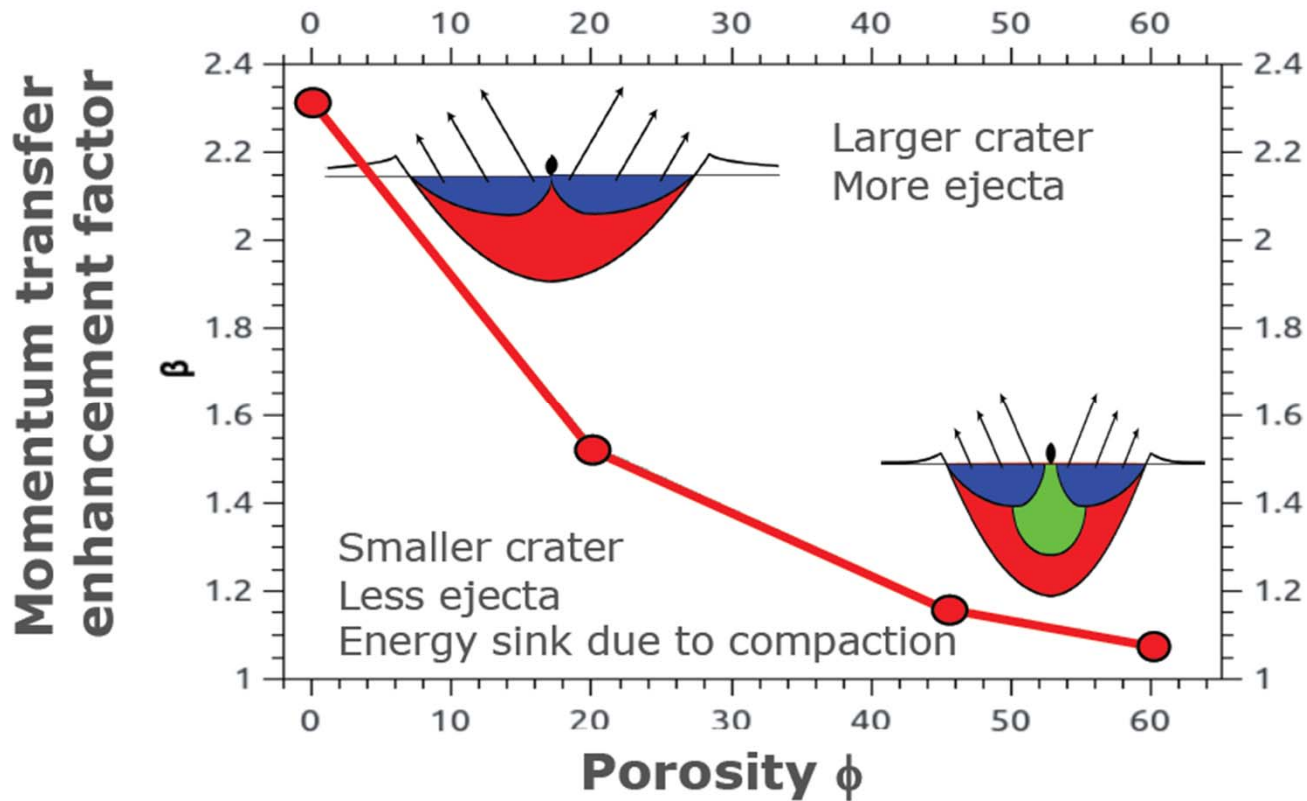


Mission Objective 3: Density of Didymoon

Needed for impact scaling and porosity

Measurement: From mass and volume. Requires shape model with a few meter accuracy from global mapping at various illumination conditions.

Mission Objective 4: Porosity of Didymoon



- Measurement:**
- 1) From density and composition measurement, the latter is obtained through vis. and near-IR spectroscopy and volatile composition analysis
 - 2) From cubesat radar and bistatic radar from radio science instrument

Mission Objective 5: Size distribution of near-surface and excavated material

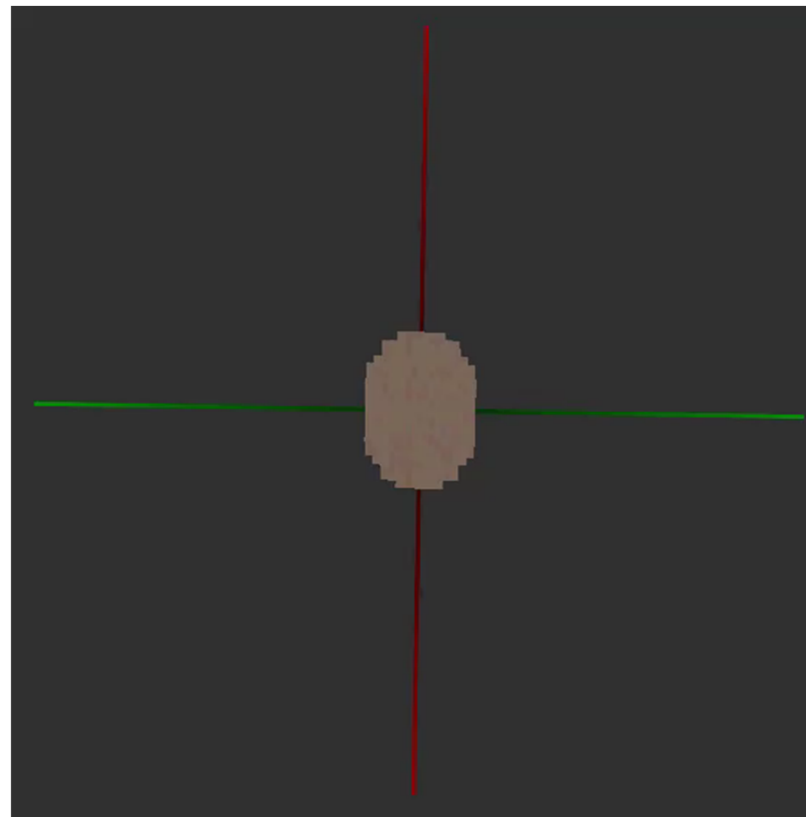
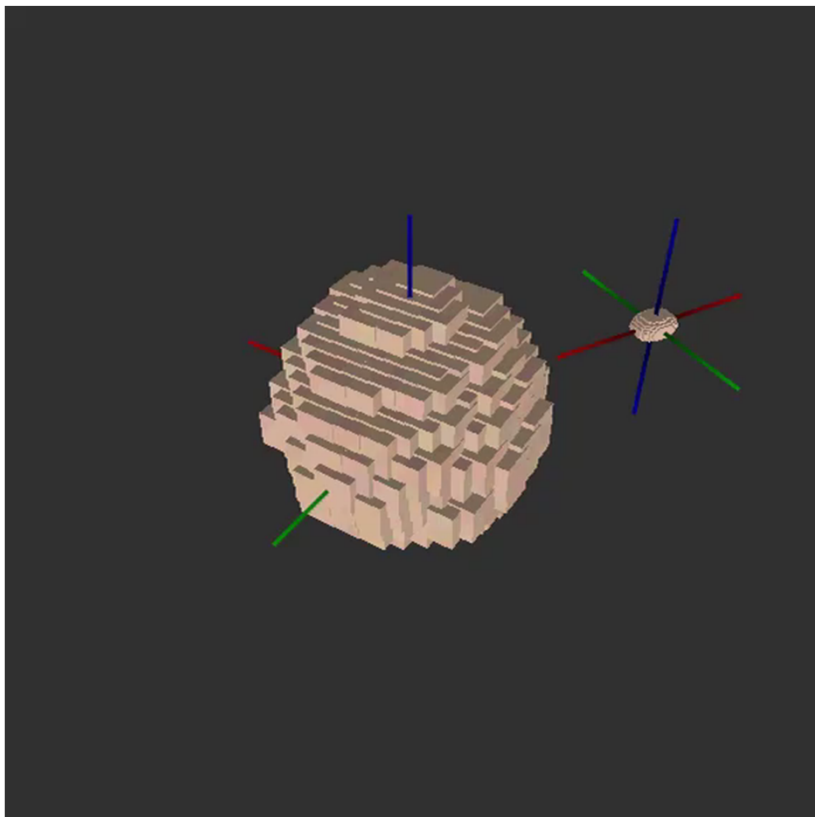


Presence of blocks that are not small compared to the size of the impactor is important (down to few dm size)

- Measurement:** 1) Regional or possibly global mapping of Didymoon
2) Radar from cubesat and bistatic radar from radio science instrument



Mission Objective 6: Size distribution of near-surface and excavated material

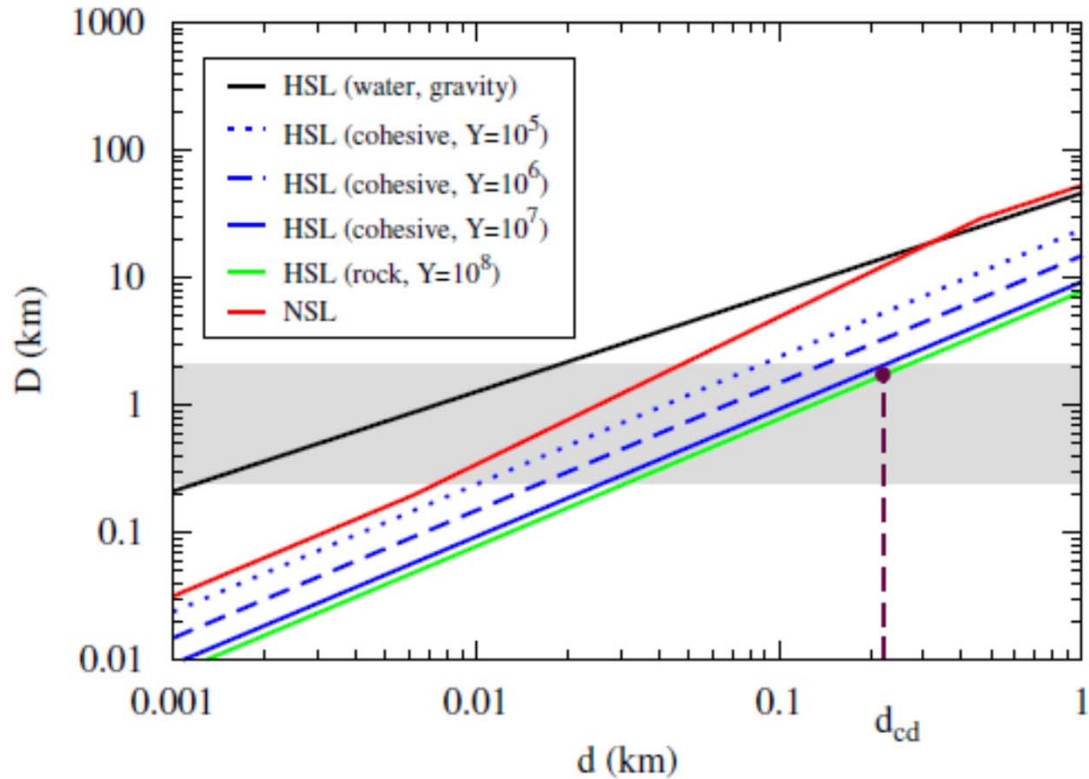


Determination of all orbital parameters and possible libration induced by DART impact

Measurement: Orbital parameters from imaging. Libration, spin precession, etc. require images over extended periods of time. Complementary observations with the altimeter.



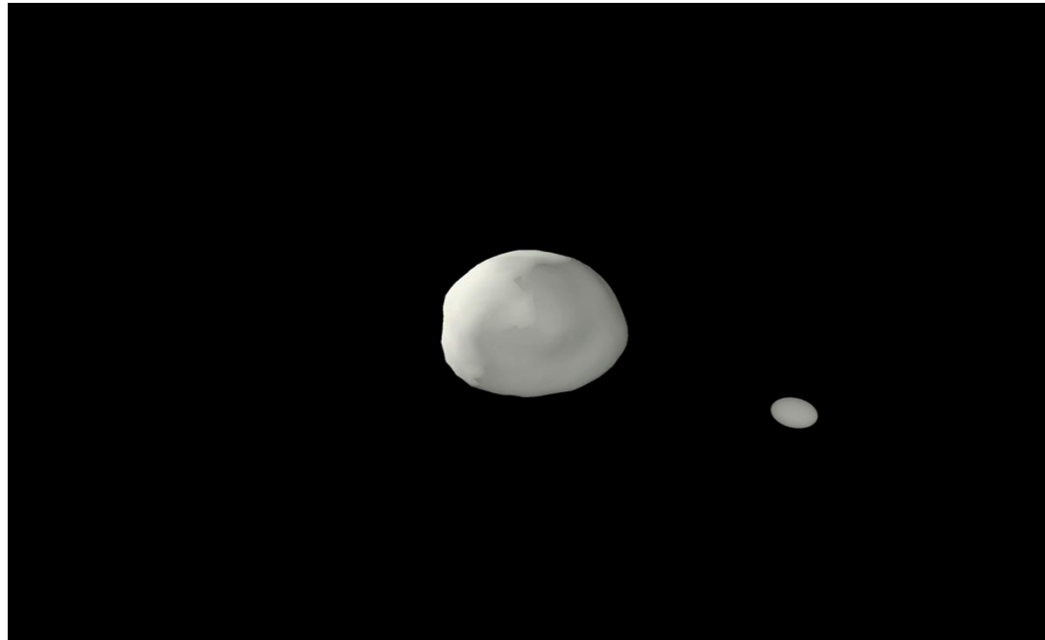
Mission Objective 7: Surface Strength



Marchi et al. 2010

- Measurement:**
- 1) From cubesat bouncing observations and in situ measurements
 - 2) Derived from impactor and crater properties

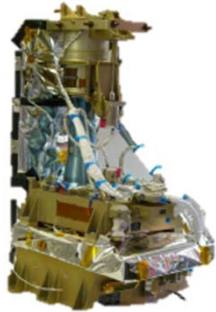
Mission Objective 8: Transport of impact ejecta from Didymoon to Didymos



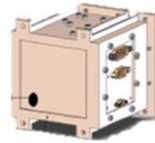
Measurement: Identification of material from Didymoon on Didymos from spectra (unweathered material from the subsurface?) and imaging



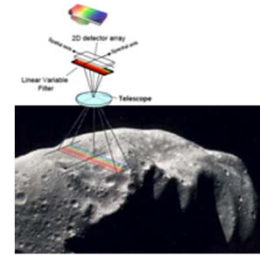
Hera baseline payload



**Asteroid Framing
Cameras**
(Visible Imaging in 8 filters)



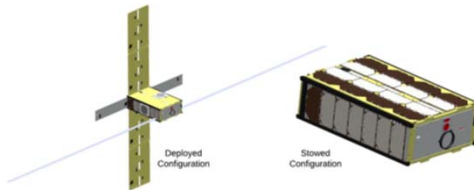
**PALT
(µLidar)**



**HYPTIRA (vis.
Hyperspectral
imager + thermal
channel)**

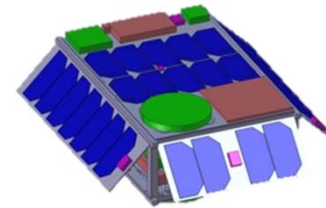


RADIOSCIENCE



APEX Cubesat

- Vis and near-IR imaging spectrometer
- Volatile Composition Analyzer
- Magnetometer



JUVENTAS Cubesat

- Radar
- Accelerometers
- Gravimeter

