



Agenzia  
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# ASI activities on Near-Earth Objects

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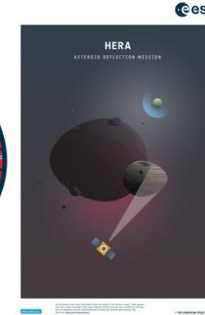
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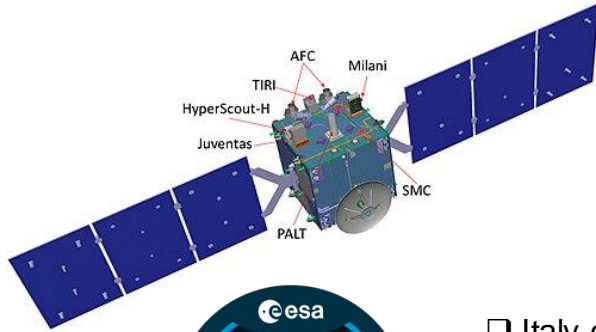
# International Cooperation and Committees

- ❑ International Asteroid Warning Network (IAWN)
- ❑ Space Mission Planning Advisory Group (SMPAG)
  - ❑ Hypothetical Near-Earth Asteroid impact exercise
- ❑ European Space Agency (ESA) Space Safety Programme
  - Planetary Defense space missions (Hera , Ramses)
  - Flyeye telescope devoted to NEOs discovery
  - ESA NEO Coordination Center Operations (ESRIN, Italy)
- ❑ European Union Space Situational Awareness Programme



# Space Missions to NEOs

## ASI contribution to ESA Planetary Defence Mission Hera



**Hera** Launched October 2024 to:

- ❑ Study the Didymos binary asteroid
- ❑ Assess the impact of NASA's DART mission
- ❑ Contribute to planetary defense
- ❑ Test new technologies

- ❑ Italy contributed to the development of the **Milani CubeSat**, a nanosatellite onboard Hera for detailed close-up observations.
- ❑ Italian science community is largely involved in the Hera **Investigation Team** and **Science Operations**, leading Radio Science and VISTA instruments.



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# Space Missions to NEOs

## ASI contribution to ESA mission concept Ramses



**RAMSES** (Rapid Apophis Mission for Security and Safety) will characterize **99942 Apophis** with high-resolution before (and after) its very **close encounter** with Earth on April 13<sup>th</sup> 2029, when the asteroid will transit within GEO.

- ❑ The close encounter represents a unique planetary defense opportunity to observe a potentially hazardous asteroid being subject to natural tidal experiment, with expected significant properties change.
- ❑ National industries are deeply involved in the preparatory work for the proposed Ramses mission.
- ❑ Ramses mission concept reuses much of the technology, expertise and industrial and science communities developed for the Hera mission.

Italian proposal for the **Opportunity Payload HAMLET**: (HyperScout for Apophis Multispectral Exploration and Taxonomy)

**Goal:** provide spectral images of Apophis in the visible–near-IR wavelength range:

- ❑ to identify the asteroid spectral class, constraining the surface structure and regolith mobility
- ❑ to measure space-weathering effects and eventual shape and surface changes of Apophis due to the close encounter with Earth



# Space Missions to NEOs

## CubeSat mission concept ANIME (Asteroid Nodal Intersection Multiple Encounters)

In the frame of the ASI project **ALCOR** for nano-satellites



**Goal:** to explore three near-Earth asteroids (NEAs) of huge interest in terms of both planetary science and planetary defence

- ❑ two flybys with potentially hazardous asteroids (PHAs)
- ❑ Rendezvous target: 2000 SG344 (ESA/NASA Risk List Top Target)

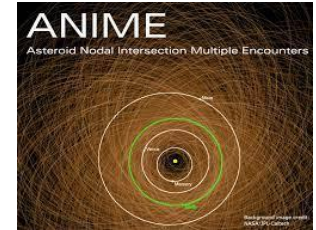
**Platform:** 12U CubeSat equipped with electric and chemical propulsion

## Payload:

- ❑ 2 COTS cameras
- ❑ Transponder

## Mission Status:

- ❑ Phase A completed
- ❑ Expected launch date Q3 2029

**Politecnico  
di Torino**

# Ground-based observations for NEOs

## *ESA Flyeye telescope network for NEO discovery*

**The Flyeye** is a new generation wide-field high-sensitivity 1-m class telescope relying on an innovative optical design. The light collected by the primary mirror is splitted into 16 sub-FoVs: this solution allows the Flyeye to be considered equivalent to sixteen, 1-m class telescopes.

ASI is the first contributor to the ESA Flyeye initiative under the Planetary Defence topic of the Space Safety Programme.

The telescope large field of view makes it especially suitable for the NEO discovery and for the observation of variable astronomical sources.

- ❑ **Flyeye-1** final location will be on Mt. Mufara (Sicily).
- ❑ **Flyeye-2** is under development and will be deployed in southern hemisphere by 2028





# Ground-based observations for NEOs

## *ESA Flyeye telescope network for NEO discovery*

Flyeye-1 has been temporarily deployed at the **ASI Matera Space Center** for the completion of FAT and for Science Verification. The final location will be on Mt. Mufara (Sicily), where the construction of the observatory has started.



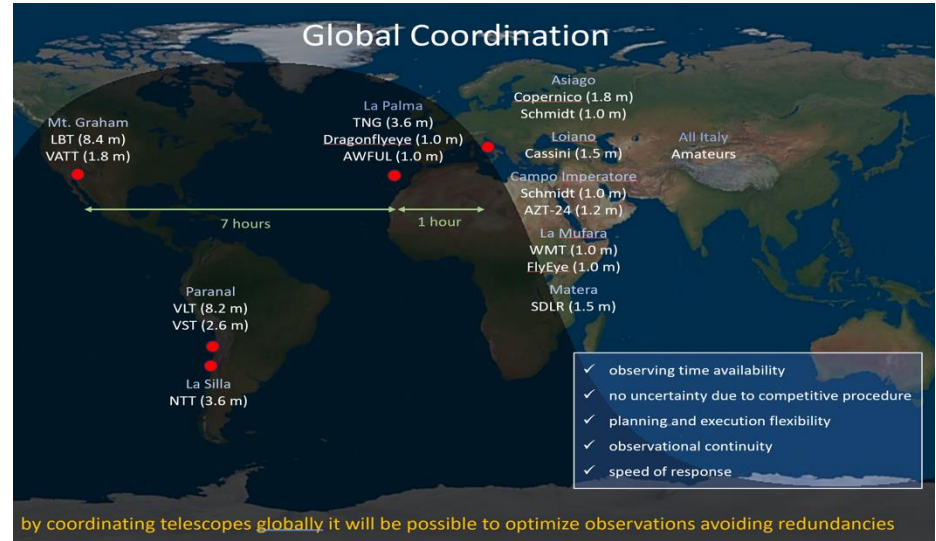
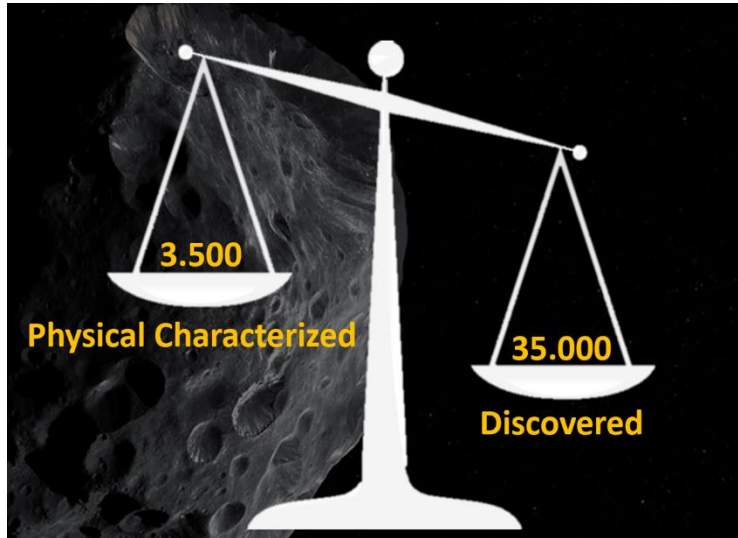
Flyeye @ ASI Matera Space Center



# Ground-based observations for NEOs

## *ASI project concept of a center for the Physical Characterization of NEOs*

Establishment of a facility to coordinate the utilization of existing, national & international telescopes accessible to the Italian community, coordinate the synergy with SST telescopes for NEOs observations, and the development of new, innovative, and dedicated instrumentation for the physical characterization of NEOs.





# Observation Tools and Services

## *ASI project concept of a center for the Physical Characterization of NEOs*

**NEOROCKS** database of NEOs physical properties



ASI has undertaken the migration inhouse of the **NEODyS** service for the orbital determination and impact monitoring of NEOs



Near  
Earth  
Objects  
Dynamic  
Site

The maintenance and evolution of the NEOROCKS database, together with other components based on the NEODyS service, are key elements of the project concept of ASI NEOs Physical Characterization center.

# **Thank you for your attention**

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