

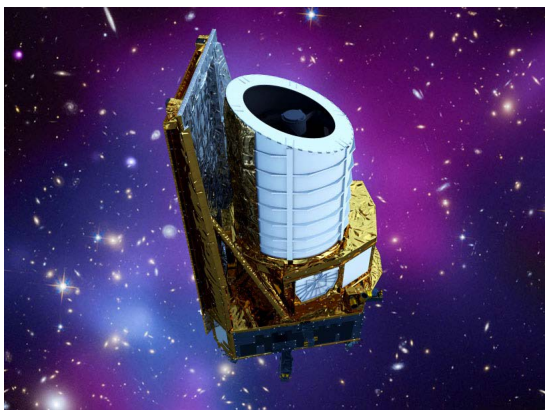
Euclid

Investigating the Dark Universe

Euclid is an ESA (European Space Agency) mission with critical contributions from NASA that aims to explore two of the biggest mysteries about the universe today: dark matter and dark energy.

While scientists don't yet know what dark matter or dark energy actually is, dark matter refers to a hypothetical type of matter said to make up 85% of the total matter in universe and dark energy is a mysterious something responsible for the accelerating expansion of the universe.

To study the evolution of the "dark universe," Euclid will make a 3D map of the universe. This map will be made up of observations of billions of galaxies stretching 10 billion light-years away over more than one-third of the sky. With this 3D map, scientists will see how matter has been pulled apart by dark energy over time.



Satellite: Euclid

Copyright: ESA/ATG medialab (spacecraft); NASA, ESA, CXC, C. Ma, H. Ebeling and E. Barrett (University of Hawaii/IfA), et al. and STScI (background)

To make these observations, Euclid will use a **1.2-meter telescope and two scientific instruments:**

1. A visible-wavelength camera, (the Visual instrument, or VIS)
2. A near-infrared camera/spectrometer (the Near-Infrared Spectrometer and Photometer, or NISP).

NASA Contributions

NASA is contributing to ESA's Euclid mission in three key areas:

1. Funding and support for U.S. scientists to analyze Euclid data and contribute to the mission's science goals.

This includes funding for three science teams led by NASA principal investigators. NASA-selected U.S. scientists participate in the mission via the Euclid Consortium. NASA will continue its support of these U.S. scientists throughout the duration of the mission.

2. Key pieces of hardware and engineering support. This includes:

- Euclid's NISP instrument detector systems. NISP's focal plane is made up of infrared detectors. NASA provided 16 flight detectors and 4 spares.
- The cold interface cables and cold readout electronics that allow NISP's detectors to run at temperature below minus 279 degrees Fahrenheit (minus 173 degrees Celsius).
- Assembly assistance and continued support following delivery of hardware.

3. A U.S.-based science data center.

- The Euclid NASA Science Center at IPAC (ENSCI) works in coordination with other science data centers within the Euclid Consortium to process and analyze Euclid science data.

NASAfacts

- ENSCI developed several key analysis data algorithms and software tools.
- ENSCI will provide support to U.S. investigators conducting Euclid research.
- Euclid data will be made available to the public sometime after observations are made.

Mission collaboration

In addition to contributing to ESA's Euclid mission, NASA will explore the dark universe with additional observatories.

Both Euclid and NASA's Nancy Grace Roman space telescope seek to answer key questions about the nature of dark energy using complementary methods and techniques.

Scientists from both of these missions will cross-check their results to support greater confidence in their conclusions about the structure of the universe and the nature of its mysteries.

Mission Timeline

The Euclid spacecraft is set to launch aboard a SpaceX Falcon 9 rocket from Cape Canaveral, Florida in the U.S in July, 2023.

Euclid will operate in a halo orbit around the Sun-Earth Lagrange point 2 (L2) which nearly one million miles from Earth. L2 is also home to NASA's James Webb Space Telescope, and will host the Roman Space Telescope.

While Euclid has a prime mission lifetime of six years, an extension may be possible, within the limits of the remaining propellant.

Mission Partners

Euclid is an ESA mission with important NASA contributions. An international group of scientists and engineers known as the Euclid Consortium, with participation from NASA, provide the scientific instruments, data, and analysis for the mission.



The Structural and Thermal Model of ESA's Euclid mission's payload module seen in the clean room, with part of the VIS (covered in black Multi-Layer Insulation (MLI) and NISP (gold MLI) instruments installed.

ENSCI is based at IPAC, located at the California Institute of Technology in Pasadena, California.

NASA's Jet Propulsion Laboratory is providing the infrared flight detectors for one of Euclid's two science instruments. NASA's Goddard Space Flight Facility performed the testing and characterization of flight detectors.

Mission Websites

For more information about the Euclid mission, visit:

<https://www.jpl.nasa.gov/missions/euclid>

<https://sci.esa.int/web/euclid>

ENSCI website:

<https://www.euclid.caltech.edu>

National Aeronautics and Space Administration

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NASA Facts