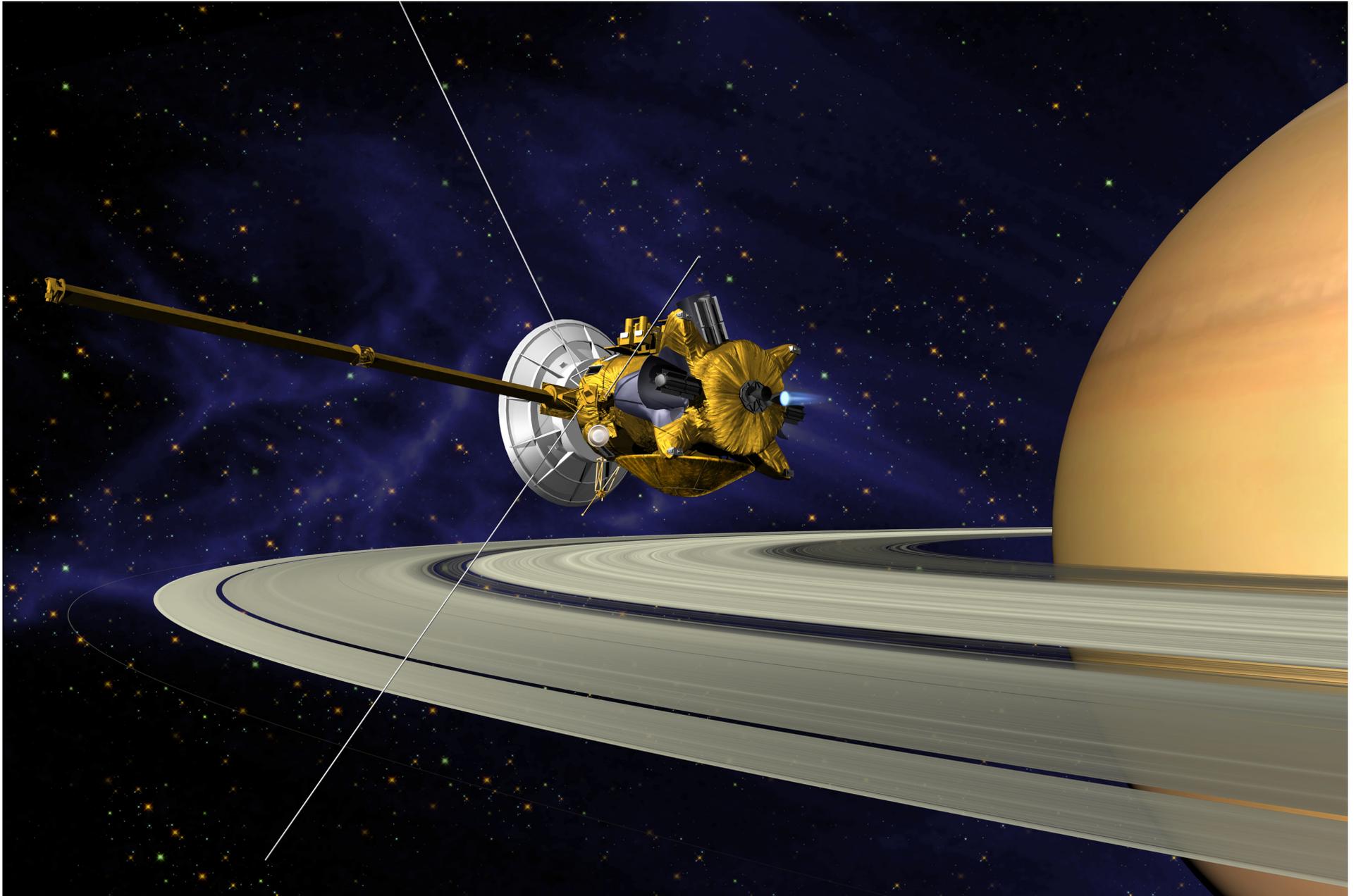




National Aeronautics and  
Space Administration  
Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California

## Cassini–Huygens Mission to Saturn and Titan





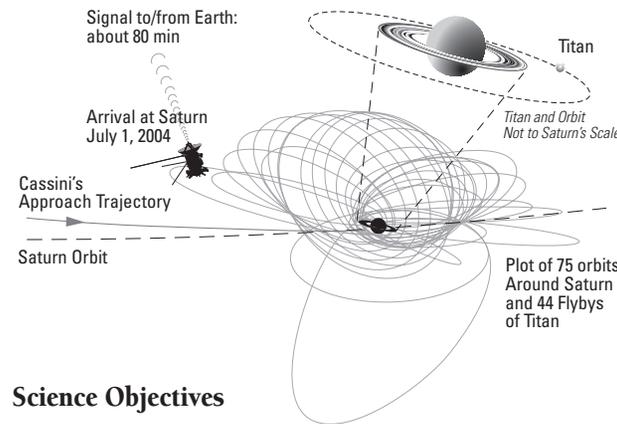
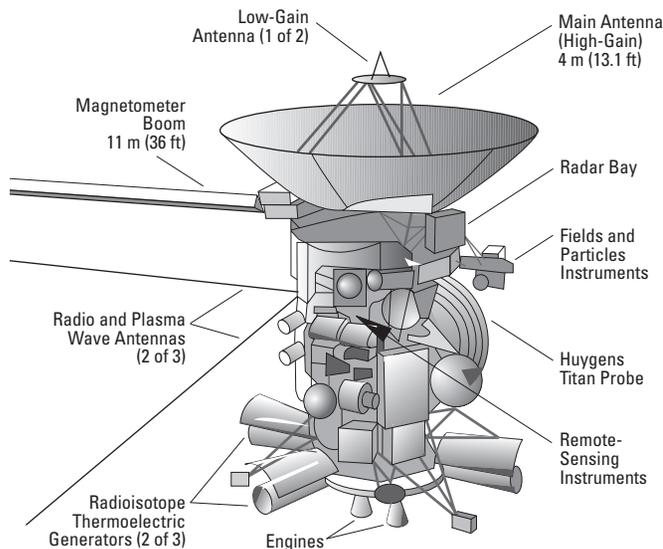
# Cassini–Huygens Mission to Saturn and Titan

## Seven Years, 17 Countries, One Planet

Launched in 1997 on a nearly seven-year journey, the Cassini–Huygens spacecraft arrives at the ringed planet on July 1, 2004, for a four-year scientific tour of the Saturn system. The Cassini spacecraft will make more than 70 orbits of Saturn, studying the planet, its magnetosphere, rings, and moons. The European Space Agency's Huygens probe descends to Saturn's largest moon, Titan, on January 14, 2005, for a three-hour data-gathering mission. An international mission, Cassini–Huygens has scientific and industrial participants from 17 countries.

## The Cassini Spacecraft

- **Launch Mass**  
 Spacecraft — 2,442 kg (5,384 lb)  
 Propellant — 3,132 kg (6,905 lb)  
 Total Mass — 5,574 kg (12,288 lb)
- **Propulsion**  
 Two engines, 445 Newton (100 lb) thrust each
- **Electrical Power Source**  
 Three radioisotope thermoelectric generators (RTGs)



## Science Objectives

### CASSINI ORBITER

- **Optical Remote-Sensing Instruments:** Determine temperatures, chemical composition, structure, and chemistry of Saturn, its rings, moons, and the atmospheres of Saturn and Titan; measure the mass and internal structure of Saturn and its moons; photograph Saturn, its rings, and moons in visible, near-infrared, and ultraviolet wavelengths.
- **Radar:** Map Titan and measure heights of surface features.
- **Fields and Particles Instruments:** Map the magnetic field of Saturn; detect charged particles and plasmas; study interactions between solid bodies and the solar wind; investigate ice and dust, plasma waves, and radio waves.

### HUYGENS PROBE

During the Huygens probe's descent through the murky atmosphere and touchdown on Titan on January 14, 2005, the science instruments will:

- Collect aerosols for chemical analysis.
- Make spectral measurements and take pictures of Titan's surface and atmosphere.
- Measure wind speeds using the Doppler effect.
- Identify constituents in the atmosphere.
- Measure physical and electrical properties of the atmosphere.
- Measure the physical properties of the solid or liquid surface of Titan.

## Saturn and Titan Key Facts

### SATURN

- **Diameter:** 120,660 km (74,975 mi)
- **Density:** 0.69 g/cm<sup>3</sup>
- **Length of Day (Rotation Period):** 10 hr 40 min
- **Length of Saturn Year:** 29.42 Earth years
- **Rings:** 7
- **Known Moons:** 31
- **Composition of Atmosphere:** Hydrogen (H<sub>2</sub>), helium (He), methane (CH<sub>4</sub>), ammonia (NH<sub>3</sub>), and numerous other hydrocarbons

### TITAN — SATURN'S LARGEST MOON

- **Distance to Saturn:** 1,221,850 km (759,200 mi)
- **Diameter:** 5,150 km (3,199 mi)
- **Density:** 1.82 g/cm<sup>3</sup> (equivalent to 1.82 times the density of water)
- **Surface Temperature:** −181 °C (−294 °F)
- **Surface Pressure:** 1.5 bars (approximately 1.5 times surface pressure at sea level on Earth)
- **Composition of Atmosphere:** Nitrogen (N<sub>2</sub>), methane (CH<sub>4</sub>), and other hydrocarbons and nitriles

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**ON THE FRONT** Artist's concept of Cassini during the Saturn orbit insertion maneuver, just after the main engine has begun firing (PIA03883).

### CASSINI PARTNERS

The Cassini mission is a joint effort of the National Aeronautics and Space Administration (NASA), European Space Agency (ESA), and Italian Space Agency (ASI). The mission is managed for NASA by the Jet Propulsion Laboratory of the California Institute of Technology. Partners include the U.S. Air Force (USAF), Department of Energy (DOE), and academic and industrial participants from 17 countries.

### NASA'S VISION

To improve life here,  
 To extend life to there,  
 To find life beyond.