

Long wait nearly over for Psyche asteroid probe's Space Coast launch

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Just off a tree-covered side road past businesses selling boats and fishing gear sits a fenced-off building that's home to a \$700 million satellite nearly ready for launch. Its mission: To study the metal-rich asteroid

Psyche, which scientists suspect could mirror the inner core of Earth and other planets in the solar system.

The probe, which also is named Psyche, awaits an October trip to the [launch pad](#) at Kennedy Space Center. But after missing a chance to launch in 2022, NASA parked it at the Astrotech Space Operations Facility across the river where it has been sitting in the center of the stark, white clean room.

With its [solar panels](#) installed this month, teams are finally set to load it with the fuel needed to send it on its 2.5-billion-mile trip to the asteroid orbiting the sun between Mars and Jupiter.

Liftoff on a SpaceX Falcon Heavy from KSC's Launch Complex 39-A is targeting as soon as Oct. 5 with a window that stretches until Oct. 23. It's not slated to arrive at Psyche, which can range from 235 million to 309 million miles away from Earth until August 2029, and only then will it get down to the business of figuring out what's special about the distant asteroid.

The Psyche mission principal investigator, Lindy Elkins-Tanton, also a professor at Arizona State University's School of Earth and Space Exploration, says Psyche could hold answers about how life was able to flourish on Earth.

"One of the key characteristics of our Earth is the metal core, which gives us our magnetic field, which shields our atmosphere and all the other great things the magnetic field does for us, including giving us auroras and the beautiful night sky," she said. "And it's long been humans' dream to go to the metal core of our Earth. I mean, ask Jules Verne."

Getting to our planet's center is technologically beyond [human ability](#),

but the mission to Psyche opens up the door to understand how planets like Mercury, Venus, Earth and Mars are formed.

"If you think about the asteroid belt, it's really the shrapnel that's leftover after the creation of our rocky planets. It's the material that got stranded, and never really incorporated into the planet that grew up to what we have now," she said. "So if you think of the Earth as a finished cake, all the ingredients have been liquefied, they were melted, they were whipped together and then the metal core formed and then it's left with the rocky exterior. Well, what were the ingredients?"

It's a rare destination, one of only nine known asteroids either made of metal or with a metal surface out of the more than a million asteroids that have been found to date, she said. Data have shown it has a nickel-iron core and has an average diameter of 140 miles, or roughly the drive from Daytona Beach to Tampa on Interstate 4.

"We visited bodies that are made of rock, rocky asteroids. We visited icy asteroids. We've looked at comets. And the last characteristic, the last kind of category of object that we've never visited as a species in our [solar system](#) is bodies made of metal," she said.

The asteroid was first discovered on March 17, 1852, by Italian astronomer Annibale de Gasparis, named for the Greek goddess of the soul who in mythology was born human, but married the Greek god of love Eros, aka Cupid.

"This is primary exploration, a new kind of object that humans have never seen before," she said. "The biggest thrill of the whole mission to me is that we're going to visit an unknown object."

The path to launch, though, has not been simple. The mission has been in the works for 12 years, with proposals finally winning NASA's approval

in 2017 to become its 14th Discovery Program effort. The program includes missions such as Mars Pathfinder, Kepler space telescope, Lunar Prospector and 2021's Space Coast launch of the Lucy probe on its way to study asteroids that orbit the sun in front of and behind Jupiter.

Psyche was supposed to launch in 2022, but issues that came to light with management at NASA's Jet Propulsion Laboratory forced a very public delay along with an independent review of where the project went wrong. The delay of launch by more than a year was exponentially compounding the life of the mission because of Earth's relative place in the solar system to where Psyche orbits. So instead of a 2022 launch with an arrival four years later in 2026, the delay meant tacking on an extra two years.

Maxar Technologies, which has nearly 100 similar satellites in orbit closer to Earth, helped construct the satellite including a plan to use solar arrays to power [electric propulsion](#) relying on nearly 2,200 pounds of xenon gas that will leave a light blue glow as it spits out ions nearly nonstop between launch and arrival to the asteroid.

Once it arrives, it has a 26-month mission to probe the asteroid, so teams are looking at a two-decade stretch between concept to scientific results.

The probe features cameras, a magnetometer, and a gamma-ray spectrometer to study the asteroid.

"That was a great scientific process to decide what we're going to measure," she said. "We need to be able to see the body so that's what the cameras are for. Then we want to measure magnetic field. What we hope is that Psyche has recorded a magnetic field from its early, early beginning. And then it has kept a history of that [magnetic field](#). it won't be active today, but it might have recorded it, so magnetometers.

"Then we need to know the composition of Psyche What is it made of, and so our gamma ray and neutron spectrometer ... and then we'll get into gravity field using the radio communications."

NASA is also hitching a ride to test out near-infrared-laser-based optical communication back to Earth during the first two years of the probe's trip before it reaches Mars for a gravity-assist swing on its way to the asteroid belt. NASA's hoping to prove out technology that will be needed for future missions to Mars.

Elkins-Tanton says Psyche is so far away that no images have ever been taken of what she thinks is a potato-shaped celestial body based on shape models from data collected from ground, and Hubble and the James Webb space telescopes.

She's excited for the eventual probe's arrival noting plans are to release images within 30 minutes of their transmission back to Earth.

"We're all going to be discovering that at the same time," she said. "We're gonna let the whole world look at the same time at the same things that we're looking at because that is what spaceflight is for. It's to inspire all of us to look beyond our destiny, to see our place in the universe."

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