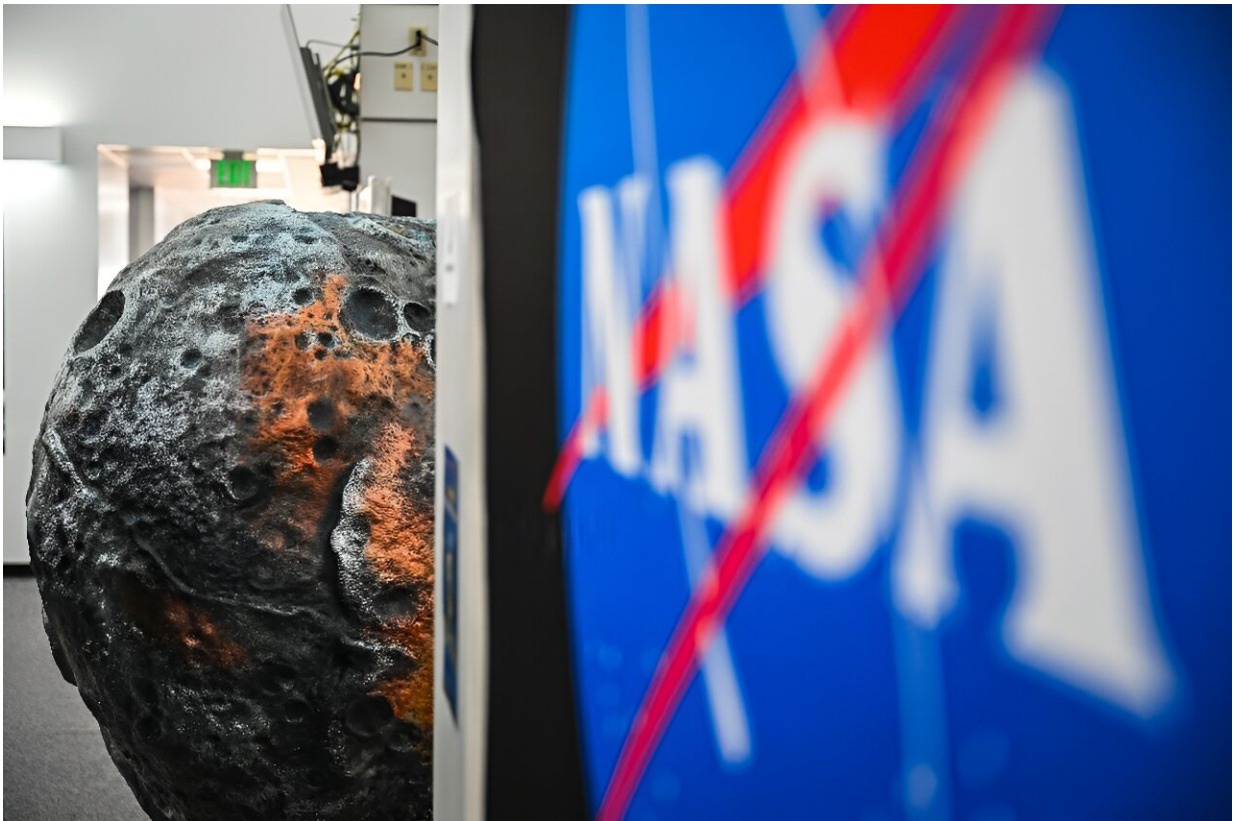


NASA journeys to the metal-rich asteroid Psyche

October 14 2023, by Chandan Khanna with Issam Ahmed in Washington



A NASA probe is set to blast off bound for Psyche, an object 2.2 billion miles (3.5 billion kilometers) away that could offer clues about the interior of planets like Earth.

It's a world like no other: a metal-rich asteroid that could be the remnants of a small planet, or perhaps an entirely new type of celestial

body unknown to science.

A NASA spacecraft [blasted off from the Kennedy Space Center Friday](#) bound for [Psyche](#), an object 2.2 billion miles (3.6 billion kilometers) away that could offer clues about the interior of planets like Earth.

"We're going to learn all kinds of new things, how these things fly through the [solar system](#), and they hit each other and they cause the evolution of what we have today, our solar system," NASA chief Bill Nelson said shortly before lift off at 10:19 am Eastern Time (1419 GMT) on a reusable SpaceX Falcon Heavy rocket.

"We've visited either in person or robotically worlds made of rock, worlds made of ice and worlds made of gas... but this will be our first time visiting a world that has a [metal surface](#)," lead scientist Lindy Elkins-Tanton told reporters during a briefing this week.

Trailing a blue glow from its next-generation [electric propulsion system](#) and flanked by two large solar arrays, the van-sized probe should arrive at its destination in the Asteroid Belt, between Mars and Jupiter, in July 2029.

Studying cores of rocky planets

Over the course of two years, it will deploy its suite of advanced instruments to probe Psyche for evidence of an ancient magnetic field and to study its chemical and mineral composition, as well as topography.

Scientists think Psyche, named after the goddess of the soul in Greek mythology, could be part of the iron-nickel core of a "planetesimal," a building block of all rocky planets, that was left exposed after an ancient collision blasted off the exterior.

It could also be something else—a primordial solar system object that's never been documented before.



The Psyche spacecraft will test out next-generation communications based on lasers and use a propulsion system that harnesses energy from solar panels to create electric and magnetic fields that, in turn, expel charged atoms of xenon gas.

"This is our one way to see a core," said Elkins-Tanton. "We say tongue in cheek that we're going to [outer space](#) to explore inner space."

Psyche is thought to have an irregular, potato-like shape, measuring 173 miles (280 kilometers) across at its widest point—though it's never actually been seen up close.

Until recently, scientists thought it was overwhelmingly composed of metal—but analyses based on reflected radar and light now indicate that metal probably comprises between 30-60 percent, with the rest being rock.

Solar electric propulsion

The mission will include several technological innovations.

The Psyche spacecraft, named after the asteroid, will test out next generation communications based on lasers—a step NASA compares to upgrading old telephone lines on Earth to fiber optics.

Deep Space Optical Communications, as the system is called, "was designed to demonstrate 10 to 100 times the data-return capacity of state-of-the-art radio systems used in space today," said Abi Biswas of NASA's Jet Propulsion Laboratory in a statement.

Psyche also uses a special kind of propulsion system called "Hall-effect thrusters" that harnesses the energy from [solar panels](#) to create electric and magnetic fields that, in turn, expel charged atoms of xenon gas.

The thrust it exerts is roughly equal to the weight of an AA battery in your hand. But in the void of space, the spacecraft will accelerate continuously to tens of thousands of miles per hour.

Such systems avoid the need to carry thousands of pounds of chemical fuel into [space](#), and Psyche will be the first time they are used beyond lunar orbit.

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