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Space

# Lucy discovers a double asteroid

NASA's spacecraft found a surprise second object as it passed asteroid Dinkinesh

Leah Crane

NASA's Lucy spacecraft flew past the small asteroid Dinkinesh on 1 November, and its observations revealed that Dinkinesh has an even smaller space rock orbiting it – the smallest main-belt asteroid ever observed up close.

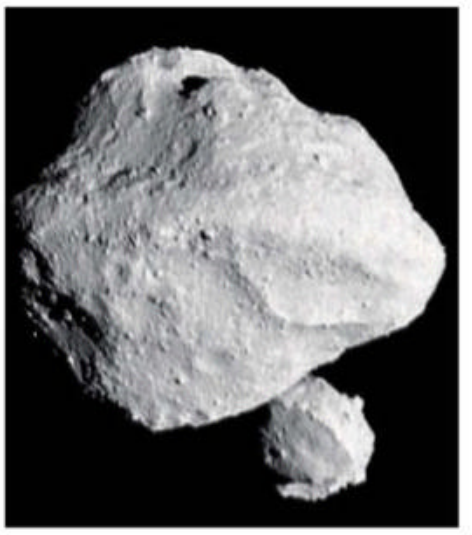
Lucy launched in October 2021, and since then it has been flying at about 19.4 kilometres per second towards the outer solar system. Its main targets for exploration are the Trojan asteroids, which share Jupiter's orbit around the sun. One clump of Trojans moves just ahead of Jupiter, while the other follows just behind it.

Dinkinesh isn't a Trojan – rather, it is in the main asteroid belt, between the orbits of Mars and Jupiter. That makes it a good pit stop on the way to the Trojans to make sure Lucy's scientific instruments will work properly for the other nine asteroids it will observe.

Finding Dinkinesh's smaller partner wasn't entirely a surprise. As Lucy approached Dinkinesh, the asteroid's brightness seemed to oscillate, which is often an indication of the presence of some sort of satellite. Dinkinesh is only about 790 metres across, though, so it was impossible to spot its satellite from Earth and even the spacecraft was still too far away to tell for sure until 1 November.

During the 1 November flyby, Lucy flew just 430 kilometres away from Dinkinesh at a speed of about 16,000 kilometres per hour, snapping pictures as it went by. The pictures were sent back to Earth and revealed a small asteroid in a binary with Dinkinesh, this one only about 220 metres across.

**The asteroid Dinkinesh and its smaller orbiting partner**



NASA/GODDARD/SWRI/JOHNS HOPKINS APL/NOAO

"We knew this was going to be the smallest main belt asteroid ever seen up close," said Keith Noll at NASA's Goddard Space Flight Center in Maryland in a statement. "The fact that it is two makes it even more exciting. In some ways these asteroids look similar to the near-Earth asteroid binary Didymos and Dimorphos that [NASA's Double Asteroid Redirection Test mission] saw, but there are some really interesting differences that we will be investigating."

The main goal of the instrument test was to ensure Lucy's tracking system, which keeps it pointed at its target as it hurtles by, was working. This system is important because of the asteroids' relatively small size and the spacecraft's extreme speed as it whips by.

"For the Trojans, we have a very good estimation of the orbit, but there is still an uncertainty of about 100 miles, and when you approach these targets you don't want to miss them," says Noemí Pinilla-Alonso at the University of Central Florida.

Other data from the encounter with Dinkinesh, such as basic measurements of its surface, is being sent back to Earth for the mission's scientists to dig into.

"The other asteroids of the same size that NASA has visited are near-Earth asteroids, so one thing that we want to see is whether the shape of this kind of object in the main belt is similar to the shape of objects that have been delivered to the inner solar system," says Pinilla-Alonso.

Now that Lucy is past Dinkinesh and its partner asteroid, its next target is the asteroid 52246 Donaldjohanson, which it will visit in 2025 before speeding onwards to Jupiter's Trojan asteroids.

The Trojans are probably crumbs left over from the formation of the solar system, so they could hold valuable insights as to how the planets formed and evolved over time. Lucy will reach the Trojans in 2027. ▮

Physics

## Left-handed badminton players get an advantage

**BADMINTON players who are left-handed could have a slight advantage thanks to the shape of the shuttlecock, a physicist has discovered.**

**Professional badminton players use feather shuttlecocks, which are usually made from about 16 overlapping feathers inserted in a cork base. This introduces an asymmetry that means a shuttlecock naturally spins anticlockwise as it flies, unlike a tennis ball, which will spin in either direction.**

**To study if this anticlockwise spin affects left and right-handed players differently, Eric Collet at the University of Rennes in France recorded and analysed videos of three left-handed and three right-handed people playing badminton. He found a key difference in the players' forehand slice shots, a common move where the racket brushes the shuttlecock to change its angle of travel.**

**For right-handers, playing this shot made the shuttlecock spin even faster anticlockwise. Meanwhile, left-handed players strike from the opposite side, which causes the shuttlecock to spin clockwise instead (arXiv, doi.org/k37v).**

**"The shuttlecock is rotating the opposite direction, then stops spinning and starts rotating around its natural rotation axis again," says Collet. This means the shuttlecock is slowed down rapidly by the air and falls faster, following a path that is about 15 degrees steeper than the same shot from a right-handed player. To reach it, the opposing player needs to travel further and stoop lower to defend the shot, giving left-handers an advantage, says Collet.**

**"People knew that left-handed players have a good slice," he says. "Now we know why."**

**There is no significant difference in the number of left and right-handed winners of professional badminton matches though. This implies right-handed players have adapted the left-handed slice shot or have advantages elsewhere. ▮**

**Chen Ly**

**"People knew that left-handed players have a good slice. Now we know why"**