ABC Radio South Queensland Drive
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Interviewer: Kaitlyn Sawrey (ABC)
Guest: Professor Richard de Grijs, Macquarie University

Kaitlyn Sawrey:
Let's turn our eyes skywards. Remember when *Artemis* II shot up to the Moon earlier this year? The coverage was astronomical. Well, another Moon mission is happening right now, kind of, sort of.

A Chinese probe is in space attempting to collect a sample from an asteroid that scientists have theorised was originally a piece of the Moon—a chunk of the Moon.

To tell us more about it, producer Kaitlyn Sawrey spoke with Professor of Astrophysics Richard de Grijs from Macquarie University a little earlier, and started by asking: what is the orbit of this particular asteroid?

Richard de Grijs:
This asteroid has a Hawaiian name, Kamoʻoalewa. It's an object that we call a quasi-satellite, or quasi-moon. These are objects that orbit the Sun just like the Earth does. They complete an orbit in about a year, just like we do, but their distance from Earth varies from several times the distance to the Moon to much farther away.

From Earth, it looks as though they're wobbling around our planet. That's due to the Earth's own motion around the Sun. The Hawaiian name actually means "oscillating celestial object."

Kaitlyn Sawrey:
Interesting. And what is the theory about its origin?

Richard de Grijs:
Well, that has changed over time, which makes it particularly interesting.

When astronomers first discovered it—they were Hawaiian astronomers, which is why it has a Hawaiian name—they examined it with a telescope and found that its spectrum, essentially its colour, was very similar to what they expected from material ejected from the Moon. So they suggested it might be a fragment of the Moon that had been blasted off by a major impact early in the history of the Solar System.

More recently, however, a team from the Chinese Academy of Sciences re-examined the spectrum and concluded that it looked rather different from lunar material. Instead, they suggested it might be an ordinary stony asteroid—an LL chondrite—that has spent a very long time in space. Exposure to the harsh space environment may have altered its surface so that it now resembles lunar rock.

So we're no longer certain what it is.

That's why China's *Tianwen*-2 mission is so exciting. The spacecraft carries instruments that will collect samples and eventually return them to Earth. Once those rocks can be analysed in

laboratories, we'll be able to determine their chemical composition and finally establish where the asteroid really came from.

Kaitlyn Sawrey:
Amazing. So we really need those samples to figure out exactly what it is.

Richard de Grijs:
Exactly. The mission aims to collect three different types of samples.

The simplest method is essentially hoovering up loose dust around the asteroid. The spacecraft will then briefly touch down to collect small surface rocks. That's already a significant technical achievement because the asteroid rotates once every 28 minutes, making operations quite challenging.

Finally, the spacecraft carries an extendable arm that it hopes to use to drill beneath the surface and retrieve pristine material from the asteroid's interior. Those samples should date back to the time the asteroid originally formed, which makes them especially valuable for understanding its origin.

Kaitlyn Sawrey:
So this sounds like an exciting mission on a number of fronts. It's technically difficult, but what you might learn from the samples could tell us something we didn't know before.

Richard de Grijs:
That's exactly right. That's how science works. We develop a hypothesis, then we test it and challenge it until we understand what's really happening.

Kaitlyn Sawrey:
Is it more difficult following a mission run by the Chinese space agency than one run by NASA or the European Space Agency?

Richard de Grijs:
In some ways, yes.

China traditionally doesn't provide a running commentary during its missions. Instead, it announces achievements after they've occurred. By contrast, NASA and the European Space Agency (ESA) often provide regular updates while missions are underway.

In this case, until today, we hadn't heard anything from the China National Space Administration apart from the fact that the spacecraft was launched in May 2025.

Today, I saw confirmation in English-language Chinese news that the spacecraft has arrived at the asteroid, at a distance of about 20 kilometres. They said this happened sometime last week. From well-informed space watchers, we believe it actually occurred last Saturday.

So that's the first confirmation we've received from the Chinese authorities.

Kaitlyn Sawrey:
If they are able to return samples, do you expect those samples—or at least the scientific results—to be shared internationally?

Richard de Grijs:
Yes, I do.

This is science, and science doesn't recognise political boundaries.

China has already carried out several lunar sample-return missions, both from the near side and the far side of the Moon. On those occasions, the authorities stated publicly that they were prepared to share samples with what they described as like-minded countries and institutions.

That's how science should work. We're interested in advancing knowledge rather than politics.

Kaitlyn Sawrey:
When do you think we'll know more?

Richard de Grijs:
The mission is actually split into two parts.

After releasing the return capsule, the main spacecraft will continue on to another asteroid between the orbits of Mars and Jupiter, a journey that will take another eight and a half years.

The sample-return capsule itself is expected back on Earth in early 2027. After that, the samples still need to be analysed.

People often think a sample-return mission sounds straightforward, but the spacecraft weighs about two tonnes—roughly the weight of a large SUV. Once deployed, its solar arrays span about ten metres.

All of that engineering is required to bring back a sample weighing only about 100 grams—roughly the weight of a chocolate bar.

That really illustrates both how challenging and how scientifically valuable these missions are.

Kaitlyn Sawrey:
That's incredible—all of that machinery to bring back a chocolate bar's worth of asteroid.

Richard de Grijs:
That's right. You won't be able to eat it, though!

Kaitlyn Sawrey:
No, we won't be doing that!

Thank you so much for your time this afternoon. We really appreciate it.

Richard de Grijs:
My pleasure. Thank you.