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Space

Asteroid 2024 YR4 will now almost certainly miss Earth in 2032

Alex Wilkins

THE world's space agencies have reduced the chances of asteroid 2024 YR4 impacting Earth to well below 1 per cent, which strongly suggests that a potentially devastating collision will be avoided. However, the asteroid will probably still travel extraordinarily close to our planet, giving astronomers a rare opportunity to observe an asteroid up close.

NASA/MAGDALENA RIDGE 2.4M TELESCOPE/NEW MEXICO INSTITUTE OF TECHNOLOGY/RYAN



“This is still something that will make a spectacularly close approach”

“We are not expecting the impact probability to rise back above 1 per cent for the close approach with Earth in 2032,” says Richard Moissl at the European Space Agency (ESA). “The most likely further development is a further drop in the impact probability, likely even to 0.”

Alarms about asteroid 2024 YR4 were first raised in December, when astronomers found it might be on a collision course with Earth in 2032. It appears to be between 40 and 90 metres wide and could generate a deadly blast should it hit a city. In the following weeks, the world's telescopes and space agencies closely tracked its trajectory, honing its future path with greater precision. It reached its highest impact risk on 17 February, with a 1-in-32 chance, but in the days afterwards, this fell to 1-in-67, or a 1.5 per cent risk.

New observations have led to a sharp downgrade of this risk and, on 24 February, NASA put it at a 0.0039 per cent chance of impact, or 1-in-25,641. ESA has it even lower, at 0.002 per cent, or 1-in-50,000. These ratings put it at a 0 on the 10-point Torino scale used to assess the hazard posed by such objects. That score is down

from 3, meaning 2024 YR4 is now considered one of many low-risk asteroids that are discovered each year, but ultimately miss Earth.

This is good news, says Gareth Collins at Imperial College London, but the asteroid will still be useful as a dry run for our planetary defence systems and for scientific purposes. “This is still something that will make a spectacularly close approach. If the risk of hitting was as high as it was, it must be coming very close to us,” he says.

NASA, ESA and space companies that were sketching out possible schemes to deflect the asteroid will probably continue planning, says Niklas Voigt at OHB, a German space company. Voigt and his team had begun thinking about a mission to divert 2024 YR4 and the new risk level doesn't change that, he says. “The risk decreased, but, for the time being, we are still proceeding with work on the topic.”

The close approach could still be a good opportunity to test our ability to deflect asteroids, says

Voigt. The only previous attempt to do this was NASA's DART mission, which successfully changed the trajectory of the 160-metre-wide asteroid Dimorphos in 2022. Or we could build a satellite to send to 2024 YR4, he says, similar to ESA's Ramses spacecraft. This is due to travel to observe the asteroid Apophis, which is set to pass close to Earth in 2029.

Moon target

The final decision on tackling 2024 YR4 probably won't be made until planned observations in March using the James Webb Space Telescope. As well as gathering trajectory data, this will better assess the size and composition of the asteroid. That information will then be fed to the United Nations-backed Space Mission Planning Advisory Group, which will decide on the best course of action around the end of April.

“These are incredibly useful exercises for finding out the pinch points to make decisions, in order to still have time to do something sensible in advance,” says Collins. “Absolutely, those committees will still be meeting, but they'll probably be less stressful.”

While the chances of an Earth impact have plummeted, the risk of 2024 YR4 hitting the moon have risen to 1.7 per cent, up from 0.3 per cent. There is a “distinct possibility of that number rising further”, says Moissl. “The exact effects for an impact on the moon from an object of this size are still under evaluation.”

The response to this object has also been a useful rehearsal for other asteroids of concern that crop up, says Collins. “We want to avoid, in future, a ‘cry wolf’ situation where the public gets so used to this threat that they think, ‘Oh, it never happens.’” ■

Alarms about asteroid 2024 YR4, circled, were first raised in December

40-90m

Estimated width of asteroid 2024 YR4

0.002%

Risk of asteroid 2024 YR4 hitting Earth in 2032, according to the European Space Agency

1.7%

Risk of asteroid 2024 YR4 hitting the moon in 2032