NASA’s new planet-hunting spacecraft TESS has found its third distant world

NASA’s newest planet-hunting spacecraft has already spied and confirmed a third world outside our Solar System – just three months into the vehicle’s science operations. This newly discovered planet, or exoplanet, is relatively close by, orbiting a small star just 53 light-years away. And that means we may be able to study this world more extensively, to figure out what its atmosphere might hold.

The discoverer of these worlds is NASA’s TESS satellite – a spacecraft about the size of a fridge that was launched into orbit around Earth in April. The vehicle is the successor to NASA’s planet-hunting spacecraft, Kepler, which sat nearly 100 million miles from Earth and found thousands of distant exoplanets. Kepler ran out of fuel in October, just after TESS’s mission started to get into full swing. But both of the spacecraft search the sky the same way: they look for tiny dips in a distant star’s light, whenever a planet crosses in front and momentarily blocks part of the star.

“we can study this system in detail.”
TESS, however, has a different mission than its ancestor. Kepler searched one patch of sky at all times, to find as many exoplanets as possible. These worlds were often incredibly far out, though, too distant to really study and analyze further. But TESS is specifically looking for exoplanets relatively close to Earth. These worlds are then easier to see and study. We can analyze them with different telescopes, to determine their mass or what might be lurking in their atmospheres.

So with each new world that TESS finds, there’s a chance of learning more about it, in ways that we couldn’t with other

worlds we've discovered before. "The important thing about this system that's especially unique is it's near to us," Diana Dragomir, a postdoc at MIT's Kavli Institute for Astrophysics and Space Research and head of the team who made the discovery detailed in *The Astrophysical Journal Letters*, tells *The Verge*. "What that means simply is we can study this system in detail. We can measure the mass of the planet and measure things about the star."

NASA/MIT/TESS

In September, NASA announced that TESS had found two candidate planets — two worlds that orbit around their host stars within just a few hours and days. But this newly confirmed planet is a bit more interesting. Just like the first two discoveries, this third planet is orbiting around a dwarf, a type of star that's smaller and fainter than our Sun. But it orbits much farther out than the other two, taking 36 days to complete one trip around the star.

That makes it a much a cooler planet than the other two, with an average temperature around 300 degrees Fahrenheit, "which is not that hot," says Dragomir. "It's a little hotter than the boiling point of water." Astronomers have not been able to study planets at such cool temperatures in depth before. But since the world is so close, it's possible that scientists will be able to peek inside its atmosphere and learn more about it in the future, possibly with NASA's upcoming James Webb Space Telescope that's supposed to launch in 2021.

"This is what TESS is designed to do: find these small planets around nearby stars."

Dragomir and her team were also able to figure out the mass of this planet by doing follow-up observations with the Magellan Telescope in Chile. Though it's about three times the size of Earth, it's 23 times more massive than our planet. That makes it a "sub-Neptune" in size, even though it's much denser than

Neptune is. There’s no hope of this world being habitable, though, as it’s most likely a gas planet and not a rocky one.

However, it’s possible there is *another* planet around the same star that this planet orbits around — one that *is* about the same size of Earth. That one, also spotted by TESS, hasn’t been confirmed yet. But if it’s out there, that one would be a much hotter world, with a super close orbit that lasts just 7.8 days. And it’d also be the first Earth-sized planet that TESS has found. Its discovery would mean we could finally study an exoplanet the size of Earth more fully.

It’s finds like these that make each new discovery from TESS so exciting for astronomers. “This is what TESS is designed to do: find these small planets around nearby stars, so now we can get their mass and get access to their atmospheres,” says Dragomir.

https://www.theverge.com/2019/1/7/18172134/nasa-tess-exoplanet-hunter-spacecraft-hd-21749b-solar-system