

Twin Asteroid Belts

It's one of the proposed locations for *Star Trek's* planet Vulcan. It was the location of space station Babylon 5 in the popular '90s television series. It has been featured in novels by Issac Asimov and Frank Herbert. But the star Epsilon Eridani is even stranger than fiction. NASA's Spitzer Space Telescope has shown it has *two* asteroid belts. Hello, I'm Daniel Brennan.

This Spitzer Space Telescope podcast is part of a series highlighting recent discoveries in infrared astronomy. It's produced by NASA's Spitzer Science Center at the California Institute of Technology in Pasadena. The Spitzer mission is managed by NASA's Jet Propulsion Laboratory.

Epsilon Eridani is a star much like our own Sun, but younger and slightly cooler. It has the distinction of being the closest known planetary system to our own. Astronomers had previously found evidence for two possible planets in the system, and a broad, outer ring of icy comets much like our own Kuiper Belt.

Now, Spitzer has discovered that the system also has dual asteroid belts. Our own solar system has just one, between the orbits of Mars and Jupiter at a distance of 3 AU from the Sun. In the Epsilon Eridani system, the first belt sits approximately this same distance out from the central star, and the second one lies between the first belt and the comet ring, at about 20 AU. That would be the equivalent of an asteroid belt slightly beyond the orbit of Uranus.

Except for the mysterious second asteroid belt, the Epsilon Eridani system is an excellent analog for our own solar system when life first formed on Earth, according to Dr. Dana Backman of the SETI Institute in Mountain View, Calif., the lead author of a paper about the findings set to appear in the Jan. 10, 2009 edition of the *Astrophysical Journal*.

Asteroid belts are rocky and metallic debris left over from the early stages of planet formation. Their presence around other stars signals that rocky planets like Earth could be orbiting in the system's inner regions, with massive gas planets circling near the belts' rims. In our own solar system, for example, there is evidence that Jupiter, which lies just beyond our asteroid belt, caused the asteroid belt to form long ago by stirring up material that otherwise would have coalesced into a planet. Nowadays, Jupiter's gravity shepherds the asteroid belt, keeping it confined to a ring.

The presence of two asteroid belts indicates that there might be additional planets beyond the two already discovered. These undiscovered planets could be lying unobserved between the orbits of the other two, shepherding material around Epsilon Eridani.

Astronomers have detected stars with signs of multiple belts of material before, but Epsilon Eridani is closer to the Earth and more like our sun overall. It's a mere 10 light-years away, slightly less massive than the sun, and roughly 800 million years old.

Spitzer observed Epsilon Eridani with both of its infrared cameras and its infrared

spectrometer. When asteroids and comets collide or evaporate, they release tiny particles of dust that give off heat, which Spitzer can see. Because the system is so close to us, Spitzer can detect the dust more easily than it can around more distant stars, allowing us to form a more detailed understanding of the system's architecture.

Epsilon Eridani was one of the first stars searched for signs of advanced alien civilizations using radio telescopes in 1960. At that time, astronomers did not know how young the star is. But whether in science or science fiction, Epsilon Eridani is yet another example of how much more we still have to learn about the stars. For the Spitzer Science Center, I'm Daniel Brennan.

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