

Ask an Astronomer

Question: "Can a planet have two suns?"

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For anyone to stand on the surface of a planet and see two setting suns, three things must be true:

- 1) These close pairs of stars must exist
- 2) Planets must be able to form around these double stars
- 3) The planets must be able to stay in orbit around the stars long enough for life to evolve.

The first of these questions is easy to answer -- these close pairs of stars are everywhere! They are called binary stars, and over half of all of the stars you can see in the night sky are really binaries, they're just so far away from us that they look like a single point of light.

Some orbit so far apart that from one star, the other just looks like a bright point of light. Others orbit so close to each other that the more massive one pulls the outer atmosphere off the other in a tiny stream of material that swirls down onto the massive star like water spiralling down a plughole.

So, can planets form around binary stars? Well, in fact some binary stars may be better at forming planets than single stars.

Planets form in a process called "accretion" from the ring of dust and gas that's left over from the formation of the stars in the system. This ring of stellar junk slowly clumps together into bigger and bigger chunks, until they eventually grow to become planets.

A second star in the system can have a double benefit -- it may increase the clumping of the dust, so that even disks with a small amount of material in them can produce planets, and it may also speed the accretion process up, allowing planets to form more quickly than around single stars.

There have been a number of Jupiter-sized planets found around binary systems, and a Spitzer Space Telescope study has found planet-forming disks around 40-60% of the binary systems they observed.

So far, it's looking good. The final step is keeping the planets around the binary stars for long enough that life can evolve on the surface. This is the trickiest part of the whole puzzle.

In fact, astronomers have found that the vast majority of planetary orbits around binary stars are unstable -- at some point in the planet's lifetime, the gravitational tugs of the two stars will cause the planet to either crash into one of the stars or to fly out of the system altogether.

The good news is that there are some planetary orbits that are stable. The simplest is when the two stars are very close together, and the planet orbits a long way away from them. Then, even though the stars are moving, the planet wobbles slightly in its orbit, but it remains stable. The second simple scenario is when the stars are a very long way away from each other, and the planet only orbits one of them. In this case, both stars may have a planet around them, and two civilisations may evolve as virtual neighbours in the Universe.

Either way, science fiction's vision of two suns setting in the same sky may be closer to science fact than we on Earth ever thought possible.

For "Ask an Astronomer," I'm Dr. Carolyn Brinkworth of the Spitzer Science Center.