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Earth-like Exoplanets

Lava World Baffles Astronomers: Planet Kepler-78b 'Shouldn't Exist'

<http://www.sciencedaily.com/releases/2013/10/131030142915.htm>

Exoplanet Kepler-78b's earth-like mass suggests more such out there

<http://www.scmp.com/lifestyle/technology/article/1346095/exoplanet-kepler-78bs-earth-mass-suggests-more-such-out-there>

Of the various exoplanets found, Kepler 78b is one of the most earth-like. While it is not hospitable due to surface temperatures exceeding 2,000 degrees Celsius, its mass and density is strangely similar to earth's and encourages the idea of finding more earth like planets.

Two separate groups of scientists independently measured the mass of Kepler 78b and one group found it to be 1.69 times that of earth and the other group found it to be 1.86 times. Their respective calculations of densities were even closer to that of earth. Each measured 5.3 and 5.57 grams per cubic centimeter compared to earth's 5.5 grams/cubic-cm. This implies that Kepler 78b has a similar composition as earth, made of rock and iron. This made Kepler-78 the exoplanet most similar to earth for which the mass, radius and density has been determined.

Kepler 78b is one of thousands of suspected earth-like, rocky and icy exoplanets found by NASA's planet hunting Kepler space telescope. The Kepler space telescope was launched in 2009. Any exoplanet's found before Kepler's launch were gas giants that orbited at scorchingly close distances to their stars. The exoplanets' sizes were measured based on how much light was blocked when they passed in front of their parent stars. The composition of these planets however, was much more difficult to determine.

In the case of Kepler-78b, its closeness to its parent star made it easier to measure the "Doppler shift" effect it expressed. While its proximity made it easier to make measurements, the small distance from its parent star creates a hellish environment. This planet could never host life as we know it for the star would create temperatures so hot that not even water could exist let alone life. They think that due to the closeness, observed from the surface from Kepler 78b the star would take up a half of the sky with its blazing disk. Nevertheless this rocky, iron based planet is a good sign that there are more like it out there.

While Kepler 78b is earth's twin in size and density, it also exists in one of the tightest orbits around its star, circling every 8.5 hours. According to current theories of planet formation, it couldn't have formed so close to its star, nor could it have moved there. There are other planets like it though; Kepler-78b is a member of a new class of planets recently identified in data from NASA's Kepler spacecraft. These newfound worlds all orbit their stars with periods of less than 12 hours. Despite its similarities to earth in composition and mass however, Kepler 78b is a doomed world. Within the next 3 billion years its star's gravity will pull it apart.

Opinion

The idea of exoplanets was a new concept to me so it was interesting to find out that we are actually finding other planets in solar systems in our galaxies. The articles which I focused on summarized the current information about the specific planet Kepler 78b which is currently the most earth-like in measurements. It also seems to be one of the only exoplanets whose mass has been found which narrows down the possible candidates for earth's "twins" considerably. One article said that scientists suspect there are over 17 billion exoplanets with a similar size to earth in the milky way and with those odds there has to be another hospitable planet in our solar system. Even if somehow we beat the odds and are the only planet which can support life in our solar system, I refuse to believe that not a single galaxy in the universe contains a planet in it that parallels earth in size, composition and temperature.

One of the points I found to be interesting that was somewhat of a minor part of the articles was the fact that Kepler 78b is a part of a completely new class of planets. Its formation is baffling to scientists because in order to have an orbit that close to the parent star, the planet would have to have been formed *inside* the young star as the solar system formed. The young star would have been much more massive and the area in which Kepler 78b orbits would have been engulfed in the fiery abyss. However, had it formed outside the star and moved in ward over time, what stopped the stars gravity from continuing to pull it in until the planet was absorbed? It's a complex puzzle and it shows that there are many things in our universe we may never understand.

Another thought I had while reading these articles was, if this small planet with such a short lifetime exists in this particular system, could we have had a similar type of planet in our solar system long ago before earth was habitable? After all our system is 4.6 billion years old and if this class of planets like Kepler are only expected to survive 3 billion years is it possible that our solar system once contained a similar planet but after being absorbed, left no trace for us to find?

Exoplanets have really opened my eyes to the possibilities of finding another habitable planet. While I still believe it to be a lot like looking for a needle in a haystack, out of thousands, if not billions of earth-like planets out there there's no way we are completely unique.