

Found: The Earthiest New Planet Yet

They didn't use a space telescope, or a huge ground-based scope like the Keck or the Gemini, or even the sort of backyard telescope some planet hunters rely on to gather evidence of alien worlds. Instead, a team of European and American astronomers started with a clever new analytical technique, applied it to a set of existing observations archived by the European Southern Observatory and made what could be the biggest planet discovery since – well, since the announcement of a world in the nearby Alpha Centauri star system three weeks ago.

The fact that big planetary discoveries are occurring so close together is a measure of how fast the exoplanet field has exploded in recent years. And the announcement a few weeks back was an exciting one indeed. That new planet orbits a star close to Earth, and it's Earthlike in size as well. Its surface is probably molten lava – which pretty much rules it out as a candidate for life – and that's where the even more recently discovered planet wins out. Known as HD 40307g, it circles its home star once every 320 days or so, at a distance that puts it right in the star's Goldilocks zone, where temperatures are not too cold or too hot but just right for water-based life like ours – if it happens to be there.

This isn't the first or even the second world discovered orbiting this particular parent star. European astronomers had already found three, called HD 40307b, c and d, based on the wobbles their gravity imposed on the star itself. Disentangling those three overlapping signals was hard enough, but Mikko Tuomi of England's University of Hertfordshire, along with his team, found a way to erase the flickering of the star itself (caused by sunspots, flares and such) from the stored observations. As a result, the fainter signals of three more planets became detectable – e, f and g – for a total of six. HD 40307g is the farthest out from the star and the only habitable world known in the system.

The newly identified planet is not exactly a mirror Earth. It's at least seven times as massive as our home planet, which qualifies it as a "Super Earth," with much stronger gravity than what we're used to. That doesn't rule out the possible presence of life, say the experts, and HD 40307g has another point in its favor. "It might rotate," says Hugh Jones of University of Hertfordshire, a co-author of a paper describing the new world slated for publication in *Astronomy & Astrophysics*.

Rotation seems like a natural feature of all planets, but those that lie too close to their stars become tidally locked, showing the same face to the star at all times (as the Moon does

with Earth). Even if it were in the habitable zone, a locked planet could be hot on one side and frigid on the other – but HD 40307g is probably evenly toasty all around.

Yet another plus is the fact that the new world lies only 44 light years away from Earthly telescopes. That's pretty far compared with the Alpha Centauri planet, just 4 light-years away, but practically next door compared with the distant Super Earths the Kepler space telescope has found. Along with another planet found by members of this same team early in 2012, HD 40307g could be the beginning of a growing collection of habitable planets that could be seen directly by a coming generation of telescopes.

The only question that remains is a pretty fundamental one: whether the new world is really there at all. Jones acknowledges that the signals from the other five planets are more robust. "We've tested this new technique on planets we already knew existed," he says, "but this is the first time we've used it to make a detection."

Nevertheless, he's reasonably confident that HD 40307g does exist and, he says, "we're using the new technique on lots of other stars even as we speak. We're seeing lots of exciting possibilities."

<http://science.time.com/2012/11/08/found-the-earthiest-new-planet-yet/>