



<p><b>ESOCast Episode 6: Lightest exoplanet found</b></p>	
<p><b>00:00</b> <b>[Visual starts]</b></p> <p><b>[Narrator]</b> 1. The holy grail of current exoplanet research is the detection of a rocky, Earth-like planet in the 'habitable zone,' region around the host star with the right conditions for water to be liquid on their surface. The latest result from the European Southern Observatory comes closer than ever to attaining these goals.</p>	<p><b>A: Artist's impression of Gliese 581e</b></p>
<p><b>00:25</b> <b>ESOCast intro</b></p> <p>This is the ESOCast! Cutting-edge science and life behind the scenes of ESO, the European Southern Observatory. Exploring the Universe's ultimate frontier with our host Dr. J, a.k.a. Dr. Joe Liske.</p>	
<p><b>00:42</b> <b>[Dr. J]</b> 2. Hello and welcome to another episode of the ESOCast. This time we have some very exciting news for you, it's another major ESO discovery. We'd like to tell you about the discovery of the smallest, or rather lightest, and possibly most Earth-like planet so far discovered outside of our own Solar System. We'd also like to report on yet another planet within the same system that has now been shown to lie within the habitable zone of its parent star, meaning that it could host liquid water and possibly even life.</p>	<p><b>A: Artist's impression of Gliese 581e</b> <b>B: Artist's impression of Gliese 581d</b></p>
<p><b>01:13</b> <b>[Narrator]</b> 3. Gliese 581 is a seemingly inconspicuous red dwarf star located 20.5 light-years away in the constellation Libra, or "the Scales". It is among the 100 closest stars to us and weighs only one third the mass of the Sun. Such red dwarfs are intrinsically at least 50 times fainter than the Sun and are the most common stars in our Galaxy.</p> <p>For astronomers studying exoplanets, red dwarfs are ideal targets for the search for low-mass planets where water could be liquid. Because such dwarfs emit less light, the habitable zone is much closer to them than it is around the Sun, which makes it easier to detect the planets.</p>	<p><b>C: Zoom-in on Gliese 581e</b></p>

<p><b>01:54</b> [Dr. J]</p> <p>4. Professor Michel Mayor from the Geneva Observatory and his team of European astronomers have carefully observed Gliese 581 over the past four years using the world's leading planet-hunting instrument, the HARPS spectrograph on the ESO 3.6-metre telescope at the La Silla Observatory in Chile.</p> <p>Now, what they found was that Gliese 581 is orbited by a planet that has only 1.9 times the mass of the Earth. This planet is known as Gliese 581 e, and it is the lightest and most Earth-like planet so far discovered outside of our own Solar System.</p> <p>Now within the very same system, the team also refined the orbit of a previously known planet — called Gliese 581 d. What they found was that this planet is definitely within the habitable zone of its parent star. Now what that means is that the planet is just at the right distance from the star for any water that might be present at its surface to be liquid. If it were any closer the radiation from the star would be too strong and the water would evaporate, if it were any further away it would be too cold and the water would freeze.</p>	<p>On screen:</p> <p>HARPS + 3.6-metre stock footage</p> <p><b>A: Artist's impression of Gliese 581e</b></p> <p><b>B: Artist's impression of Gliese 581d</b></p>
<p><b>03:01</b> [Narrator]</p> <p>5. From previous observations — also done with the HARPS spectrograph at ESO's La Silla Observatory and announced two years ago — this star was known to also harbour a system of three super-Earth planets. With Gliese 581e the planetary system has four known planets, with masses of about 1.9 (planet e), 16 (planet b), 5 (planet c), and 7 Earth-masses (planet d).</p>	<p><b>D: Artist impression of the Gliese 581 system</b></p>
<p><b>03:28</b> [Dr J.]</p> <p>6. The planet with the largest orbit in this system is Gliese 581d and it takes about 66.8 days for one round trip around its parent star. Now because it orbits within the habitable zone of its star, this planet could be covered in liquid oceans — making it the first serious 'water world' candidate.</p>	<p><b>B: Artist's impression of Gliese 581d</b></p>
<p><b>03:48</b> [Narrator]</p> <p>7.</p> <p>Thanks to Mayor and his team, we now know that the Gliese 581 system contains at least four exoplanets. These planets were discovered through the tiny wobble they cause to their host star as they move around — only about 7 km/hour which equates to brisk walking speed. The discovery of Gliese 581e and the refinement of Gliese 581d's orbit were possible only due to HARPS's unique precision and stability.</p>	<p><b>E: Star wobble animation</b></p> <p>Stock footage of HARPS</p>

<p><b>04:18</b>  <b>[Dr. J]</b>  8.  Using the HARPS spectrograph Michel Mayor and his team of European exoplanet hunters are leading the way towards answering some of our most fundamental questions about life outside of our own Solar System. They are confident that in the not too distant future, a truly Earth-like planet will be discovered. So stay tuned!</p> <p>This is Dr J signing off for the ESOcast. Join us again next time for another cosmic adventure.</p>	<p><b>D: Artist impression of the Gliese 581 system</b></p>
<p><b>04:43</b>  <b>[Outro]</b></p>	<p>ESOcast is produced by ESO, the European Southern Observatory.</p> <p><i>ESO, the European Southern Observatory, is the pre-eminent intergovernmental science and technology organisation in astronomy designing, constructing and operating the world's most advanced ground-based telescopes.</i></p>

**04:56**  
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