= Kepler @-@ 11e =

Kepler @-@ 11e is an exoplanet (extrasolar planet) discovered in the orbit of the sunlike star Kepler @-@ 11 . It is the fourth of six planets around Kepler @-@ 11 discovered by NASA 's Kepler spacecraft . Kepler @-@ 11e was found by using the transit method , in which the dimming effect that a planet causes as it crosses in front of its star is measured . Kepler @-@ 11e is most likely a gas giant like Neptune , having a density that is less than that of Saturn , the least dense planet in the Solar System . Its low density can probably be attributed to a large hydrogen and helium atmosphere . Kepler @-@ 11e has a mass eight times of Earth 's mass and a radius 4 @.@ 5 times that of Earth . The planet orbits its star every 31 days in an ellipse that would fit within the orbit of Mercury . Kepler @-@ 11e was announced on February 2 , 2011 with its five sister planets after it was confirmed by several observatories .

= = Name and discovery = =

At the time when Kepler @-@ 11 was first noted as a host to a potential transit event , the star was given the designation KOI @-@ 157 . It was later assigned the name " Kepler @-@ 11 " after the Kepler spacecraft , a NASA satellite tasked with discovering planets in transit of , or crossing in front of , their stars . This transit causes a slight and regular change in the host star 's brightness , which can then tested to prove the planet 's existence and , later , to extrapolate the orbital parameters of the planet . Kepler @-@ 11e is first given the designation by its host star , Kepler @-@ 11 . Since Kepler @-@ 11e was announced with five other planets , the letters added to the star are sorted by the planet 's distance from its star . Kepler @-@ 11e is the fourth planet from Kepler @-@ 11 , it is given the designation " e " .

Follow @-@ up confirmation observations were made by the Keck 1 telescope at the W.M. Keck Observatory in Hawaii , the Hale and Shane telescopes in California , the Harlan J. Smith and Hobby @-@ Eberly telescopes in west Texas , the Nordic Optical Telescope in the Canary Islands , and by telescopes at the WIYN (including MMT) and Whipple observatories in Arizona . The Spitzer Space Telescope was also used . Kepler @-@ 11 's planetary system became the first discovered extrasolar system with more than three transiting planets , as well as the most compact and flattest system yet discovered , according to NASA . The planets of Kepler @-@ 11 , including Kepler @-@ 11e , were announced jointly at a press conference on February 2 , 2011 . The findings were published in the journal Nature on February 3 .

= = Host star = =

Kepler @-@ 11 is a G @-@ type star located in the Cygnus . It has a mass of .95 Msun and a radius of 1 @.@ 1 Rsun , and is thus almost the same mass and radius as the Sun . With an effective temperature of 5680 K , it is also almost as hot as the Sun , and with a metallicity of 0 , Kepler @-@ 11 is almost as metal @-@ rich as the Sun is . Metal @-@ rich stars tend to have easily detectable planets because higher metallicities tend to either facilitate the creation of gas giants or to promote planetary migration , in which the planet orbits more closely to its star . However , Kepler @-@ 11 is almost 1 @.@ 73 times older than the Sun , as it has an estimated age of eight billion years . Kepler @-@ 11 is 613 parsecs away from the Earth ; its distance contributes to its apparent magnitude of 14 @.@ 2 (V) . It , thus , cannot be seen with the naked eye . Other than Kepler @-@ 11e , Kepler @-@ 11 is the host star of the planets Kepler @-@ 11b , Kepler @-@ 11c , Kepler @-@ 11d , Kepler @-@ 11f , and Kepler @-@ 11g . The inner five planets in the system orbit in a tightly knit configuration that would fit within the orbit of planet Mercury , while Kepler @-@ 11g , compared to its inner sister planets , orbits at a much further distance .

= = Characteristics = =

Kepler @-@ 11e , which formed within the first few million years of the star system 's formation ,

has a mass 8 @.@ 4 times that of Earth 's , and radius 4 @.@ 52 times that of Earth 's . With a density of 0 @.@ 5 grams / cm3 , Kepler @-@ 11e has a density that is half of that of pure water at standard temperature and pressure and slightly less than the density of Saturn . Kepler @-@ 11e has a surface equilibrium temperature of 617 K , and is thus has an equilibrium temperature approximately 2 @.@ 4 times hotter than Earth 's . Kepler @-@ 11e orbits its star at a mean distance of .194 AU , making it the fourth planet from its star . It completes an orbit every 31 @.@ 995990 days . In comparison , Mercury orbits the Sun every 87 @.@ 97 days at a distance of .387 AU . Kepler @-@ 11e 's orbital inclination is 88 @.@ 8 ° , making it almost entirely edge @-@ on to its star as seen from Earth .

Because it isn 't as close to its star as its sister planets Kepler @-@ 11b and Kepler @-@ 11c , the Kepler team suggests that its light density may come from a large hydrogen and helium atmosphere that has not been blown away by the stellar wind .