

= Kepler @-@ 11c =

Kepler @-@ 11c is an exoplanet discovered in the orbit of the sun @-@ like star Kepler @-@ 11 by the Kepler spacecraft , a NASA telescope aiming to discover Earth @-@ like planets . It is the second planet from its star , and is most likely a water planet with a thin hydrogen ? helium atmosphere . Kepler @-@ 11c orbits Kepler @-@ 11 every 10 days , and has an estimated density twice that of pure water . It is estimated to have a mass thirteen times that of Earth and a radius three times that of Earth . Kepler @-@ 11c and its five sister planets form the first discovered system with more than three transiting planets . The Kepler @-@ 11 system also holds the record of being the most compact and the flattest system discovered . Kepler @-@ 11c and the other Kepler @-@ 11 planets were announced to the public on February 2 , 2011 , and was published in Nature a day later .

= = Name and discovery = =

Kepler @-@ 11c 's name is divided into two parts : it is named for Kepler @-@ 11 , the star around which it orbits . As planets with discoveries that are announced at the same time are sorted by distance , Kepler @-@ 11c 's " c " is because it was the second closest planet from its host star at the time of discovery ( Kepler @-@ 11b is the closest ) . Kepler @-@ 11 , the host star , was named for the Kepler satellite , a NASA telescope that searches for terrestrial planets by measuring small fluctuations in the light of stars that occurs when celestial bodies transit , or cross in front of , the star with respect to Earth . Kepler @-@ 11 was flagged as home to a potential transit event by the satellite , and was given the designation KOI @-@ 157 . After further observations , Kepler @-@ 11c 's existence was confirmed by the observation of an orbital resonance effect between Kepler @-@ 11b and Kepler @-@ 11c . Along with the other five planets in orbit around Kepler @-@ 11 , Kepler @-@ 11c was announced on February 2 , 2011 at a press conference . Its findings were published on February 3 in the journal Nature . The Kepler @-@ 11 system is the first known to host more than three transiting planets .

Follow @-@ up observations were conducted by the Hale and the C. Donald Shane telescopes in California ; MMT , WIYN , and Tillinghast telescopes in Arizona ; the Keck I telescope in Hawaii ; the Hobby @-@ Eberly and Smith telescopes in Texas ; and the Nordic Optical Telescope in the Canary Islands .

= = Host star = =

Kepler @-@ 11c 's host star , Kepler @-@ 11 , is a G @-@ type star 2 @, @ 000 light years away in the Cygnus constellation . With a mass of .95 Msun , a radius of 1 @. @ 1 R<sub>sun</sub> , a metallicity of [ Fe / H ] = 0 , and an effective temperature of 5680 ( ± 100 ) K , Kepler @-@ 11 is almost identical to the Sun in terms of radius , mass , and temperature . However , Kepler @-@ 11 is much older than the Sun , with an estimated age of 8 ( ± 2 ) billion years ( the Sun is approximately 4 @. @ 6 billion years old ) . Along with Kepler @-@ 11c , Kepler @-@ 11 is host to the planets Kepler @-@ 11b , Kepler @-@ 11d , Kepler @-@ 11e , Kepler @-@ 11f , and Kepler @-@ 11g . The inner five planets ' orbits would fit within the orbit of planet Mercury , while Kepler @-@ 11g orbits Kepler @-@ 11 at a much further distance in comparison to the inner components .

With an apparent magnitude of 14 @. @ 2 , Kepler @-@ 11 cannot be seen from Earth with the naked eye .

= = Characteristics = =

Kepler @-@ 11c has a mass of 13 @. @ 5 M<sub>E</sub> and a radius of 3 @. @ 15 R<sub>E</sub> , making it over 13 @. @ 5 times the mass of earth , but approximately 3 @. @ 15 times its radius . Neptune , in comparison , has a radius approximately 3 @. @ 9 times that of Earth . With a density of 2 @. @ 3 grams / cm<sup>3</sup> , Kepler @-@ 11c has a mass over double of that of pure water at 0 ° C ; it is also

denser than all the Sun 's gas giants , but less dense than any of its rocky planets . Its density is closest to the dwarf planet Pluto . Due in part to its proximity to its star , the planet 's equilibrium temperature is 833 K , about three times hotter than Earth 's average temperature . It orbits Kepler @-@ 11 every 13 @.@ 02502 days at a distance of .106 AU ; it is Kepler @-@ 11 's second closest planet . Mercury , in comparison , orbits every 87 @.@ 97 days at a distance of .387 AU . The orbit 's inclination of Kepler @-@ 11c is  $89^\circ$  , and is thus almost edge @-@ on as seen from Earth .

The Kepler team has said that Kepler @-@ 11b and Kepler @-@ 11c are probably composed mostly of water with a thin hydrogen and helium atmosphere . In comparison to the outer planets of the system , which probably have large hydrogen and helium atmospheres , Kepler @-@ 11c 's proximity to its star has blown off most of its atmosphere . Kepler @-@ 11 and its six @-@ planet system form what NASA considers to be the most compact and flattest planetary system yet discovered . Kepler @-@ 11b and Kepler @-@ 11c orbit Kepler @-@ 11 with a phenomenon called orbital resonance , a gravitational tugging that keeps their orbit stable at a 5 @.@ 4 ratio .