= Kepler @-@ 11g =

Kepler @-@ 11g is an exoplanet discovered in the orbit of the sunlike star Kepler @-@ 11 by the Kepler spacecraft , a NASA satellite tasked with searching for terrestrial planets . Kepler @-@ 11g is the outermost of the star 's six planets . The planet orbits at a distance of nearly half the mean distance between Earth and the Sun . It completes an orbit every 118 days , placing it much further from its star than the system 's inner five planets . Its estimated radius is a little over three times that of Earth , i.e. comparable to Neptune 's size . Kepler @-@ 11g 's distance from the inner planets made its confirmation more difficult than that of the inner planets , as scientists had to work to exhaustively disprove all reasonable alternatives before Kepler @-@ 11g could be confirmed . The planet 's discovery , along with that of the other Kepler @-@ 11 planets , was announced on February 2 , 2011 . According to NASA , the Kepler @-@ 11 planets form the flattest and most compact system yet discovered .

= = Name and discovery = =

Kepler @-@ 11 was originally called KOI @-@ 157 when NASA 's Kepler spacecraft flagged the star for possible transit events , which exhibit tiny and roughly periodic decreases in the star 's brightness are measured as it passes in front of its star as seen from Earth . Kepler @-@ 11 's name is incorporated into Kepler @-@ 11g 's name because it is the host star . As Kepler @-@ 11g and its five sister planets were discovered and announced at the same time , its planets were sorted alphabetically by distance from the host star , starting with the letter b . Because Kepler @-@ 11g was the furthest of the six , it was given the designation " g . "

The Kepler team 's scientists conducted follow @-@ up observations to confirm or reject the planetary nature of the detected object . To do so , they used the Keck 1 telescope at the W.M. Keck Observatory in Hawaii ; the Shane and Hale telescopes in California ; telescopes at the WIYN (including MMT) and Whipple observatories in Arizona ; Nordic Optical Telescope in the Canary Islands ; the Hobby @-@ Eberly and Harlan J. Smith telescopes in Texas ; and NASA 's Spitzer Space Telescope . Because Kepler @-@ 11g orbits its star at a far greater distance than the inner five planets , fewer transits were observed , and radial velocity (the observation of a Doppler effect) interactions could not be easily discerned . As with the discovery of Kepler @-@ 9d , the Kepler team ran the information through numerous models to see if Kepler @-@ 11g 's light curve could fit the profile of some other object , including an eclipsing binary star in the background that may have contaminated the data . The probability that Kepler @-@ 11g is not a planet but instead a false positive was determined to be 0 @.@ 18 % , effectively confirming its existence .

Kepler @-@ 11g , along with its five sister planets , were announced at a NASA press conference on February 2 , 2011 . The findings were published in the journal Nature a day later .

= = Host star = =

Kepler @-@ 11 is a G @-@ type star in the Cygnus constellation . It is located approximately 613 parsecs away . Kepler @-@ 11 is .95 (± 0 @.@ 1) times the mass and 1 @.@ 1 (± 0 @.@ 1) times the radius of the Sun . The star has an iron content (metallicity) of 0 (± 0 @.@ 1) , similar to that of the Sun . Metallicity plays a vital role in the formation of planets , as a more metal @-@ rich star tends to form more dense planets . Kepler @-@ 11 has an effective temperature of 5680 (± 100) K , only slightly cooler than the Sun (5778 K) . Kepler @-@ 11 hosts six known planets : Kepler @-@ 11b , Kepler @-@ 11c , Kepler @-@ 11d , Kepler @-@ 11e , and Kepler @-@ 11f , all of which form a tight group well within the orbit of Mercury . Kepler @-@ 11g is considerably farther away from Kepler @-@ 11 than its five sister planets . According to NASA , the planets orbiting Kepler @-@ 11 form the flattest and most compact system known .

Kepler @-@ 11 has an apparent magnitude of 14 @.@ 2 , and thus cannot be seen with the naked eye .

= = Characteristics = =

Kepler @-@ 11g , the sixth planet of six from its star , it 's mass is estimated to be at most 25 times that of Earth . Its exact mass could not be determined through transit observations because , while gravitational interactions of Kepler @-@ 11 's five inner planets were used to determine their masses , Kepler @-@ 11g 's comparatively large distance prevented it from affecting , or being affected by , the other five planets . As a result , only an upper limit can be placed on the mass , which is based on the assumption that if it were above this limit , gravitational effects on the other planets would be observed . Nonetheless , tighter constraints were placed on Kepler @-@ 11g 's mass by formation and evolution calculations , which indicated that the planet mass is not much greater than about 7 ME .

Its radius is estimated to be 3 @.@ 33 times that of Earth , somewhat smaller than Neptune 's radius . Kepler @-@ 11g has an estimated surface equilibrium temperature of 400 K , over 1 @.@ 5 times (50 % higher) that of Earth 's equilibrium temperature . Kepler @-@ 11g orbits Kepler @-@ 11 every 118 @.@ 37774 days (over 2 @.@ 5 times that of the fifth planet from Kepler @-@ 11 , Kepler @-@ 11f) at a distance of 0 @.@ 462 AU , almost half of the distance from which Earth orbits the Sun . Its eccentricity is unknown . In comparison , planet Mercury orbits the Sun every 87 @.@ 97 days at a distance of 0 @.@ 387 AU . With an orbital inclination of 89 @.@ 8 ° , Kepler @-@ 11g is seen almost edge @-@ on with respect to Earth .