= Kepler @-@ 10 =

Kepler @-@ 10 , formerly known as KOI @-@ 72 , is a Sun @-@ like star in the constellation of Draco that lies 173 parsecs (564 light years) from Earth . Kepler @-@ 10 was targeted by NASA 's Kepler spacecraft , as it was seen as the first star identified by the Kepler mission that could be a possible host to a small , transiting exoplanet . The star is slightly less massive , slightly larger , and slightly cooler than the Sun ; at an estimated 10 @.@ 4 billion years in age , Kepler @-@ 10 is almost 2 @.@ 6 times the age of the Sun . Kepler @-@ 10 is host to a planetary system made up of at least two planets . Kepler @-@ 10b , the first undeniably rocky planet , was discovered in its orbit after eight months of observation and announced on January 10 , 2011 . The planet orbits its star closely , completing an orbit every 0 @.@ 8 days , and has a density similar to that of iron . The second planet , Kepler @-@ 10c , was confirmed on May 23 , 2011 , based on follow @-@ up observations by the Spitzer Space Telescope . The data shows it has an orbital period of 42 @.@ 3 days and has a radius more than double that of Earth , but a higher density , making it the largest and most massive rocky planet discovered as of June 2014 .

= = Nomenclature and history = =

Kepler @-@ 10 was named because it was the tenth planetary system observed by the Kepler spacecraft , a NASA satellite designed to search for Earth @-@ like planets that transit , or cross in front of , their host stars with respect to Earth . The transit slightly dims the host star ; this periodic dimming effect is then noted by Kepler . After eight months of observation ranging from May 2009 to January 2010 , the Kepler team established Kepler @-@ 10b as the first rocky exoplanet discovered by the Kepler satellite . Kepler @-@ 10 was the first Kepler @-@ targeted star suspected of having a small planet in orbit . Because of that , verifying Kepler 's discovery was prioritized by telescopes at the W.M. Keck Observatory in Hawaii . The discovery was successfully verified . Although there had been many potentially rocky exoplanets discovered in the past , Kepler @-@ 10b was the first definitively rocky planet to have been discovered .

The discovery of Kepler @-@ 10b was announced to the public at a winter meeting of the American Astronomical Society on January 10 , 2011 in Seattle . On May 23 , 2011 , the existence of Kepler @-@ 10c was confirmed at the 218th AAS meeting in Boston .

= = Characteristics = =

Kepler @-@ 10 is a G @-@ type star , like the Sun . With a mass of 0 @.@ 895 (± 0 @.@ 06) Msun and a radius of 1 @.@ 056 (± 0 @.@ 021) Rsun , the star is approximately 10 % smaller than and 5 % wider than the Sun . The metallicity of Kepler @-@ 10 , as measured in [Fe / H] (the amount of iron in the star) , is -0.15 (± 0 @.@ 04) ; this means that Kepler @-@ 10 is about 70 % as metal @-@ rich as the Sun . Metallicity tends to play a large role in the formation of planets , determining if they form , and what kind of planet they will form . In addition , Kepler @-@ 10 is estimated to be 11 @.@ 9 billion years old and to have an effective temperature of 5627 (± 44) K ; To compare , the Sun is younger and hotter , with an age of 4 @.@ 6 billion years and an effective temperature of 5778 K.

Kepler @-@ 10 is located at a distance of 173 (± 27) parsecs from the Earth , which equates to approximately 564 light years . Also , Kepler @-@ 10 's apparent magnitude , or brightness as seen from Earth , is 10 @.@ 96 ; it therefore cannot be seen with the naked eye .

= = Planetary system = =

Per the usual exoplanet nomenclature , the first planet discovered to be orbiting Kepler @-@ 10 is called Kepler @-@ 10b . Announced in 2011 , it was the first rocky planet identified outside the Solar system . The planet has a mass that is 3 @.@ 33 ± 0 @.@ 49 times that of Earth 's and a radius that is 1 @.@ 47 + 0 @.@ 03

? 0 @.@ 02 times that of Earth . The planet orbits Kepler @-@ 10 at a distance of 0 @.@ 01684 AU every 0 @.@ 8375 days ; this can be compared to the orbit and orbital period of planet Mercury , which circles the Sun at a distance of 0 @.@ 3871 AU every 87 @.@ 97 days . Because the planet orbits so closely to its star , its eccentricity is virtually zero . It , thus , has an extremely circular orbit .

Kepler @-@ 10c was also discovered by NASA 's Kepler Mission , the second exoplanet found to orbit Kepler @-@ 10 . Radial @-@ velocity measurements of the body suggest that it has a mass of 17 @.@ 2 ± 1 @.@ 9 Earth masses and a radius of 2 @.@ 35 Earth radii , making it the largest known rocky planet as of 2014 . Kepler @-@ 10c would orbit Kepler @-@ 10 at a distance of 0 @.@ 24 AU every 45 @.@ 29 days .