= Kepler @-@ 40 =

Kepler @-@ 40 , formerly known as KOI @-@ 428 , is an F @-@ type star in the constellation Cygnus . Kepler @-@ 40 is known to host at least one planet , Kepler @-@ 40b . The star is approximately 1 @.@ 5 times more massive than the Sun , and is over two times its size ; it was , at upon its discovery , the largest yet discovered with a transiting planet in its orbit . Kepler @-@ 40 was first noted as home to a possible transiting object by the Kepler spacecraft ; the data on the system was released to the public . A team of French and Swiss scientists used follow @-@ up data to determine the existence of the Hot Jupiter planet Kepler @-@ 40b , and later had their results published in a scientific journal on January 4 , 2011 .

= = Observational history = =

Kepler @-@ 40 was first targeted by the Kepler spacecraft , an Earth @-@ trailing NASA operation that searches for planets that transit , or cross in front of , their host stars . It was labeled a Kepler Object of Interest (KOI) during the satellite 's first 33 @.@ 5 days of operations , which stretched from mid @-@ May to mid @-@ June 2009 , because of the detection of a potential transit event . The data collected by Kepler 's photometer was publicly released , including data on Kepler @-@ 40 and its possible transiting companion .

Data on Kepler @-@ 40 was analyzed by a team of French and Swiss astronomers , who first tested for false positives . When all obvious false positives were cleared , the science team used the SOPHIE échelle spectrograph at the Haute @-@ Provence Observatory in southern France to gather radial velocity measurements on the star . Collected data was then checked to see if it corresponded with that of a closely orbiting binary star or that of a planet ; it was found to be that of a planet , leading to the confirmation of Kepler @-@ 40b .

After Kepler @-@ 40b was confirmed , the French and Swiss science team worked to clarify the stellar parameters its star by analyzing the star 's spectrum as collected by SOPHIE . Kepler @-@ 40 is the sixth known planetary host star with a radius of more than 1 @.@ 8 times that of the Sun . At the time of its discovery , Kepler @-@ 40 was the most evolved star known to have a transiting planet .

Kepler @-@ 40 and its exoplanet were published in the journal Astronomy and Astrophysics on January 4 , 2011 , after being submitted on September 15 , 2010 .

= = Characteristics = =

Kepler @-@ 40 is an F @-@ type star that is 1 @.@ 48 times the mass of the Sun and 2 @.@ 13 times its radius . The star has an effective temperature of 6510 K , making it hotter than the Sun . Its metallicity of [Fe / H] = 0 @.@ 10 means that Kepler @-@ 40 has 1 @.@ 26 times as much iron as the Sun does .

Kepler @-@ 40 was , at the time of its discovery , the largest and most evolved star known to host a transiting planet . It is the sixth known host star with a radius over 1 @.@ 8 times that of the Sun and a transiting planet , after stars that include Kepler @-@ 5 and Kepler @-@ 7 .

Kepler @-@ 40 lies 2700 parsecs (8 @,@ 806 @.@ 4 light years) away from Earth , further than any star (with a known distance) with an exoplanet previously discovered by Kepler . With an apparent magnitude of 14 @.@ 58 , it was also dimmer than any star previously recognized by Kepler . Because of its low apparent magnitude , Kepler @-@ 40 cannot be seen with the naked eye .

= = Planetary system = =

Kepler @-@ 40b is the first (and only) planet discovered so far in the orbit of Kepler @-@ 40 . It has a mass that is 2 @.@ 2 times that of Jupiter 's , the rough equivalent of 700 Earths . The planet also has a radius that is 1 @.@ 17 times that of Jupiter and a density of 1 @.@ 68 grams / cm3 .

Kepler @-@ 40b has an equilibrium temperature of 1620 K , over six times hotter than the equilibrium temperature of Earth . It orbits its star every 6 @.@ 87 days at a distance of 0 @.@ 081 AU .