= WASP @-@ 13b =

WASP @-@ 13b is an extrasolar planet that was discovered in 2008 in the orbit of the sunlike star WASP @-@ 13 . The planet has a mass of nearly half that of Jupiter , but a radius five @-@ fourths the size of Jupiter . This low relative mass might be caused by a core that is of low mass or that is not present at all .

The planet orbits at approximately 5 % of the distance between the Sun and Earth every four days . The star was observed several times between 2006 and 2009 , at first through the SuperWASP program and later through focused follow @-@ up observations . Analysis of collected radial velocity measurements led to the discovery of WASP @-@ 13b , which was reported in a journal on April 7 , 2009 . A follow @-@ up study published in 2011 investigated the cause for inflated planets such as WASP @-@ 13b , and re @-@ examined (and re @-@ constrained) its mass , radius , density , and age .

= = Discovery = =

Between November 27 , 2006 , and April 1 , 2007 , 3329 images of the star WASP @-@ 13 by the SuperWASP @-@ North program based at Roque de los Muchachos Observatory in the Canary Islands led to the identification of WASP @-@ 13 as host to a potentially transiting object . Photometric follow @-@ up observations were taken on February 16 , 2008 using the James Gregory Telescope (JGT) in Scotland , which took 1047 exposures of the star , although the last twenty images taken were obscured by cloud cover and were discarded . Using HD 80408 as a reference star along with JGT measurements , the astronomers investigating the system were able to create a light curve for the transiting planet .

WASP @-@ 13 was observed between February 11 and 15 in 2008 by the SOPHIE échelle spectrograph at the Haute @-@ Provence Observatory in France , determining the radial velocity of the transiting body . Use of the FIES echelle spectrograph at the Nordic Optical Telescope in the Canary Islands gained other spectral measurements that yielded the characteristics of the star . Analysis of the SOPHIE and FIES data were used to constrain some of the orbiting body 's characteristics . The discovery of the orbiting body 's mass using radial velocity measurements led to its confirmation as the planet WASP @-@ 13b .

The discovery of WASP @-@ 13b was reported in the journal Astronomy and Astrophysics by the European Southern Observatory on May 19 , 2009 . The discovery paper was received by the journal on April 7 , 2009 .

Later , between 2009 and 2011 , another team of astronomers observed WASP @-@ 13b and WASP @-@ 21b to find what caused some Hot Jupiters to have anomalously high radii . The RISE photometric camera on the Liverpool Telescope was used to detect further transits . Two partial transits and two full transits were observed during this period , although the quality of both full transits was slightly compromised because of passing cloud cover . The collected observations , along with the JGT observations that were used to confirm the planet , were scaled to filter out errors such as background noise . The data was then used to re @-@ define WASP @-@ 13b 's parameters , including its age , mass , radius , and density . The study also noted that a limb darkening effect was present , a characteristic that may affect future atmospheric studies of the planet .

= = Host star = =

WASP @-@ 13 is a sunlike G @-@ type star located in the Lynx constellation . Measurements taken by FIES and SOPHIE did not constrain the mass , radius , or age well ; however , a later 2011 study using the Liverpool Telescope better @-@ constrained those parameters . The star 's mass is estimated at 1 @.@ 09 times the mass of the Sun , its radius at 1 @.@ 559 times that of the Sun , and its density at 0 @.@ 288 time 's the Sun 's density . These characteristics are re @-@ defined taking limb darkening into account . The star 's metallicity , which is measured by iron content , is

placed roughly at [Fe / H] = 0 , similar to that of the Sun . Also , the star 's estimated effective temperature is 5826 K , slightly warmer than the Sun .
WASP @-@ 13 has an apparent magnitude of 10 @.@ 42 , making it invisible to the unaided eye as seen from Earth .

= = Characteristics = =

WASP @-@ 13b is a transiting planet with an estimated mass that is (including limb darkening) 0 @.@ 477 times that of Jupiter and a radius that is 1 @.@ 389 times Jupiter 's radius . The planet is , in other words , less than half the mass of Jupiter , but slightly less than fourteen tenths its size . WASP @-@ 13b 's low mass can mostly likely be attributed to the presence of a low @-@ mass core , or to the total lack of a core , according to the discovery paper . WASP @-@ 13b , which orbits its host star at a distance of 0 @.@ 05362 AU , circles its star completely every 4 @.@ 35298 days . The 2011 study on the planet recognized WASP @-@ 13b as the fifth lowest @-@ density extrasolar planet known , behind Kepler @-@ 7b ; WASP @-@ 17b ; TrES @-@ 4b ; and COROT @-@ 5b .
WASP @-@ 13b has an orbital inclination of 86.9º , which means that it orbits almost edge @-@ on as seen from Earth .