= 55 Cancri e =

55 Cancri e (abbreviated 55 Cnc e) , also named Janssen , is an exoplanet closely orbiting its Sun @-@ like host star 55 Cancri A. The mass of the exoplanet is about 8 @.@ 63 Earth masses and its diameter is about twice that of the Earth , thus classifying it as the first super @-@ Earth discovered around a main sequence star , predating Gliese 876 d by a year . It takes fewer than 18 hours to complete an orbit and is the innermost known planet in its planetary system . 55 Cancri e was discovered on 30 August 2004 . However , until the 2010 observations and recalculations , this planet had been thought to take about 2 @.@ 8 days to orbit the star . In October 2012 , it was announced that 55 Cancri e could be a carbon planet .

In July 2014 the International Astronomical Union launched a process for giving proper names to certain exoplanets and their host stars . The process involved public nomination and voting for the new names . In December 2015 , the IAU announced the winning name was Janssen for this planet . The winning name was submitted by the Royal Netherlands Association for Meteorology and Astronomy of the Netherlands . It honors the spectacle maker and telescope pioneer Zacharias Janssen .

In February 2016 , it was announced that NASA 's Hubble Space Telescope had detected hydrogen and helium (and suggestions of hydrogen cyanide) , but no water vapor , in the atmosphere of 55 Cancri e , the first time the atmosphere of a super @-@ earth exoplanet was analyzed successfully .

= = Discovery = =

Like the majority of extrasolar planets found prior to the Kepler mission , 55 Cancri e was discovered by detecting variations in its star 's radial velocity . This was achieved by making sensitive measurements of the Doppler shift of the spectrum of 55 Cancri A. At the time of its discovery , three other planets were known orbiting the star . After accounting for these planets , a signal at around 2 @.@ 8 days remained , which could be explained by a planet of at least 14 @.@ 2 Earth masses in a very close orbit . The same measurements were used to confirm the existence of the uncertain planet 55 Cancri c .

55 Cancri e was one of the first extrasolar planets with a mass comparable to that of Neptune to be discovered . It was announced at the same time as another " hot Neptune " orbiting the red dwarf star Gliese 436 named Gliese 436 b .

= = = Planet challenged = = =

In 2005 the existence of planet e was questioned by Jack Wisdom in a reanalysis of the data : according to him , instead of the 2 @.@ 8 @-@ day planet there is a planet with a mass similar to that of Neptune in a 261 @-@ day orbit around 55 Cancri A. In 2007 , Debra Fischer and colleagues at San Francisco State University published a new analysis indicating that both planets existed ; the planet in the 260 @-@ day orbit was accordingly designated 55 Cancri f .

= = = Transit = = =

The planet 's transit of its primary was announced on 27 April 2011 , based on two weeks of nearly continuous photometric monitoring with the MOST space telescope . The transits occur with the period (0 @.@ 74 days) and phase that had been predicted by Dawson & Fabrycky . This is one of the few planetary transits to be confirmed around a well @-@ known star , and allowed investigations into the planet 's composition .

= = Orbit and mass = =

The radial velocity method used to detect 55 Cancri e obtains the minimum mass of 7 @.@ 8 times

that of Earth , or 48 % of the mass of Neptune . The transit shows that its inclination is about 83 @.@ 4 ± 1 @.@ 7 , so the real mass is close to the minimum . 55 Cancri e is also coplanar with b .

= = Characteristics = =

55 Cancri e receives more radiation than Gliese 436 b . The side of the planet facing its star has temperatures more than 2 @,@ 000 kelvin (approximately 1 @,@ 700 degrees Celsius or 3 @,@ 100 Fahrenheit) , hot enough to melt metal .

It was initially unknown whether 55 Cancri e was a small gas giant like Neptune or a large rocky terrestrial planet . In 2011 , a transit of the planet was confirmed , allowing scientists to calculate its density . At first it was suspected to be a water planet . As initial observations showed no hydrogen in its Lyman @-@ alpha signature during transit , Ehrenreich speculated that its volatile materials might be carbon dioxide instead of water or hydrogen .

An alternative possibility is that 55 Cancri e is a solid planet made of carbon @-@ rich material rather than the oxygen @-@ rich material that makes up the terrestrial planets in our solar system . In this case , roughly a third of the planet 's mass would be carbon , much of which may be in the form of diamond as a result of the temperatures and pressures in the planet 's interior . Further observations are necessary to confirm the nature of the planet .

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= = = Volcanism = = =

Large surface temperature variations on 55 Cancri e have been attributed to possible volcanic activity releasing large clouds of dust which blanket the planet and block thermal emissions .