Gliese 876 c

Gliese 876 c is an exoplanet orbiting the red dwarf Gliese 876 , taking about 30 days to complete an orbit . The planet was discovered in April 2001 and is the third planet in order of increasing distance from its star .

Discovery

At the time of discovery , Gliese 876 was already known to host an extrasolar planet designated Gliese 876 b . In 2001 , further analysis of the star 's radial velocity revealed the existence of a second planet in the system , which was designated Gliese 876 c . The orbital period of Gliese 876 c was found to be exactly half that of the outer planet , which meant that the radial velocity signature of the second planet was initially interpreted as a higher eccentricity of the orbit of Gliese 876 b .

Orbit and mass

Gliese 876 c is in a 1 : 2 : 4 Laplace resonance with the outer planets Gliese 876 b and Gliese 876 e : for every orbit of planet e , planet b completes two orbits and planet c completes four . This leads to strong gravitational interactions between the planets , causing the orbital elements to change rapidly as the orbits precess . This is the second known example of a Laplace resonance , the first being Jupiter 's moons Io , Europa and Ganymede .
The orbital semimajor axis is only 0 @.@ 13 AU , around a third of the average distance between Mercury and the Sun , and is more eccentric than the orbit of any of the major planets of our solar system . Despite this , it is located in the inner regions of the system 's habitable zone , since Gliese 876 is such an intrinsically faint star .
A limitation of the radial velocity method used to detect Gliese 876 c is that only a lower limit on the planet 's mass can be obtained . This is because the measured mass value depends on the inclination of the orbit , which is not determined by the radial velocity measurements . However , in a resonant system such as Gliese 876 , gravitational interactions between the planets can be used to determine the true masses . Using this method , the inclination of the orbit can be determined , revealing the planet 's true mass to be 0 @.@ 72 times that of Jupiter .

Characteristics

Based on its high mass , Gliese 876 c is likely to be a gas giant with no solid surface . Since it was detected indirectly through its gravitational effects on the star , properties such as its radius , composition , and temperature are unknown . Assuming a composition similar to Jupiter and an environment close to chemical equilibrium , the planet is predicted to have a cloudless upper atmosphere .
Gliese 876 c lies at the inner edge of the system 's habitable zone . While the prospects for life on gas giants are unknown , it might be possible for a large moon of the planet to provide a habitable environment . Unfortunately tidal interactions between a hypothetical moon , the planet , and the star could destroy moons massive enough to be habitable over the lifetime of the system . In addition it is unclear whether such moons could form in the first place .
This planet , like b and e , has likely migrated inward .