= HD 40307 =

HD 40307 is an orange (K @-@ type) main @-@ sequence star located approximately 42 light @-@ years away in the constellation of Pictor (the Easel) , taking its primary name from its Henry Draper Catalogue designation . It is calculated to be slightly less massive than the Sun . HD 40307 was observed during or before 1900 as part of the Cape Photographic Durchmusterung . The star has six known planets , three discovered in 2008 and three more in 2012 . One of them , HD 40307 g , is a potential super @-@ Earth in the habitable zone , with an orbital period of about 200 days . This object might be capable of supporting liquid water on its surface , although much more information must be acquired before its habitability can be assessed .

= = History and nomenclature = =

The designation HD 40307 is from the Henry Draper Catalogue , which is based on spectral classifications made between 1911 and 1915 by Annie Jump Cannon and her co @-@ workers , and was published between 1918 and 1924 .

= = Characteristics = =

As a K @-@ type star , HD 40307 emits orange @-@ tinted light . It has only about three @-@ quarters of the Sun 's radius and mass . Its temperature is measured at slightly under 5000 K. This is relatively high for a K @-@ type star , approaching the temperatures normally found in G @-@ type stars such as the Sun .

The astronomers who discovered the planets orbiting HD 40307 suggested that the metallicities of stars determine whether or not the planetary bodies that orbit them will be terrestrial , like Earth , or gaseous , like Jupiter and Saturn .

= = = Distance and visibility = = =

Despite its relative proximity to the Sun at 42 light @-@ years , HD 40307 is not visible to the naked eye , given its apparent magnitude of 7 @.@ 17 . It came within 6 @.@ 4 light @-@ years of the Sun about 413 @,@ 000 years ago .

= = Planetary system = =

After spending five years observing the star , the European Organisation for Astronomical Research in the Southern Hemisphere (ESO) announced that they had discovered three super @-@ Earths in orbit around HD 40307 in June 2008 . All three planets were detected by the radial velocity method , using the HARPS spectrograph system .

In 2012 , an independent analysis carried out by a team of astronomers led by Mikko Tuomi of the University of Hertfordshire confirmed the existence of these planets and found an additional three planets in the systems .

Five of the planets orbit very close to the star , with the farthest of them located twice as close to HD 40307 than is the planet Mercury is to the Sun . The outermost planet orbits at a distance similar to the distance of Venus to the Sun and is situated well in the system 's liquid water habitable zone .

The minimum masses of the planets in the system ranges from three to ten times the mass of the Earth , placing them somewhere between Earth and gas giants like Uranus and Neptune . Dynamical analysis of the innermost planets suggests that planet b is unstable at its age unless it is an ice giant , having migrated from further away . That implies similar for the other planets , even further out . The most recent discovery also indicates via dynamical analysis that the true planetary masses can not be much higher than their minimum masses .