

= Upsilon Andromedae d =

Upsilon Andromedae d (abbreviated ? Andromedae d , ? And d) , also named Majriti , is an extrasolar planet orbiting the Sun @-@ like star Upsilon Andromedae A every 1276 @.@ 46 days . Its discovery in April 1999 by Geoffrey Marcy and R. Paul Butler made this the first multiple @-@ planet system to be discovered around a main @-@ sequence star , and the first multiple @-@ planet system known in a multiple star system . Upsilon Andromedae d is the third known planet in order of distance from its star .

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 Majriti for this planet . The winning name was submitted by the Vega Astronomy Club of Morocco and honours the 10th and early 11th Century astronomer Maslama al @-@ Majriti of Muslim Spain .

= = Discovery = =

Like the majority of known extrasolar planets , Upsilon Andromedae d was detected by measuring variations in its star 's radial velocity as a result of the planet 's gravity . This was done by making precise measurements of the Doppler shift of the spectrum of Upsilon Andromedae A. At the time of discovery , Upsilon Andromedae A was already known to host one extrasolar planet , the hot Jupiter Upsilon Andromedae b ; however , by 1999 , it was clear that the inner planet could not explain the velocity curve .

In 1999 , astronomers at both San Francisco State University and the Harvard @-@ Smithsonian Center for Astrophysics independently concluded that a three @-@ planet model best fit the data . The two new planets were designated Upsilon Andromedae c and Upsilon Andromedae d .

= = Orbit and mass = =

Upsilon Andromedae d orbits its star in an eccentric orbit , more eccentric than that of any of the major planets in the Solar System (including Pluto) . The orbit 's semimajor axis puts the planet in the habitable zone of Upsilon Andromedae A.

To explain the planet 's orbital eccentricity , some have proposed a close encounter with a (now lost) outer planet of Upsilon Andromedae A. The encounter would have moved Upsilon Andromedae d into an eccentric orbit closer to the star and ejected the outer planet from the system . Subsequently , gravitational perturbations from Upsilon Andromedae d moved the inner planet Upsilon Andromedae c into its present eccentric orbit . If so , the rogue planet would have had to be ejected immediately ; it is unclear how likely this situation might be . Other models are possible .

A limitation of the radial velocity method used to detect Upsilon Andromedae d is that the orbital inclination is unknown , and only a lower limit on the planet 's mass can be obtained . However , by combining radial velocity measurements from ground @-@ based telescopes with astrometric data from the Hubble Space Telescope , astronomers have determined the orbital inclination as well as the actual mass of Upsilon Andromedae d , which is about 10 @.@ 25 times the mass of Jupiter .

Preliminary astrometric measurements suggest the orbit of Upsilon Andromedae d may be inclined at 155 @.@ 5 ° to the plane of the sky . However , these measurements were later proved useful only for upper limits ; worthless for HD 192263 b and probably 55 Cancri c , and contradict even the inner planet u And b 's inclination of > 30 ° . The mutual inclination between c and d meanwhile is 29 @.@ 9 degrees .

= = Characteristics = =

Given the planet 's high mass , it is likely that it is a gas giant with no solid surface and surface gravity of over 25 times that of Earth . Since the planet has only been detected indirectly through observations of its star , properties such as its radius , composition , and temperature are unknown .

Upsilon Andromedae d lies in the habitable zone of Upsilon Andromedae A as defined both by the ability for an Earthlike world to retain liquid water at its surface and based on the amount of ultraviolet radiation received from the star .