



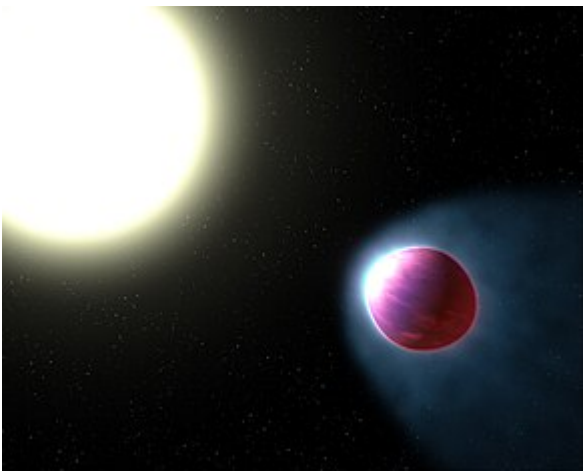
WASP-121b

WASP-121b, formally named **Tylos**,^[2] is an exoplanet orbiting the star WASP-121.^{[5][6]} WASP-121b is the first exoplanet found to contain water in an extrasolar planetary stratosphere (i.e., an atmospheric layer in which temperatures increase as the altitude increases).^{[5][6]} WASP-121b is in the constellation Puppis,^[7] and is about 858 light-years from Earth.^{[8][5][9]}

Nomenclature

In August 2022, this planet and its host star were included among 20 systems to be named by the third NameExoWorlds project.^[10] The approved names, proposed by a team from Bahrain, were announced in

WASP-121b / Tylos



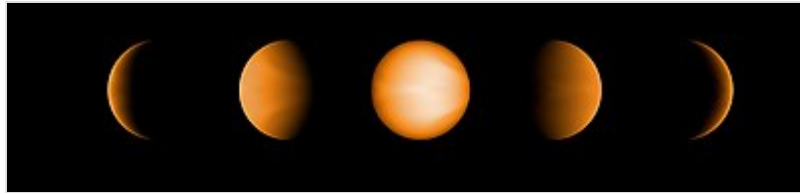
Artist's impression of WASP-121b and its host star

Discovery ^[1]	
Discovered by	L. Delrez <i>et al.</i>
Discovery date	2015
Detection method	Transit
Designations	
Alternative names	Tylos ^[2]
Orbital characteristics ^[3]	
Semi-major axis	0.025 96^{+0.000 43}_{−0.000 63} AU
Eccentricity	<0.0032
Orbital period (sidereal)	1.274 925 04(15) d
Inclination	88.49° ± 0.16°
Argument of periastron	10° ± 10°
Star	<u>WASP-121</u>
Physical characteristics ^[3]	
Mean radius	1.753 ± 0.036 <i>R</i>_J
Mass	1.157 ± 0.070 <i>M</i>_J
Mean density	0.266^{+0.024}_{−0.022} g/cm³
Surface gravity	9.33^{+0.71}_{−0.67} m/s² (0.95 g)

June 2023. WASP-121b is named **Tylos** after the ancient Greek name for Bahrain, and its host star is named **Dilmun** after the ancient civilization.^[2]

<u>Temperature</u>	$2602 \pm 53 \text{ K}$ (2,329 °C; 4,224 °F) ^[4]
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Characteristics



WASP-121b - computer simulated views (August 2018)

WASP-121b is a hot Jupiter exoplanet with a mass about 1.16 times that of Jupiter and a radius about 1.75 times that of Jupiter. The exoplanet orbits WASP-121, its host star, every 1.27 days.^[3]

In 2019 a work by Hellard et al. discussed the possibility of measuring the Love number of transiting hot Jupiters using HST/STIS. A tentative measurement of $h_2 = 1.4 \pm 0.8$ for WASP-121b was published in the same work.^{[11][12]}

The planetary orbit is inclined to the equatorial plane of the star by 8.1° .^[13]

Atmospheric composition

A spectral survey in 2015 attributed 2,500 °C (4,530 °F), hot^[5] stratosphere absorption bands to water molecules, titanium(II) oxide (TiO) and vanadium(II) oxide (VO).^[14] Neutral iron was also detected in the stratosphere of WASP-121b in 2020,^{[15][16]} along with neutral chromium and vanadium.^[17] The detection claims of titanium(II) oxide (TiO) and vanadium(II) oxide (VO) have since been disproved.^{[6][18][19][20]}

Reanalysis of aggregated spectral data was published in June 2020. Neutral magnesium, calcium, vanadium, chromium, iron, and nickel, along with ionized sodium atoms, were detected. The low quality of available data preclude a positive identification of any molecular species, including water. The atmosphere appears to be significantly out of chemical equilibrium and possibly escaping.^[21] The strong atmospheric flows beyond the Roche lobe, indicating ongoing atmosphere loss, were confirmed in late 2020.^[13]

In 2021, the planetary atmosphere turned out to be slightly more blue and less absorbing, which may be an indication of planetary weather patterns.^[22] By mid-2021, the presence of ions of iron, chromium, vanadium and calcium in the planetary atmosphere was confirmed.^[23] In 2022, barium was also detected.^[24] By 2022, an absence of titanium in the planetary atmosphere was confirmed and attributed to the nightside condensation of highly refractory titanium dioxide.^[25]

Observations by the Hubble Space Telescope from 2016-2019, published in 2024, confirm variability in the atmosphere of WASP-121b.^{[26][27]}

Possible exomoon

The sodium detected via absorption spectroscopy around WASP-121b^[21] is consistent with an extrasolar gas torus, possibly fueled by a hidden exo-Io.^[28]

See also

- List of exoplanet firsts
- List of exoplanets discovered in 2015
- SuperWASP
- WASP-33b

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