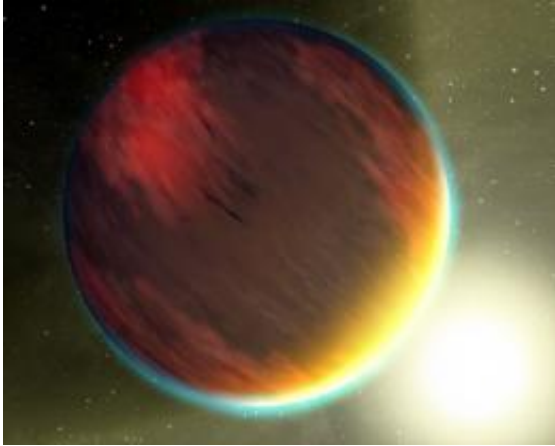


'Hot Jupiter' planets unlikely to have moons

August 23 2010, by Lin Edwards



An artist's concept of a "Hot Jupiter" extrasolar planet. Credit: NASA/JPL-Caltech

(PhysOrg.com) -- Planets of the major type so far found outside our solar system are unlikely to have moons, according to new research reported in the August 20 issue of *The Astrophysical Journal Letters*.

Hundreds of large, hot, Jupiter-class [planets](#) have been discovered orbiting stars outside our [solar system](#). They are called "hot Jupiter" planets because they are large and in close proximity of their stars. As yet no moons have been found circling these planets, but since large planets in our solar system have several moons they ought to exist.

The new research, led by astronomer Fathi Namouni of the Universite de Nice, CNRS, at the Observatoire de la Cote d'Azur in France,

determined via [computer simulations](#) that moons orbiting or forming around hot Jupiter planets migrating close in to the star are unlikely to remain because of the large gravitational forces in play between the planet and star. The forces would destroy inner moons as they smashed into the planet, while outlying moons would be catapulted out of the planet's orbit.

Hot Jupiter planets are believed to form in the outer regions of their solar systems and to migrate inwards towards their star over a period of around 100,000 years. Namouni said that as the planet migrates its sphere of influence over any moons would shrink, making them unstable.

The computer simulation models a [gas giant](#) that migrates towards its star to become a hot Jupiter. At the beginning of the simulation the planet has four large moons, but all are lost during the migration. The three outermost moons are hurled out into elongated orbits around the star, while the innermost moon smashes into the planet and is destroyed.

Namouni said that if any moons are found around a hot Jupiter they must have been captured later, rather like Neptune's Triton, which is the largest captured moon in the solar system. Triton is believed to have been captured because it orbits in the opposite direction to the other moons of Neptune.

The computer simulations did not take into account possible formation of moons from material orbiting the planet after a moon crashes into the surface.

Astronomers will continue to search for extrasolar moons around hot Jupiter planets because they are the vast majority of planets so far discovered. One way in which they plan to search for them is by observing hot Jupiters as they pass in front of their stars. Any large

moons present would alter the timing of transits. Hot Jupiter be unable to support life, but this may not be true of any moons orbiting the planet.

More information: Fathi Namouni 2010 *ApJ* 719 L145,
[doi:10.1088/2041-8205/719/2/L145](https://doi.org/10.1088/2041-8205/719/2/L145)

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