

# A Warm and Fuzzy Planet?

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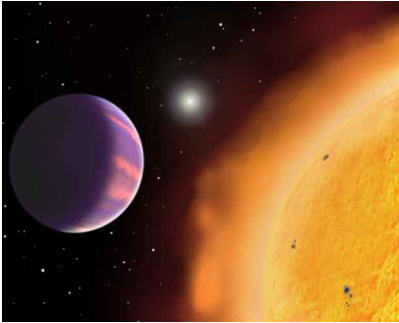


Image Credit: David A. Aguilar (CfA)

**The newly discovered world HAT-P-1b** (shown here in an artist's rendering) has baffled astronomers, since it is puffed up much larger than theory predicts. HAT-P-1 has a radius about 1.38 times Jupiter's but contains only half Jupiter's mass.

Astronomers continue to discover exo-planets. Most fall into the category of 'hot Jupiters', these are giant planets orbiting very close to their parent star. A typical such world is just 0.05 Astronomical Units from its Sun, in contrast Earth is 1 AU from the Sun and tiny, scorched Mercury orbits 0.3 AU from the Sun. Note that we have discovered so many hot Jupiters because they are the easiest type of planet to find, they are not necessarily particularly common in the galaxy. No one expected such strange planets to exist until we found the first one ten years ago, but

**"The planet would float if you managed to find a bathtub big enough"**

now they are taken for granted.

However a really strange exo-planet has recently been discovered by scientists using telescopes

in Arizona and Hawaii. In the constellation Lacerta, 450 light years (138 parsecs) from Earth lies a Sun-like star designated ADS 16402 B. Around this star circles the newly discovered planet HAT-P-1b. This world orbits only about 0.55 AU from the star's surface, with a 'year' lasting a mere 4.46 days. It must be a hot and desolate place.

The planet is unusual not only because it is so close to its star. The planet is huge, nearly 200 000 km across, it is about 1.36 times as wide as Jupiter. Stranger still is its mass. It is unusually light, with only about 60% of Jupiter's mass, so on average a 1m 'cube' of HAT-P-1b would weigh less than 290 kg. This is about the same weight as a block of cork the same size, so this imaginary lump of planet is light enough to float (of course the planet as a whole would also float if you managed to find a bathtub big enough). In contrast, a 1 m cube of Jupiter would weigh more than a tonne, about 1300 kg, heavier still would be a chunk of our own Earth which weighs 5.5 tonnes per cubic metre. By the way, these values are averages over the entire planets, which tend get denser the deeper you go into them. For example, near the Earth's surface the soil's density is roughly 1500 kg/cu m, but if you were to sink into the interior the surrounding material would get ever heavier. When you reached the inner core you would find the molten nickel-iron around you to weigh 15 tonnes per cubic metre, ten times as dense as near the surface. This new planet's abnormally low density was a real surprise to its discoverers.

Compared to the planets in our own Solar System, HAT-P-1b is a big and fluffy lightweight. Why this should be is unknown. One suggestion is that a heat source inside has bloated the planet. It would not be a nice place to visit; although the gravity would be only a comfy 80% of Earth's, the planet's searingly hot atmosphere will be even less pleasant than that of Venus. HAT-P-1b is probably composed of primarily hydrogen and helium and was formed far from

its parent star before migrating sunward. The strange orbits of most exo-planets have led astronomers to the surprising conclusion that planets, once believed to be firmly fixed in place by gravity, actually can wander across solar systems.

HAT-P-1b was detected when it transited across the face of its parent star. As the planet passed

in front the star (as seen from Earth), it blocked out a tiny portion (just 0.6% ) of the star's light. This was enough to reveal its existence. Already several similar hot and fuzzy worlds have been discovered the same way, proving this that planet is not a one-off oddball. The inhabitants of the exo-planet 'zoo' are proving to be much stranger beasts than anyone expected.