

# OUR SOLAR SYSTEM:

**Mercury** is 3,030 miles wide: about the size of the continental U.S. and smaller than Jupiter's largest moon, Ganymede.

Our Sun is a G star (~5500° C)

**Uranus** has retrograde rotation, which means its day is backwards to ours. Celestial objects rise in the west and set in the east.

**Venus** is about the size of Earth. Its thick atmosphere traps heat causing surface temperatures of 500 Celsius.

**Earth** is located in our solar system's habitable zone, where liquid water can exist on a planet's surface. Other terrestrial planets are close in density to Earth (5.5 g/cm<sup>3</sup>, similar to pyrite).

The Habitable Zone

Terrestrial/Rocky Planets

Jovian Planets/  
Gas & Ice Giants

**Neptune**, like the other Jovian planets, has rings. These were first discovered with the Voyager 2 space craft.

At a tenth the mass of Earth, **Mars'** small size caused it to cool quickly, leaving a weak magnetic field that could not protect its atmosphere or surface, which could have once contained liquid water.

**Saturn's** density is so low that it would float in a bath of water. Its moons and icy rings can be seen from Earth with a small telescope.

**Jupiter** is the largest planet and is made up of mostly liquid hydrogen and helium. It also has many rocky moons, some of which might support life.

What about **Pluto**? Pluto is no longer a planet because it is not large enough nor did it clear its orbit of debris.

The search is on for **Planet X**. Its gravitational influence would explain a peculiar trend in the orbits of nearby dwarf planets. Astronomers predict it is close in mass to Neptune but 10 times more distant.



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Made by: A. Baker & D. Sliski (2016)

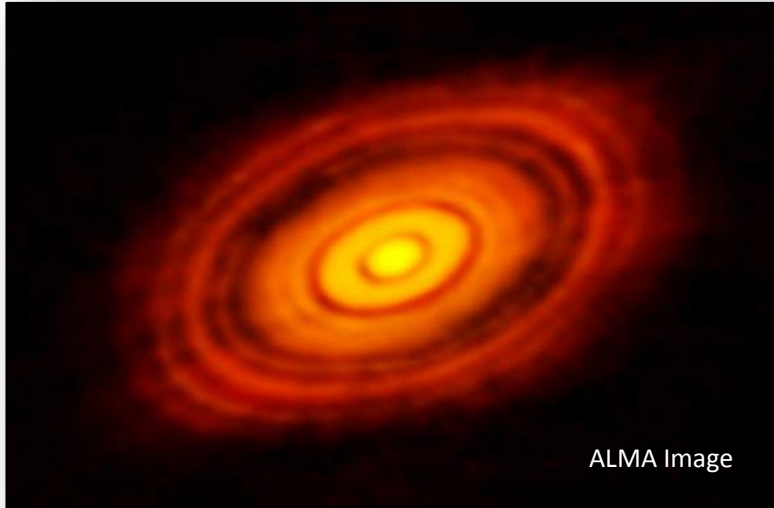
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# WORLDS BEYOND OUR SUN

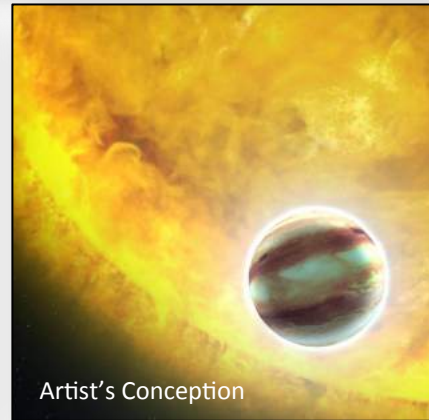


In the past 20 years, we have detected thousands of exoplanets (planets orbiting other stars) in the Milky Way. We now know that other planetary systems can be very different from our Solar System. Here's a sample of some of the surprising finds!



ALMA Image

This is an actual image of the **HL Tauri star system** taken by the ALMA telescope. The gaps in this young planetary disk that surround the central star are where planets are forming! Young systems like these will help astronomers understand how our own solar system formed.



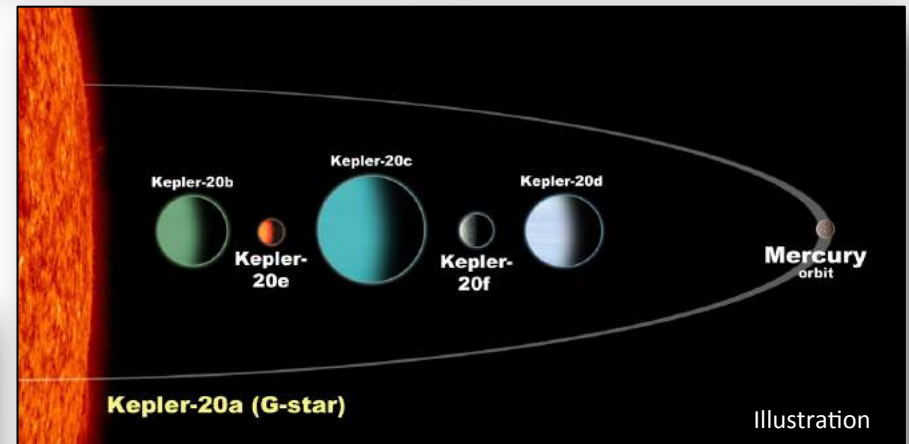
Artist's Conception

Astronomers used to think that planets like Jupiter could not survive close-in to their star, but now we have discovered many so-called "hot Jupiters". **WASP-18b** is an example of one of these. It's 10 times the mass of Jupiter, but is so close to its host star that it takes only 23 hours to complete an orbit (Jupiter takes 12 years)!



Artist's Conception

**Kepler-22b 'Water World':** We have found a handful of exoplanets similar in size and density to Earth that are in the habitable zone of their star. At 2.4 times the radius of Earth, Kepler-22b orbits its G-star every 289 days. It's possible that its surface is covered in water, maybe supporting life.



Kepler-20a (G-star)

Illustration

**Kepler-20 system:** The Kepler space telescope discovered this system of planets all shockingly closer to their host star than Mercury is to our sun! The host star, Kepler-20a, is very similar in size and temperature to our sun. There are five confirmed exoplanets; three are Neptune-sized and two are Earth-sized.