

# Exoplanets Chronicles

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## SUMMARY

Our team is very happy and excited to share what we've been working on, which is a project designed with the special and unique purpose of IMPROVING the way kids are educated about Exoplanets and their characteristics nowadays.

We decided that it could all start on a dynamic board in Miro, that represents a star and how the whole life cycle of the exoplanets that revolve around it would get developed.

As students, we daily go through classes that may or may not captivate our attention, that's why we chose the education area, cause this kind of topics are wonderful and great to explore and learn! Especially for little kids that are at a certain age where their love and dedication for science can start.

### What is an exoplanet?

(straight from the website)

An exoplanet is any planet beyond our solar system. Most of them orbit other stars, but some free-floating exoplanets, called rogue planets, are untethered to any star. We've confirmed more than 5,600 exoplanets out of the billions that we believe exist.

(resumido)

The exoplanets are planets that are not in our solar system. There are more than 5,000 exoplanets confirmed!

In depth: Exoplanets  
September, 14 (2024)  
National Aeronautics and Space Administration  
October, 5 (2024)  
<https://science.nasa.gov/exoplanets/>

## **Types of exoplanets**

So far scientists have categorized exoplanets into the following types: Gas giant, Neptunian, super-Earth and terrestrial.

The exoplanets come in a wide variety of sizes, from gas giants larger than Jupiter to small, rocky planets about as big around as Earth or Mars.

Some exoplanets are sunless rogues, wandering through the galaxy in permanent darkness.

### **Terrestrial planets**

Earth-sized or smaller, mostly made of rock and metal. Some could possess oceans or atmospheres and perhaps other signs of habitability.

### **Neptune-Like**

Similar in size to our own Neptune and Uranus, with hydrogen or helium-dominated atmospheres. "Mini-Neptunes," not found in our solar system, are smaller than Neptune but larger than Earth.

### **Super-Earth**

Typically "terrestrial," or rocky, and more massive than Earth but lighter than Neptune. They might or might not have atmospheres.

### **Gas giants**

The size of Saturn or Jupiter, or much larger. They include "hot Jupiters"- scorching planets in close orbits around their stars.

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<https://science.nasa.gov/exoplanets/planet-types/>

## 5 Ways to find an exoplanet

- **Radial velocity**  
orbiting planets cause a star to wobble in space, changing the color of the light astronomers observe.
- **Transit**  
when a planet passes directly between its star and observer, it dims a star's light by a measurable amount
- **Direct imaging**  
astronomers can take pictures of exoplanets by removing the overwhelming glare of the stars they orbit.
- **Gravitational microlensing**  
light from a distant star is bent and focused by gravity as a planet passes between the star and earth
- **Astrometry**  
the orbit of a planet can cause a star to wobble around in space in relation to nearby stars in the sky

In Depth: Exoplanets

September 14, 2024

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October 5, 2024

<https://science.nasa.gov/exoplanets/facts/>

## TYPES OF EXOPLANETS AND CLASSIFICATIONS

A wide variety of planets exist in our solar system, ranging from rocky planets (like [Earth](#)) to gas giants (like [Jupiter](#)). Exoplanets are even more diverse. Here are some of the types that make up the zoo of exoplanets:

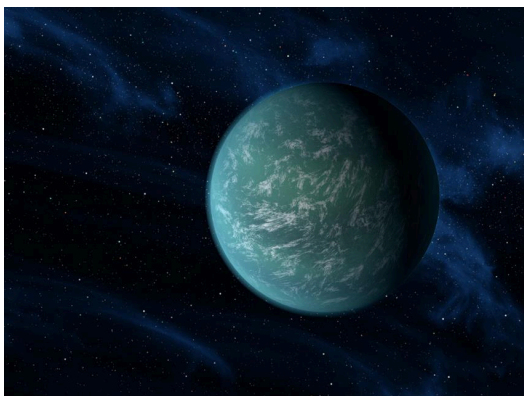
- **Hot Jupiters:** Large gas giants like Jupiter, but with one key difference – they are found very close to their host star, even closer than [Mercury](#) is to the Sun
- **Mini-Neptunes and Super-Earths:** The most common type of exoplanet observed by scientists, these could be supersized rocky planets, or gas planets smaller than [Neptune](#)
- **Ocean worlds:** Exoplanets that feature a rocky core which is completely covered by a vast liquid ocean hundreds of kilometers deep
- **Rocky worlds:** [Earth](#)- or [Mars](#)-like planets with a solid surface, which may or may not include small oceans or have an atmosphere

According to astronomers, over 50 percent of stars likely host at least one planet.

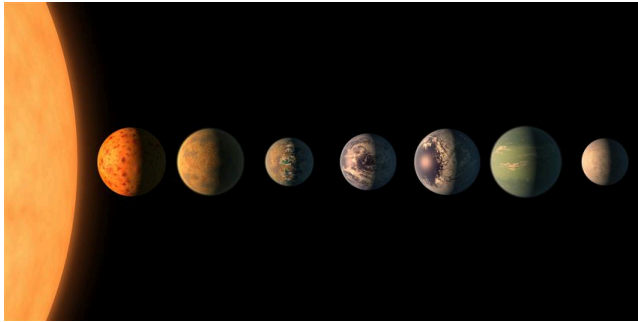
## FAMOUS EXOPLANETS



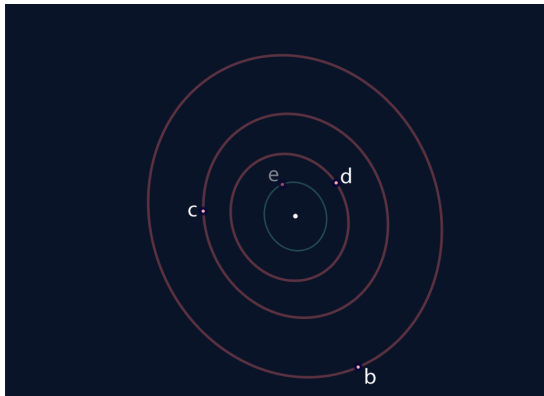
51 Pegasi b was the first exoplanet ever discovered orbiting a star that resembles our Sun. Also the first Hot Jupiter ever observed, this gas giant located 50 light-years from Earth takes only 4.2 days to orbit its star. 51 Pegasi b's discovery in 1995 by Swiss astronomers Michel Mayor and Didier Queloz surprised the scientific community since models of planetary formation at the time did not predict its existence. The pair later won the Nobel Prize in Physics in 2019 for their achievement.



Roughly twice the size of Earth, Kepler-22b was discovered in 2011 by [NASA](#)'s Kepler Space Telescope. The exoplanet was the first to be found in any star's **habitable zone**. Although scientists are unsure what Kepler-22b looks like, the exoplanet orbits its star at just the right distance – where a planet is most likely to have a climate that would allow any water on its surface to remain liquid. This area is also called the Goldilocks Zone, since the conditions are not too hot, not too cold, but just right.



Proxima Centauri is the closest star to the Sun. This **red dwarf star** is located 4.2 light-years – or 40 trillion kilometres – away from Earth. An exoplanet, Proxima Centauri b, was detected orbiting this star in 2016. Proxima Centauri b is a rocky planet that is a bit larger than Earth. Like Kepler-22b, it is also located in its star's habitable zone. Scientists find this exoplanet very intriguing, but they will have to continue studying it from afar – even using the fastest space probe ever built, the Parker Solar Probe which could travel at speeds of up to 724,000 km/h, it would take almost 7000 years to reach Proxima Centauri b!



The four exoplanets found orbiting star HR 8799 make up the first multi-planet system to ever be directly imaged – meaning that astronomers took real pictures of the distant planets, instead of simply detecting their effects on the host star.

## The exoplanet zoo

2022 - 04 - 22

Canadian Space Agency

2024 - 10 - 05

<https://www.asc-csa.gc.ca/eng/astronomy/beyond-our-solar-system/exoplanet-zoo.asp>

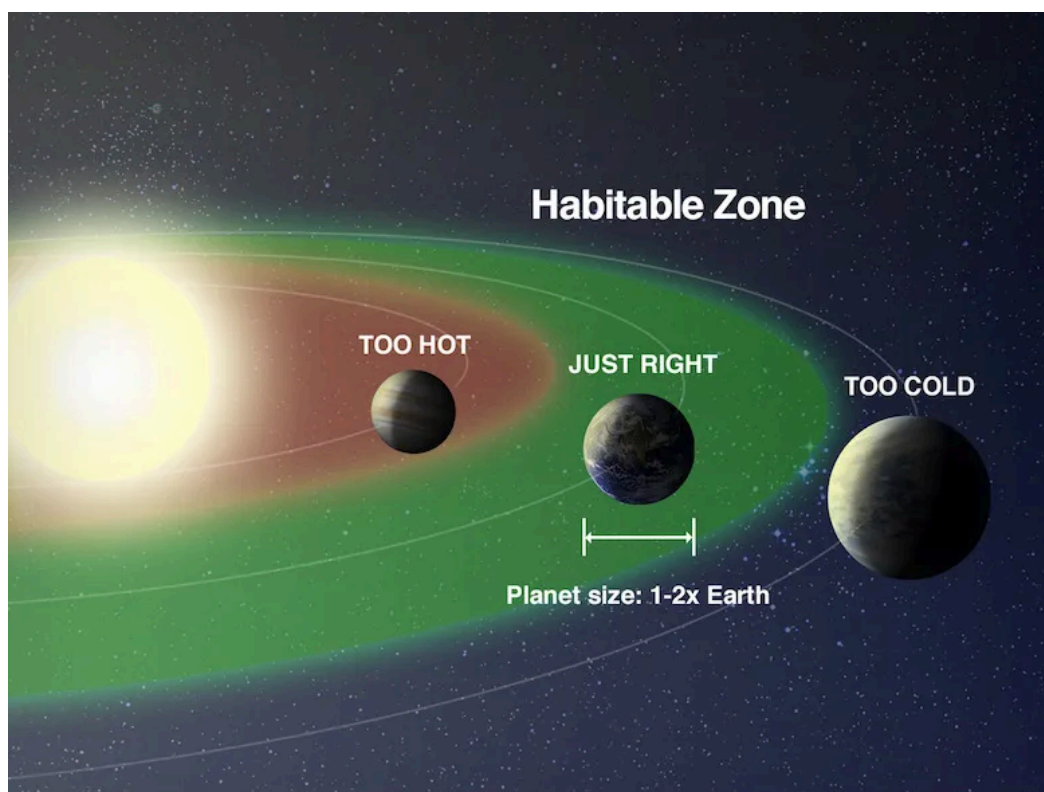
## The habitable zone

The habitable zone, also known as the Goldilocks zone, is the region around a star where the temperature is just right for liquid water to pool on the surface of a planet.

As tens, then hundreds, then thousands of planets were confirmed to circle stars across the Milky Way, the question kept bubbling up: Might any of these worlds be capable of supporting some form of life?

These days, however, researchers tell us it might not be that simple. While the traditional definition of the habitable zone is still a useful first approximation, the dizzying variety of planets and planetary systems

Such depictions of potentially habitable worlds emerge from the bare bones data on actual planets – that is, once scientists apply their best conceptual ideas, plus a little computer modeling.



**In depth:** Oceans, Beaches, Cosmic Shorelines: Our Changing Views of Habitable Planets

**April, 2024**

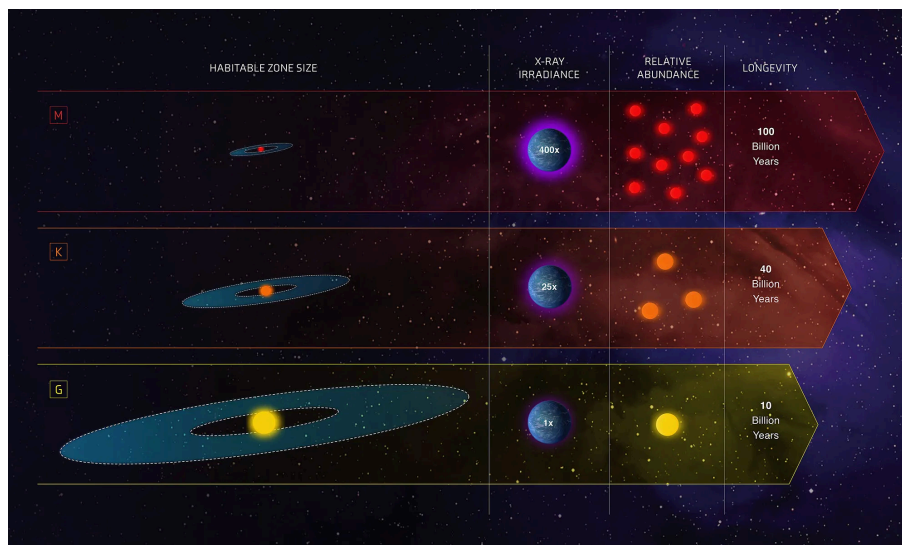
**National Aeronautics and Space Administration**

**October, 5 (2024)**

<https://science.nasa.gov/universe/exoplanets/oceans-beaches-cosmic-shorelines-our-changing-views-of-habitable-planets/>

## STARS

Different star types have different habitable zones. This is the area around a star where conditions are just right, neither too hot nor too cold for liquid water to exist on a planet's surface.



M: Red dwarfs

K: stars less massive and cooler than our Sun are K dwarfs;

G: Sunlike stars are classified as G-type stars

Stars in an Exoplanet World

April 2024

National Aeronautics and Space Administration

10 - 05 - 2024

<https://science.nasa.gov/exoplanets/stars/>

### **Alpha centauri A**

Alpha Centauri A is a Class G star that is 1.1 times the mass of the Sun.

At 4.3 light-years away, Alpha Centauri A and B are the nearest Sun-like stars to our solar system.

Alpha Centauri Stellar System

Tuesday, June 13, 2023

NASA Scientific Visualization Studio

10 - 06 - 2024}

### **51 Pegasi b**

May, 2024

National Aeronautics and Space Administration

September, 6 (2024)

<https://science.nasa.gov/exoplanet-catalog/51-pegasi-b/>

### **Kepler-62f**

May, (2024)

National Aeronautics and Space Administration

September, 6 (2024)

<https://science.nasa.gov/exoplanet-catalog/kepler-62-f/>



## **TOI-1452 b**

May, (2024)

National Aeronautics and Space Administration

September, 6 (2024)

<https://science.nasa.gov/exoplanet-catalog/toi-1452-b/>