

The search for planets

Why are we looking for other planets?

The search for planets around other stars (called exo-planets) will help us answer lots of questions from understanding the formation of our own Solar System to looking for life elsewhere in the Universe and understanding the conditions needed for life to begin.

Can we see the planet(s)?

Planets outside our Solar System cannot be seen directly with current telescopes. They are too far away and the bright glare of the star's light blocks them from view. It's a bit like trying to see a grain of sand in a car headlight. However, future space missions will be able to see the planets using new telescopes and special techniques.

Why does the star wobble?

Gravitational forces determine the motion of both the star and any planets in orbit around the star. The star pulls on the planet, but the planet also pulls on the star and makes it do its own little orbit in space. If a star wobbles it tells us there is a planet orbiting it. The amount the star wobbles and how long it takes to wobble depends on the number and size of planets orbiting around it.

How does this technique work?

The wobble of a star can be detected by measuring changes in wavelength of the star's light – a technique called spectroscopy. The light is shifted to shorter wavelengths (blue) when the star moves toward us and to longer (red) wavelengths when it moves away. This is called the Doppler effect and is the same as the effect that makes an ambulance siren seem higher in pitch when it is moving towards you and lower when it is moving away from you.

Is this the only method used to detect planets?

No, other methods include looking for the star's light to dip as a planet passes in front of it and looking for tiny movements of the star in the sky that can be detected without the need for spectroscopy. This method is called astrometry.

How many planets have been found so far?

Around 150 planets have been found so far but new ones are being discovered all the time. Scientists all around the world are looking for them.

What are the planets like?

The planets discovered so far have been quite unexpected. They are called 'Hot Jupiters' as they are gas giants like Jupiter but are found very close to the star. Much closer than Jupiter is to the Sun. Our current ideas about the formation of Solar Systems cannot explain how these planets form.

Has anyone discovered another Solar System like our own?

Our Solar System has nine planets orbiting around one star – the Sun. Some other stars have been found to have more than one planet orbiting around them but so far no-one has found anything similar to our own Solar System. The largest number so far is four planets around one star.

Has anyone discovered life on one of these planets?

No life has been discovered yet, but there are lots of missions planned that will look for chemical signatures of life on the exo-planets. They will be looking for oxygen, water vapour, methane and ozone.

What does all this have to do with Einstein?

The search for planets is all about how gravity affects the motions of objects in the Universe. Einstein built on Newton's work to give us a wider understanding of gravity and the universe.

Where can I find more information?

<http://exoplanets.org/>