

ARE WE ALONE?

Looking for exoplanets



ore we look for life, we need to find planets where it might

ARE WE ALONE?

Why is it so difficult to look for planets?

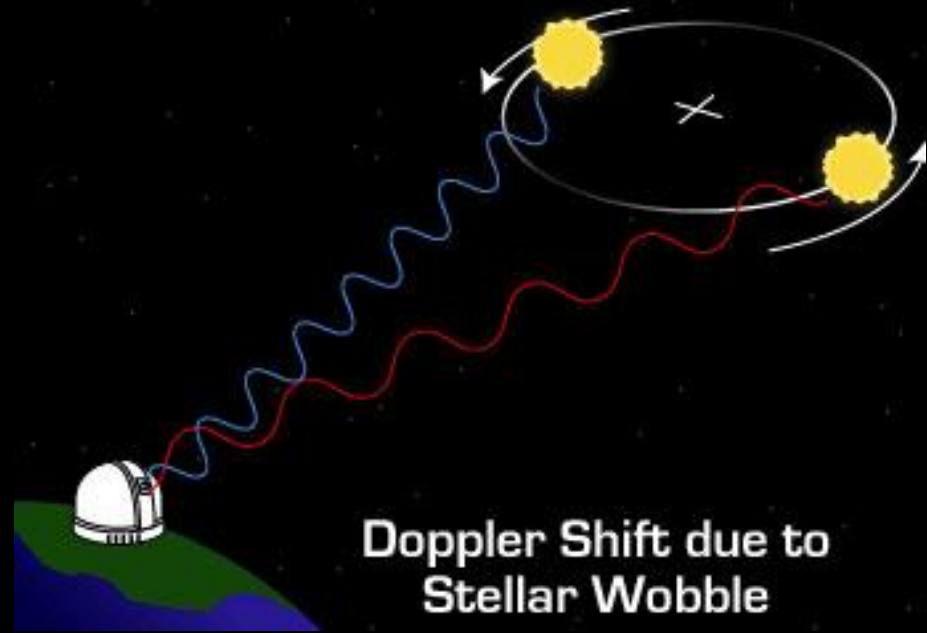
1. Planets don't produce any light of their own.
2. They are an enormous distance away from us.
3. They are lost in the blinding glare of their parent stars.



Method #1: Radial velocity method (Doppler shift)

Stars will be moved off center by the gravitational pull of large planets

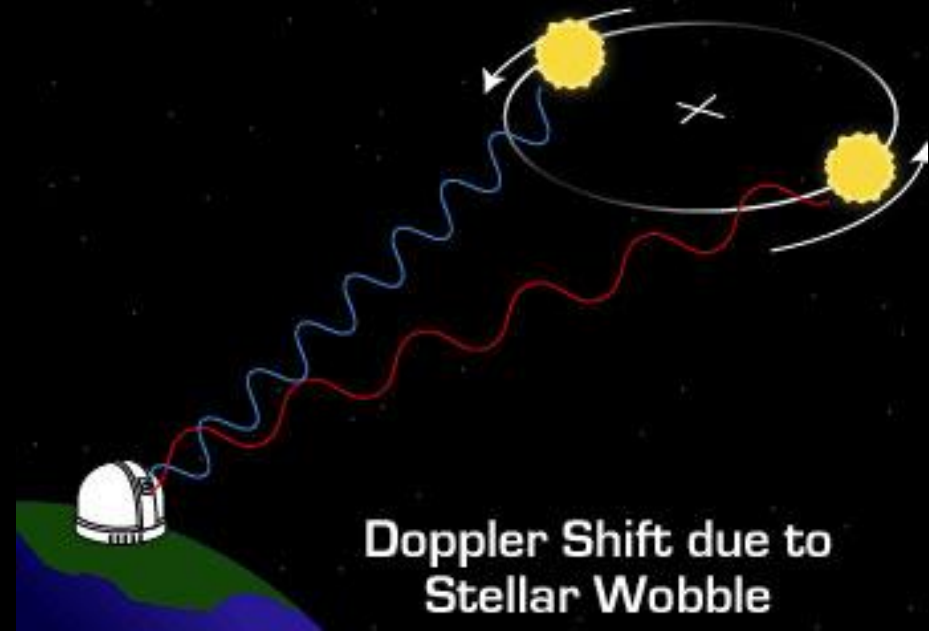
For example, Jupiter causes the Sun to “wobble” due to gravitational tugs on the Sun



Radial velocity method

When stars move towards us, the light will be slightly blueshifted

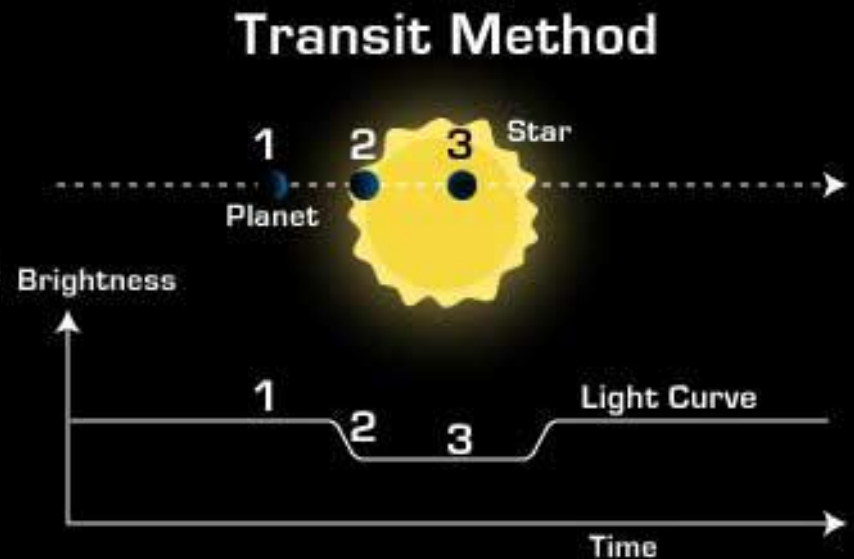
When stars move away from us, the light will be slightly redshifted



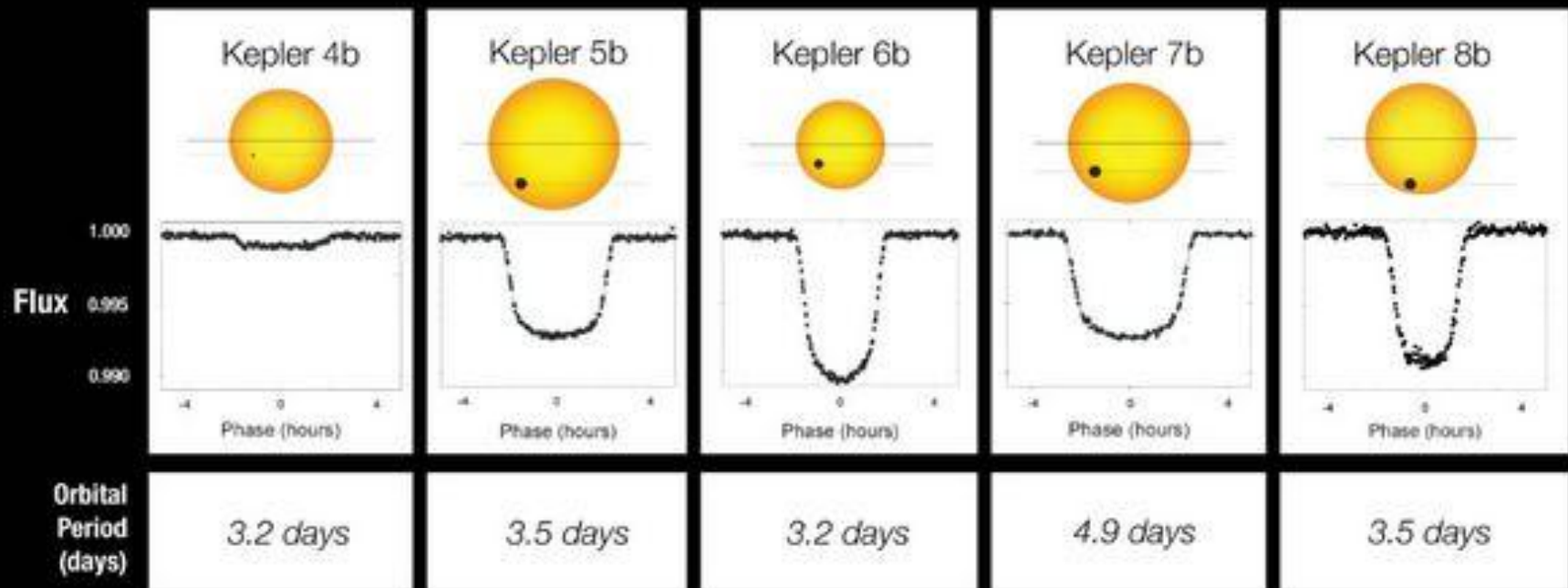
Method #2: Transit method

Planets will transit in front of their parent stars and eclipse the light from the star

By measuring the drop-off in light intensity, we can measure the planet

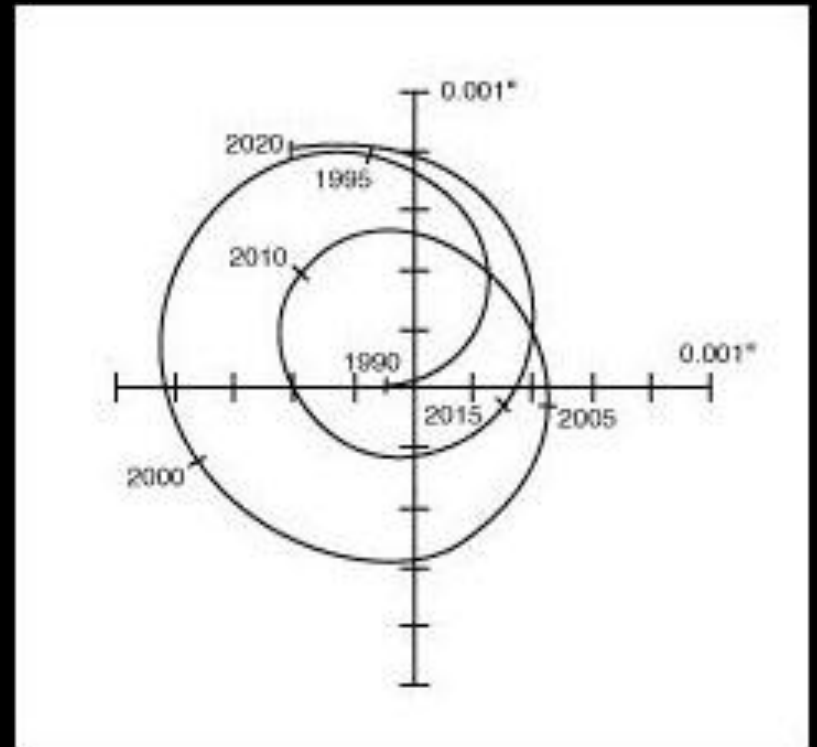


Transit Light Curves



Method #3: Astrometry

Astronomers search for the tiny movements of the stars due to gravitational tugs of the planets

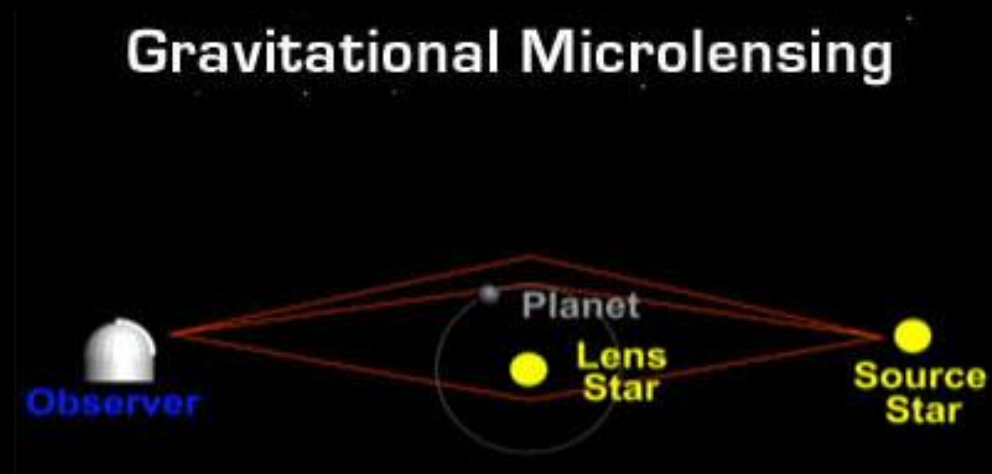


(Astrometric displacement of the Sun due to Jupiter as it would be observed from 10 parsecs, or about 33 light-years)

Method #4: Gravitational lensing

Stars bend spacetime and cause light to curve around them

Star + Planet will cause the light to curve, focusing the light and showing a slight change in position of the star



How many exoplanets?

How many
exoplanets have we
found so far?

Let's see....

[http://planetquest.jpl
.nasa.gov/](http://planetquest.jpl.nasa.gov/)

