

Kepler will be the first space mission to search for Earth-sized and smaller planets in the habitable zone of other stars in our neighborhood of the Miky Way galaxy. Kepler is a special-purpose spacecraft that precisely measures the light variations from thousands of distant stars, looking for planetary transits.

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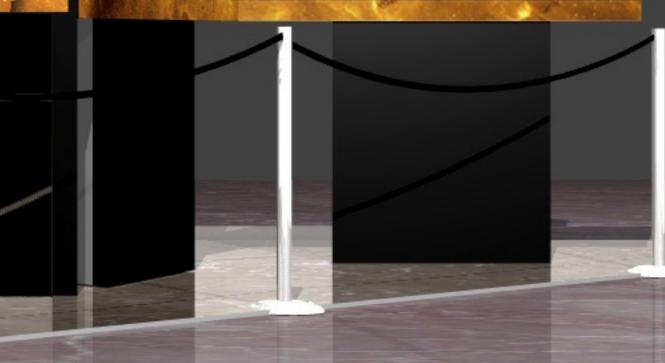




### The Spacecraft

The Kepter spacecraft consists of a spacecraft bus and a single instrument called a phetometer, a light meter, which can simultaneously measure the brightness variations of over 100,000 sams with a precision of about 20 parts per million (ppm). So as not to miss any translate, Kapter will stare at the same star field in the Cygnus-Cyra region for the ordine Non-year strasters.

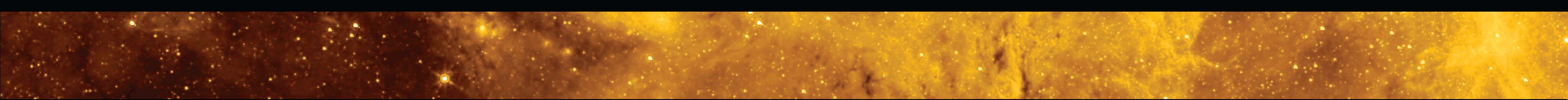
NASA



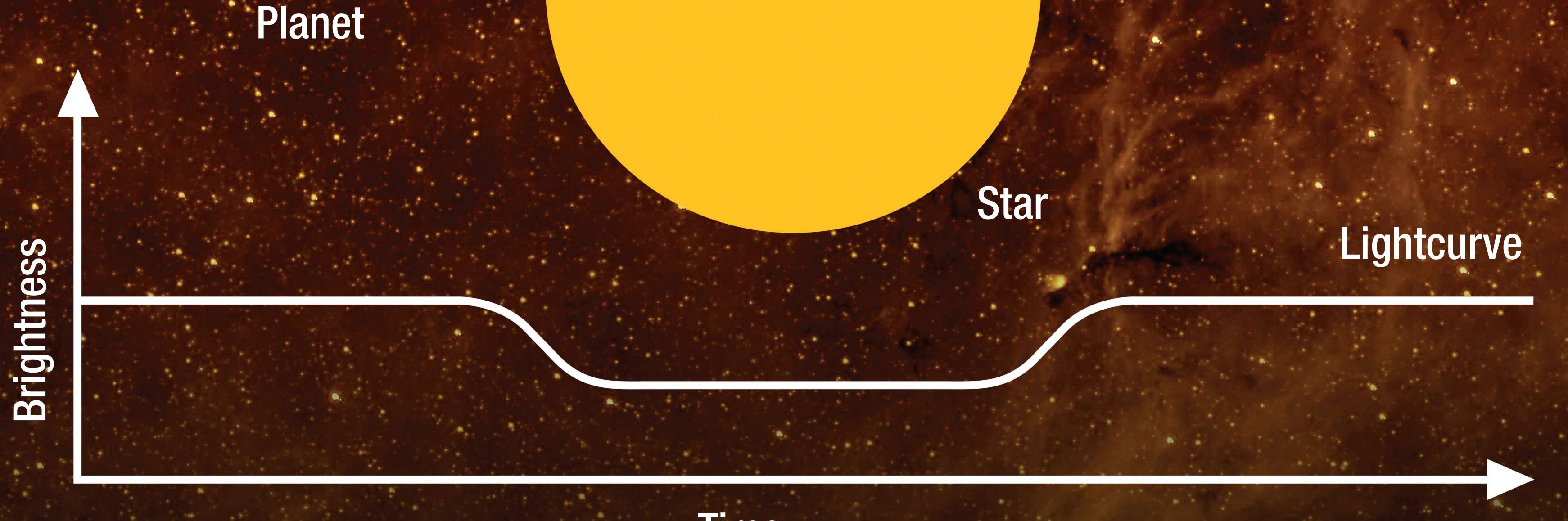


# Space Telescope

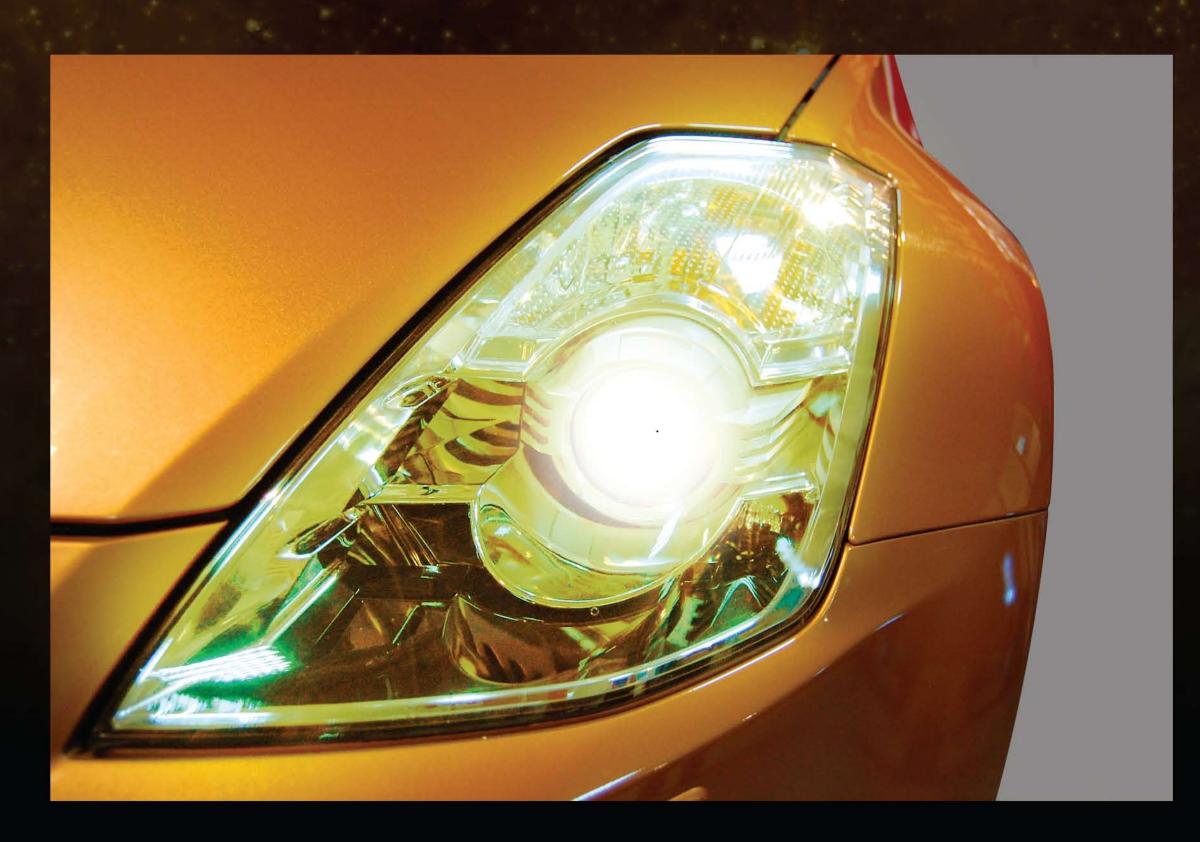
Kepler is NASA's first space mission capable of discovering Earth-sized and smaller planets in the habitable zones of stars like the Sun in our neighborhood of the Milky Way galaxy. Kepler's special purpose photometer will stare nearly continuously at a 100 square degree patch of starry sky to precisely measure the light variations from many thousands of stars looking for planetary transits.



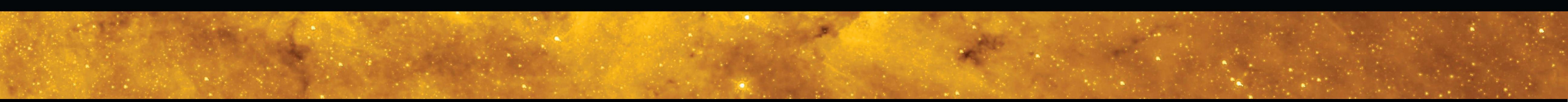
## What is a Planetary Transit?

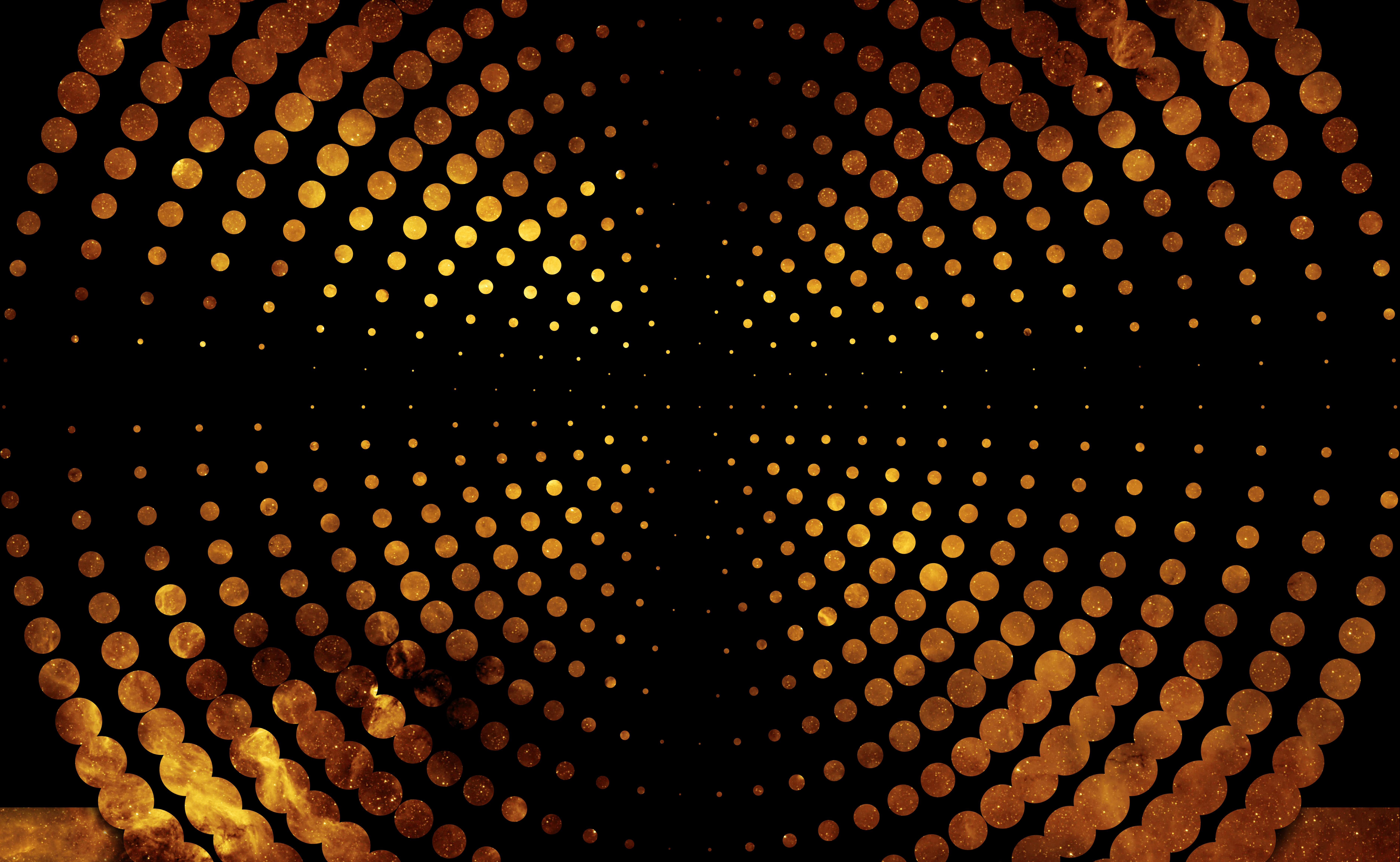






A transit occurs when a planet passes in front of its parent star and blocks a small fraction of the light from that star. Searching for transits of distant "Earths" is like spotting a flea crawling across a car's head light. Measuring repeated transits, all with a regular period, duration and change in brightness, provides a method for discovering and confirming planets and their orbits.





## Challenges and Results

There is now clear evidence for substantial numbers of three types of exoplanets: gas giants, hotsuper-Earths in short period orbits, and ice giants. The challenge is to find terrestrial planets, which have a radius about ten times smaller than Jupiter. Kepler is designed to search for Earth-size and smaller planets in the habitable zone. Kepler will continuously monitor over 100,000 stars similar to our Sun for brightness changes produced by planetary transits. At the beginning of the mission, planets of all sizes orbiting very close to their stars will be found. After three years, we will be able to discover planets with orbits of one year; those in the habitable zone of stars like the Sun. The number of Earth-sized planets in the habitable zone found by Kepler will tell us if Earth is common or rare, allowing us to place our solar system within the continuum of planetary systems in the Galaxy.

### How far are these new worlds?

If you wanted to radio home, how long would it take for your words to reach Earth?





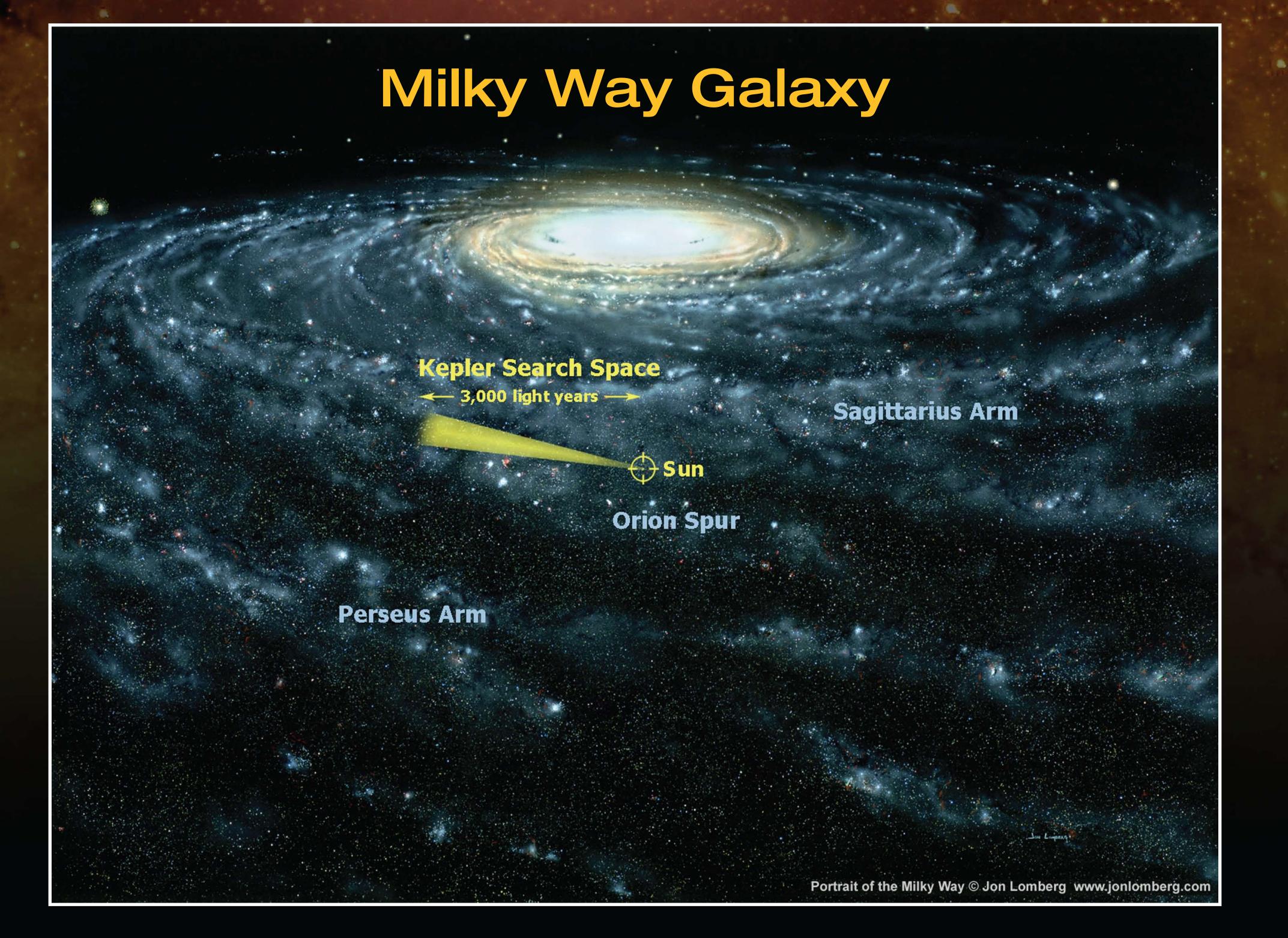
An Earth-size planet in the habitable zone of a typical Kepler field star: between 300 and 1000 years!

From the Moon: 1 Second From Mars: 10 Minutes From the nearest known extrasolar planet:









## The Spacecraft

The Kepler spacecraft contains a single instrument, a specially designed 0.95-meter diameter telescope called a photometer or light meter, which can simultaneously measure the brightness variations of over 100,000 stars with a precision of about 20 parts per million (ppm). So as not to miss any transits, Kepler will stare at the same star field in the Cygnus-Lyra region for the entire four-year mission.

