

Kepler



Kepler is part of NASA's Discovery Program and it is the first mission specifically designed to search for Earth-like planets around stars beyond our solar system. The Kepler spacecraft is based on a proven spacecraft design used for the Deep Impact mission to Comet Tempel 1. Ball Aerospace & Technologies Corp. will build the spacecraft and instrument, and manage launch and mission operations.



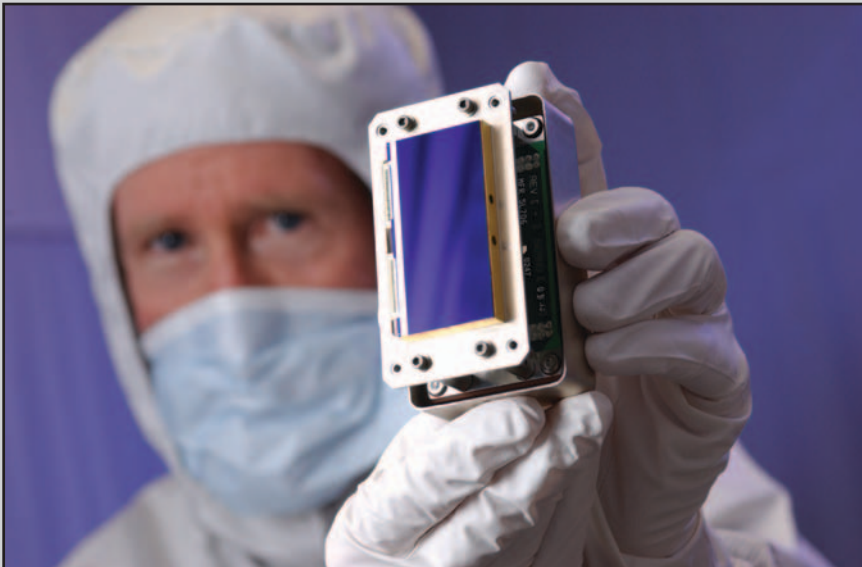
The goal of the Kepler mission is to detect planets that appear to orbit other stars. When a planet passes in front of its parent star, it causes a small decrease in the brightness of the star. The photometer aboard Kepler will continuously measure the brightness of 100,000 stars. The Kepler photometer will be sensitive enough to see changes in brightness caused by planets passing in front of, or transiting, stars whose diameters are 100 times larger than the planets. The Kepler mission is expected to detect planets transiting their stars several times, making it possible to determine their orbital period.

The key technology at the heart of Kepler's photometer is an array of charged-coupled devices that will gather the stellar brightness data on target stars. Ball Aerospace is employing its instrument expertise from its success on the Hubble Space Telescope in the photometer for Kepler. The instrument on Kepler uses a 0.95-meter (37-inch) aperture Schmidt photometer with a 1.4-meter (55-inch) primary mirror. It features a focal plane array with more than 95 million pixels that will measure the brightness of stars every 15 minutes.

The Kepler mission is expected to monitor a large sample of stars in order to obtain a statistically meaningful survey of Earth-sized planets. Astronomers also are specifically looking for planets with liquid water, so Kepler is also expected to provide temperature ranges of the planets surveyed. Astronomers are eager to discover new planets outside our solar system. Even if Kepler discovers that these planets are rare, it would provide valuable insight about the origin of our Earth.

To date, astronomers have discovered approximately 80 giant gas planets about the size of Jupiter and larger. The Kepler mission will be the first search capable of detecting planets as small as one-tenth the size of Earth. Kepler is expected to launch in June 2008 aboard a Delta II rocket. The spacecraft will then enter an Earth-trailing heliocentric orbit that will allow continuous viewing opportunities and high-rate communications with Earth.

The information provided by the Kepler mission will help to identify the likeliest spots in the galaxy to find Earth-sized planets, which will be invaluable to NASA's Terrestrial Planet Finder mission, a planet-imaging mission expected to launch around 2014.



This detector is one of 25 that make up the Kepler focal plane array assembly, which will gather data on the brightness of stars.