

MEDIA RELEASE

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University of Sydney Astronomers on a NASA mission to search for stellar oscillations

On Saturday 7 March 2009 at 03:50 Universal Time (14:50 AEST) NASA successfully launched the Kepler Spacecraft into orbit around the Sun from the Kennedy Space Center in Florida. The goal of this mission is ambitious and exciting. Using Kepler, NASA expects to answer a very fundamental question: do Earth size planets exist in orbit around other stars? The Kepler Spacecraft is equipped with a large telescope that will measure the variations in brightness of 170,000 stars simultaneously and continuously for a period of at least 3.5 years.

NASA's Kepler mission will not only be able to search for planets around other stars, but also yield new insights into the parent stars themselves. Kepler's measurements of changes in stellar brightness can also be used to study stars and their interiors. Kepler mission scientists are expected to answer a host of questions about stars in our galaxy: How old are stars? How do they evolve? Is the Sun a typical star? How does matter behave under the extreme conditions in stars?

Astronomers at the University of Sydney's School of Physics are members of the Kepler Asteroseismic Science Consortium who are taking part in the analysis of this exciting data set. Dr Dennis Stello, an astrophysicist at the University of Sydney says "We will now get the opportunity to study a large variety of stars, which will lead to a much improved understanding of the evolution of stars and hence ultimately of the Universe in which they reside." The team at the University of Sydney is leading the efforts to understand stars much older than the Sun, and stars located in stellar clusters. "We are tremendously excited to extent our seismic techniques to measure ages of stars much older than the Sun," says Dr Stello.

Stars, such as our sun, can "ring like a bell" due to sound waves which will result in oscillations of the whole star. Kepler's precise photometry will be able to measure these oscillations by recording small variations in a star's light and conduct "stellar seismology," in a similar way geologists probe Earth's interior through earthquakes which make waves move in the Earth's interior. If the surface of the star is oscillating, Kepler will detect periodic variations in the brightness of the star, and by measuring the brightness fluctuations over time spans from weeks to months and years the Kepler team will be able to measure the precise periods of those stellar oscillations.

The Kepler team will use seismic techniques to probe the cores of a large number of stars. This will allow the team to determine the size of stars, and to measure a star's chemical composition as well as rotation rate. For many of the stars where accompanying planets will be detected, the astronomers expect to use stellar seismology to determine the parent star's age. Do stars that host planets have the same age as the Sun and the Earth? The quality of the Kepler data and the large number of stars observed are expected to lead to a huge step forward in understanding of stellar evolution.

During the first nine months in space Kepler will survey more than 5,000 stars for oscillations. Based on those measurements, around 1100 stars will be followed for detailed studies throughout the full mission. The accuracy with which Kepler will be able to measure stellar oscillations is so high that the science team expects for the first time to watch directly the change in stars as they age.

In order to allow scientists worldwide to participate in analyzing the huge dataset, a scientific consortium has been formed, aiming at maximizing the scientific use of the data. This consortium, Kepler Asteroseismic Science Consortium (KASC), includes more than 200 researchers from 50 institutions all over the world.

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For more details on the launch:

http://www.nasa.gov/mission_pages/kepler/main/index.html

<http://www.nasa.gov/multimedia/nasatv/index.html>

Downloadable Images and Animations:

Images and links can be found via: <http://astro.phys.au.dk/KASC/im2009> (see below)

Kepler Images and animations: <http://kepler.nasa.gov/media>

<http://kepler.nasa.gov/media/animations.html>

Kepler Presskit: http://www.nasa.gov/pdf/314268main_Kepler_presskit_2-19_print.pdf

Images to be used in relation to the present Press Release:

All images and links can be found via: <http://astro.phys.au.dk/KASC/im2009>

More images via: <http://mediaarchive.ksc.nasa.gov/search.cfm?cat=194>

Kepler Images and animations: <http://kepler.nasa.gov/media>

<http://kepler.nasa.gov/media/animations.html>

http://www.nasa.gov/mission_pages/kepler/news/L-14-press-conference.html

Kepler Presskit: http://www.nasa.gov/pdf/314268main_Kepler_presskit_2-19_print.pdf