

PRESS RELEASE

2 March 2009

For immediate release

Astronomers will use NASA's Kepler Mission to search for stellar oscillations

Astronomers from the South African Astronomical Observatory and the University of Cape Town will be working on the data from this ambitious and exciting space mission

On 7 March 2009 at 03:50 Universal Time *[05:50 am local South African Time]* NASA plans to launch the Kepler Spacecraft into orbit around the Sun. The launch will be from launch pad 17B at 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 planets the size of Earth 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?

Stars like 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 over time spans from weeks to months and years and 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 5000 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 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.

Astronomers, Dr. Luis Balona from the South African Astronomical Observatory and Dr. Thebe Medupe from the University of Cape Town, will as active members of the Kepler Asteroseismic Science Consortium take part in the analysis of this exciting data set. The expertise from South African astronomers will be used to extract the detailed seismic information for the stars observed by Kepler. Dr. Luis Balona and Dr. Thebe Medupe are busy preparing for the analysis of the data and selected some of the stars that will be observed by the Kepler Spacecraft.

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

For information on the Kepler project, please contact:

- William J. Borucki, *Kepler Science Principal Investigator*, NASA Ames Research Center, Moffett Field, CA 94035-1000, Telephone: +1 650-604-6492; FAX: +1 650-604-0673, email: William.J.Borucki@nasa.gov
- NASA Ames. Contact person: Michael Mewhinney Ames Research Center, Moffett Field, Calif., Telephone: +1 650-604-3937, email: michael.s.mewhinney@nasa.gov
- JPL, Contact person: Whitney Clavin, Telephone: +1 818-458-9008, Jet Propulsion Laboratory, Pasadena, Calif., email: whitney.clavin@jpl.nasa.gov
- George Diller, Kennedy Space Center, Telephone: +1 321-867-2468, email: george.h.diller@nasa.gov
- Tracy Young, Kennedy Space Center, Telephone: +1 321-867-2468, email: tracy.g.young@nasa.gov

For information on the Kepler Asteroseismology, please contact:

- Dr Luis Balona, South African Astronomical Observatory, Observatory, South Africa, Telephone: +27 (0)21 460 6292; email: lab@sao.ac.za
- Dr Thebe Medupe, University Of Cape Town, Rondebosch, South Africa, Telephone: +27 (0)21 650 2393 ; email: thebe@baghayogo.ast.uct.ac.za
- Ronald Gilliland, Space Telescope Science Institute, Baltimore, Md., Telephone: +1 410-338-4366; email: gillil@stsci.edu
- Jørgen Christensen-Dalsgaard, Institut for Fysik og Astronomi, Aarhus Universitet Ny Munkegade 120, 8000 Aarhus C., Telephone: +45 8942 3614, email: jcd@phys.au.dk
- Tim Brown, Las Cumbres Observatory Global Telescope Network, Inc., 6740 Cortona Dr. Suite 102, Santa Barbara, CA 93117, email: tbrown@lcogt.net
- Hans Kjeldsen, Institut for Fysik og Astronomi, Aarhus Universitet Ny Munkegade 120, 8000 Aarhus C., Telephone +45 2338 2160, email: hans@phys.au.dk

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



November 2008: As dawn lights the sky on Launch Pad 17-B at Cape Canaveral Air Force Station in Florida, the first stage of the Delta 2 launch vehicle that will carry the Kepler spacecraft into orbit waits for the installation of the final solid rocket boosters.

Details: <http://mediaarchive.ksc.nasa.gov/detail.cfm?mediaid=38253>

Kepler is a NASA Discovery mission. NASA's Ames Research Center is the home organization of the Science Principal Investigator and is responsible for the ground system development, mission operations and science data analysis. Kepler mission development is managed by JPL. Ball Aerospace & Technologies Corp., Boulder, Colo., is responsible for developing the Kepler flight system and supporting mission operations. More information about the Kepler mission is at <http://www.nasa.gov/kepler>



December 2008: On Complex 17-B at Cape Canaveral Air Force Station in Florida, the second stage of the Delta 2 rocket for the launch of NASA's Kepler spacecraft is moved inside the mobile service tower. Details: <http://mediaarchive.ksc.nasa.gov/detail.cfm?mediaid=38875>



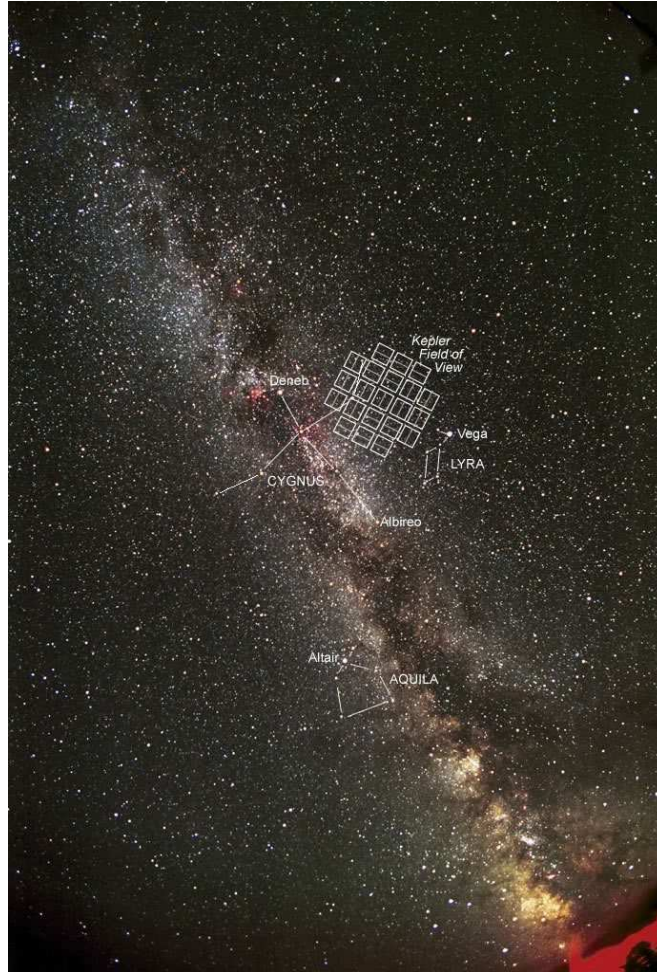
January 2009: NASA's Kepler spacecraft that will be launched in March aboard a United Launch Alliance Delta II rocket. Details: <http://mediaarchive.ksc.nasa.gov/detail.cfm?mediaid=39501>

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February 2009: At the Hazardous Processing Facility at Astrotech in Titusville, Florida, a scale on the crane is moved into place above the Kepler spacecraft. The spacecraft will be lifted and weighed. Details: <http://mediaarchive.ksc.nasa.gov/detail.cfm?mediaid=39687>

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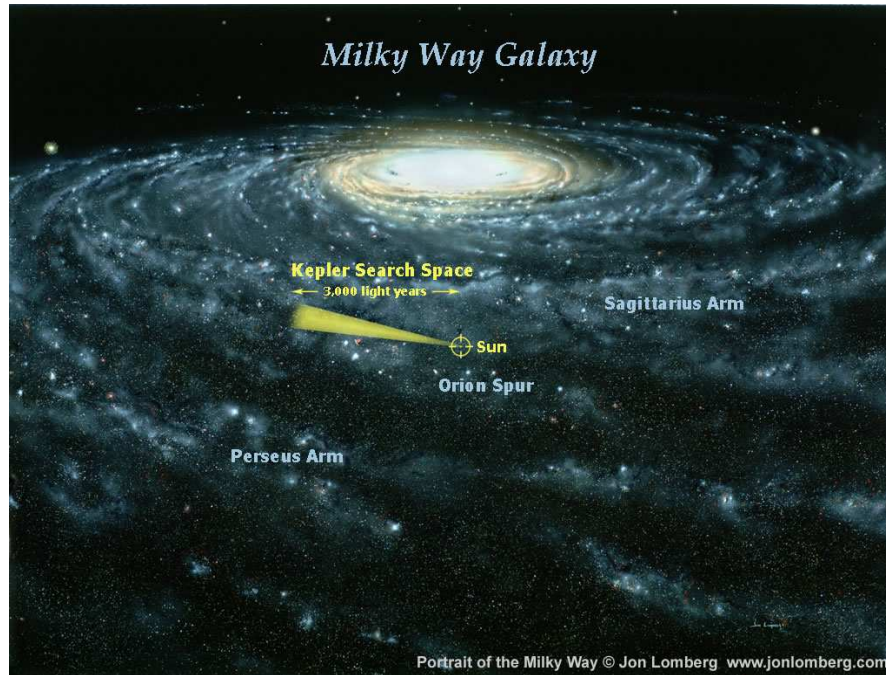
The area in the sky where Kepler will observe 170,000 stars simultaneously and continuously for a period of 3.5 years.

Details: <http://kepler.nasa.gov/sci/basis/images/MilkyWay+FOV-CRoberts%20copy.jpg>
and <http://kepler.nasa.gov/media/art.html>

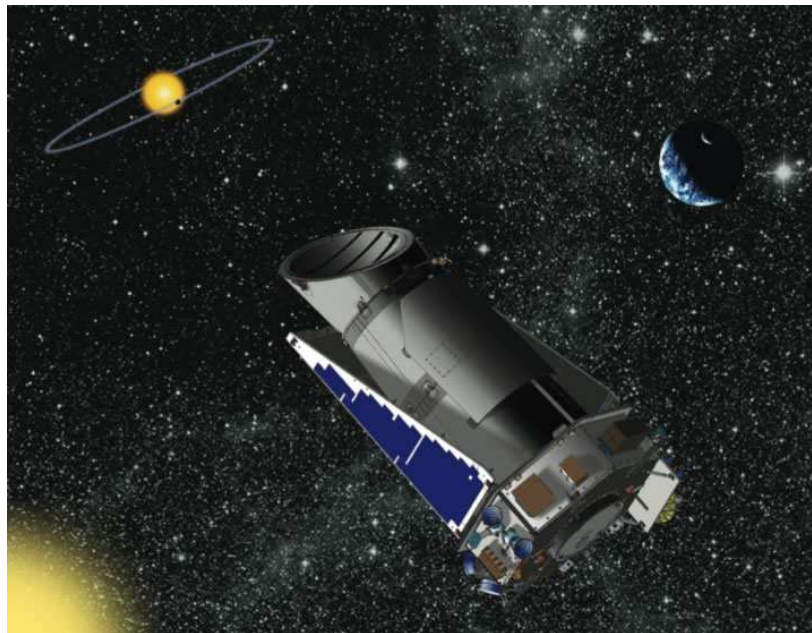


Mission Logo at:
http://kepler.nasa.gov/media/images/Kepler_logo_transp.jpg

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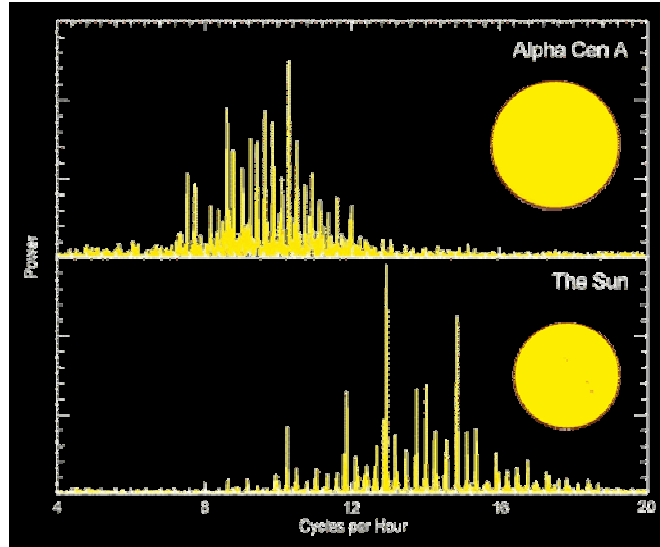
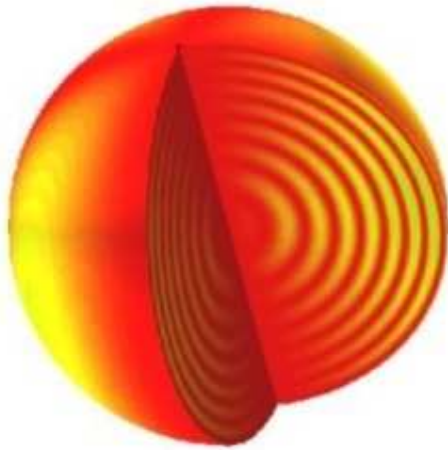
The Kepler Target Region in Milky Way (the part of our galaxy that will contain the stars observed by the Kepler Spacecraft). Details at: <http://kepler.nasa.gov/media/images/LombergA1600.jpg>



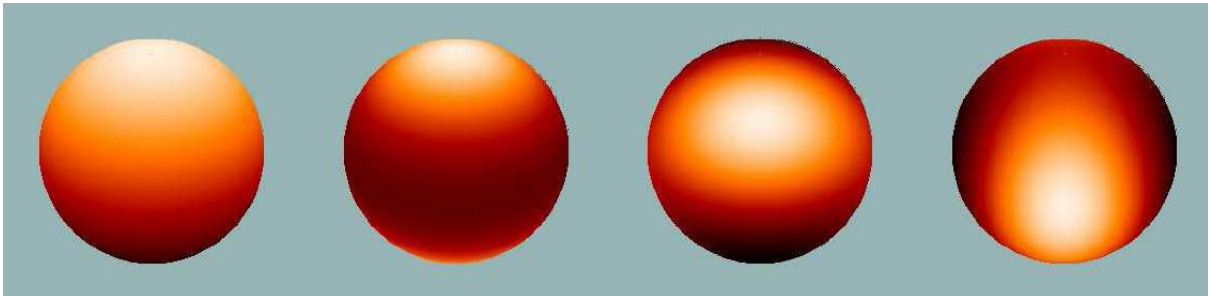
The Kepler Spacecraft in orbit around the Sun. Kepler will be able to determine if a planet orbiting a given star passes in front of the star. Such an event will cause the observed brightness to decrease a tiny fraction.

Details at: <http://kepler.nasa.gov/media/images/Kepler+bkgdHR.jpg>

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An oscillating star (standing sound waves) is illustrated at left. With periods from minutes to months a given star will oscillate and change its brightness periodically. A star will oscillate in several periods simultaneously and through mathematical analysis the Kepler scientists will construct a diagram where all the individual periods can be measured from the measurements of brightness variations over the length of the Kepler mission. Such a diagram is shown at right for our own Sun and for another star. As can be seen the periods of oscillations are different for the two stars reflecting the different size, age and structure of those stars. Check <http://astro.phys.au.dk/KASC/seismology/> for more details.



Oscillations (standing sound waves) in the Sun will if we speed them up 100,000 times have frequencies that we are able to listen to. Real sound data from the Sun (speeded up by a factor of 100,000) may be found via the BiSON webpage: <http://bison.ph.bham.ac.uk/sounds/wideband.wav> More details at: <http://bison.ph.bham.ac.uk/sounds/solarsounds.html>

More animations, images and information via:

Kennedy Space Center: <http://mediaarchive.ksc.nasa.gov/search.cfm?cat=194>
Kepler: http://www.nasa.gov/mission_pages/kepler/main/index.html
Kepler: <http://kepler.nasa.gov/>
Images and animations: <http://kepler.nasa.gov/media>
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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

Asteroseismology: <http://astro.phys.au.dk/KASC/seismology/>
KASC: <http://astro.phys.au.dk/KASC>
The sound of the Sun: <http://bison.ph.bham.ac.uk/sounds/wideband.wav>
<http://bison.ph.bham.ac.uk/sounds/solarsounds.html>

More links: <http://astro.phys.au.dk/KASC/Links.htm>

Follow the launch of Kepler via:

NASA TV: <http://www.nasa.gov/multimedia/nasatv>
NASA TV DIGITAL: <http://www.nasa.gov/multimedia/nasatv/digital.html>