

UNIVERSITY OF
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The Music of the
Stars and the Search
for New Worlds

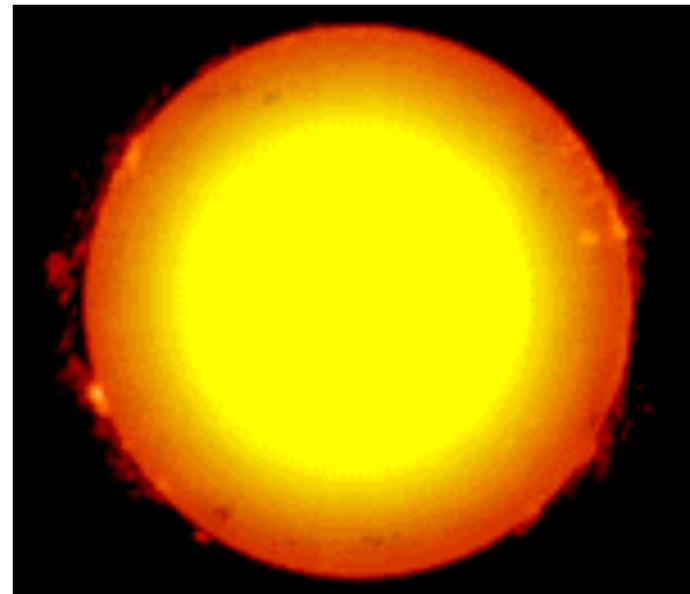
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The resonant Sun

The Sun resonates like a musical instrument!



helioseismology, *n.*

The study of the Sun's interior by the observation and analysis of oscillations at its surface.

Cf. asteroseismology

[Oxford English Dictionary]

FIFTY YEARS OF SEISMOLOGY OF THE SUN & STARS

NSO Workshop #27
May 6-10, 2013 • Tucson, AZ, USA

In the last 50 years, helioseismology has made significant contributions to the knowledge of the Sun's interior physics and has led the way to asteroseismology. On this occasion, a workshop is being organized to discuss recent advances, reflect on the progress made to date, and address new challenges.

Scientific Organizing Committee

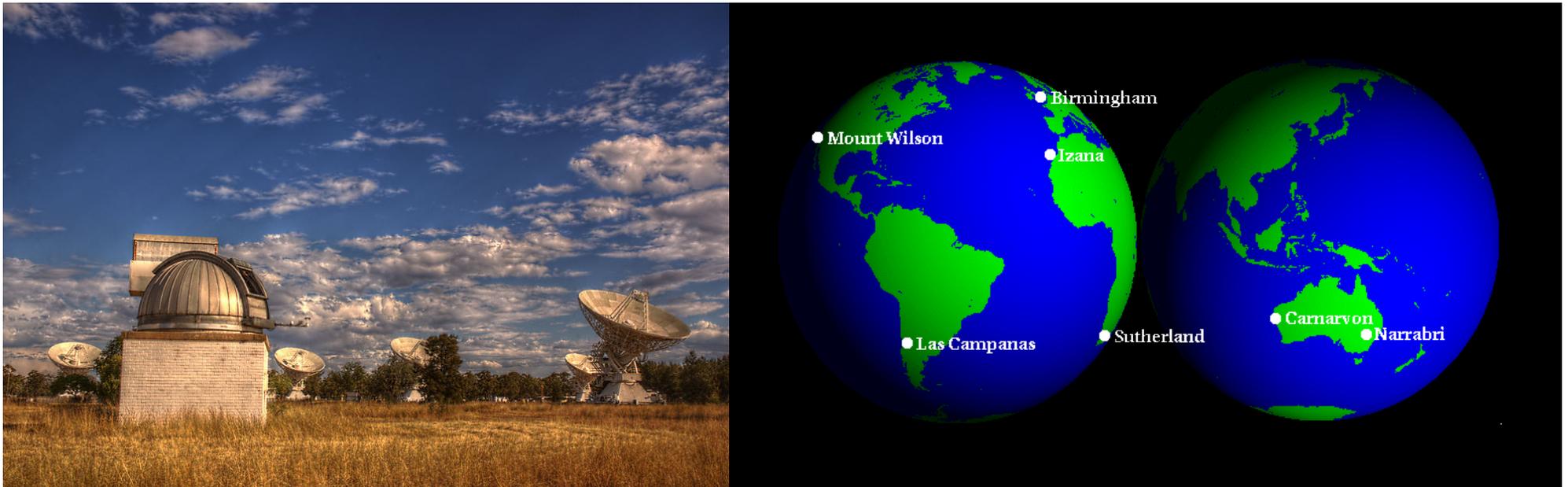
- S. Basu
- J. Christensen-Dalsgaard
- F. Hill (Co-Chair)
- K. Jain (Co-Chair)
- S. Korzennik
- C. Lindsey
- A. Pavlov (Co-Chair)
- E. J. Rhodes, Jr.
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- T. Sekii
- M. J. Thompson
- S. Tripathy (Chair)

Financial support for young researchers is available from the Solar Physics Division of American Astronomical Society under the Thomas Metcalf SPD travel fund and solar physics student travel awards. For eligibility and other criterion, please visit the workshop web-site.

www.nso.edu/workshops/2013

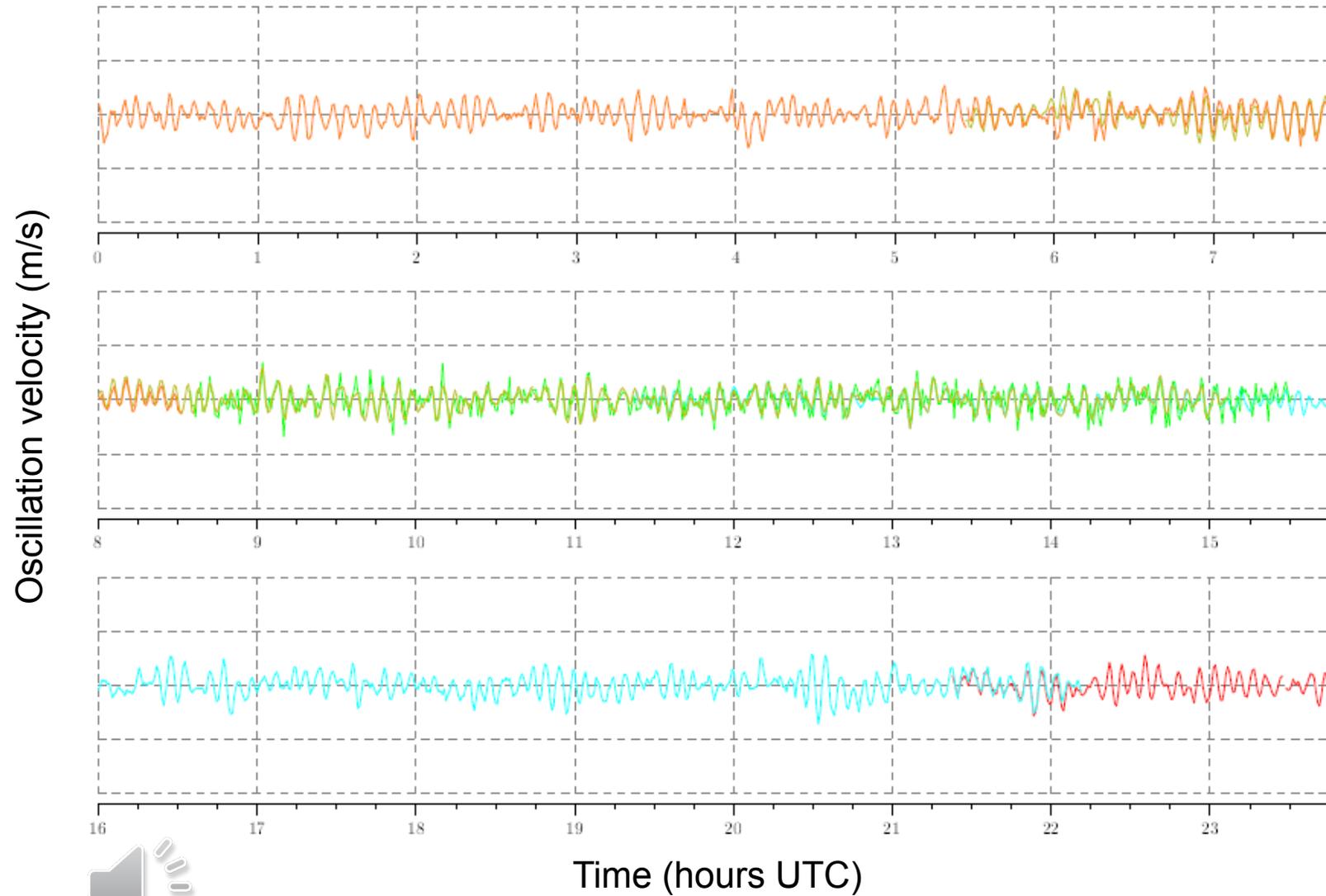
NSO NISP NST NASA ESA ST-UD

Birmingham Solar-Oscillations Network (BiSON)



<http://bison.ph.bham.ac.uk/>

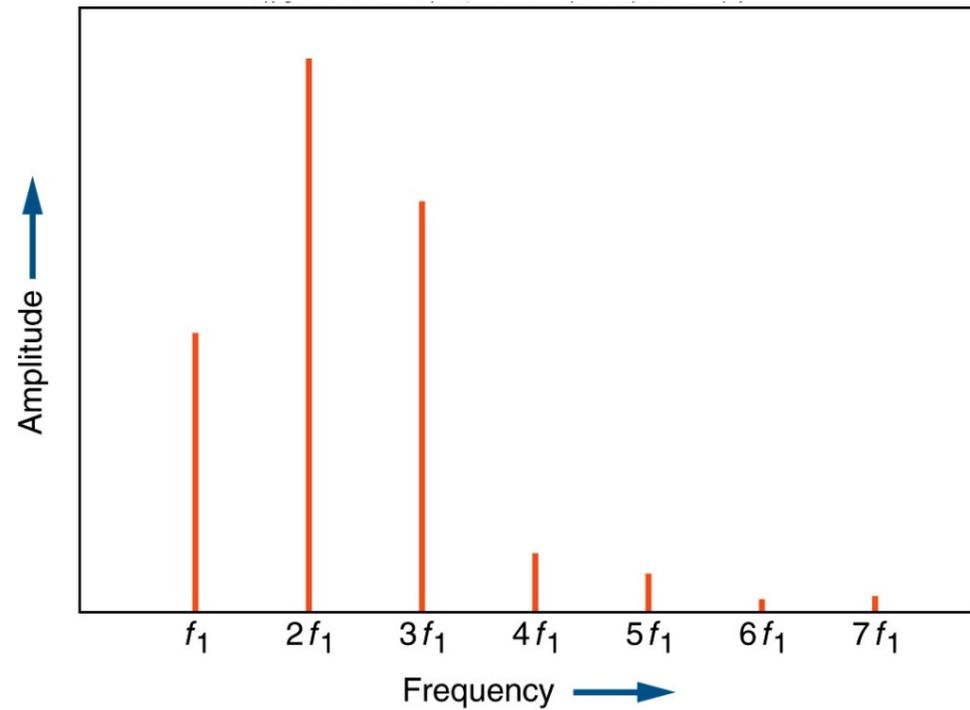
“Sun quakes”



Overtones of an instrument

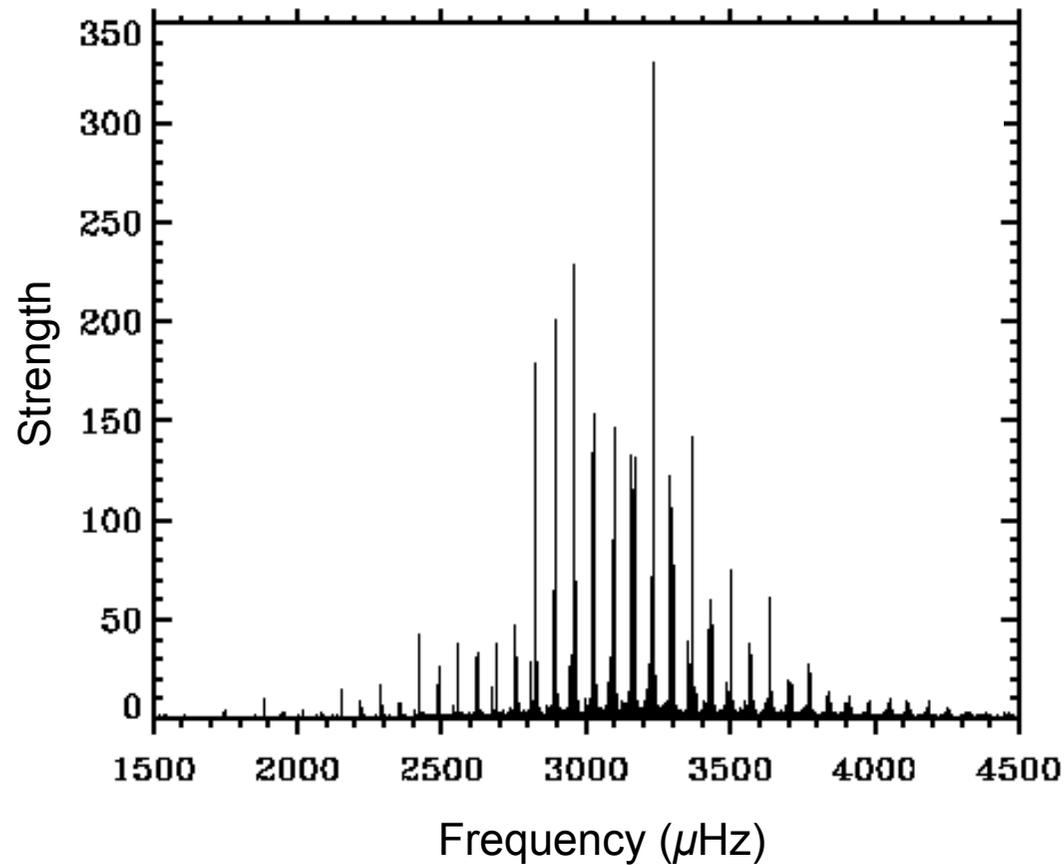


Frequency spectrum

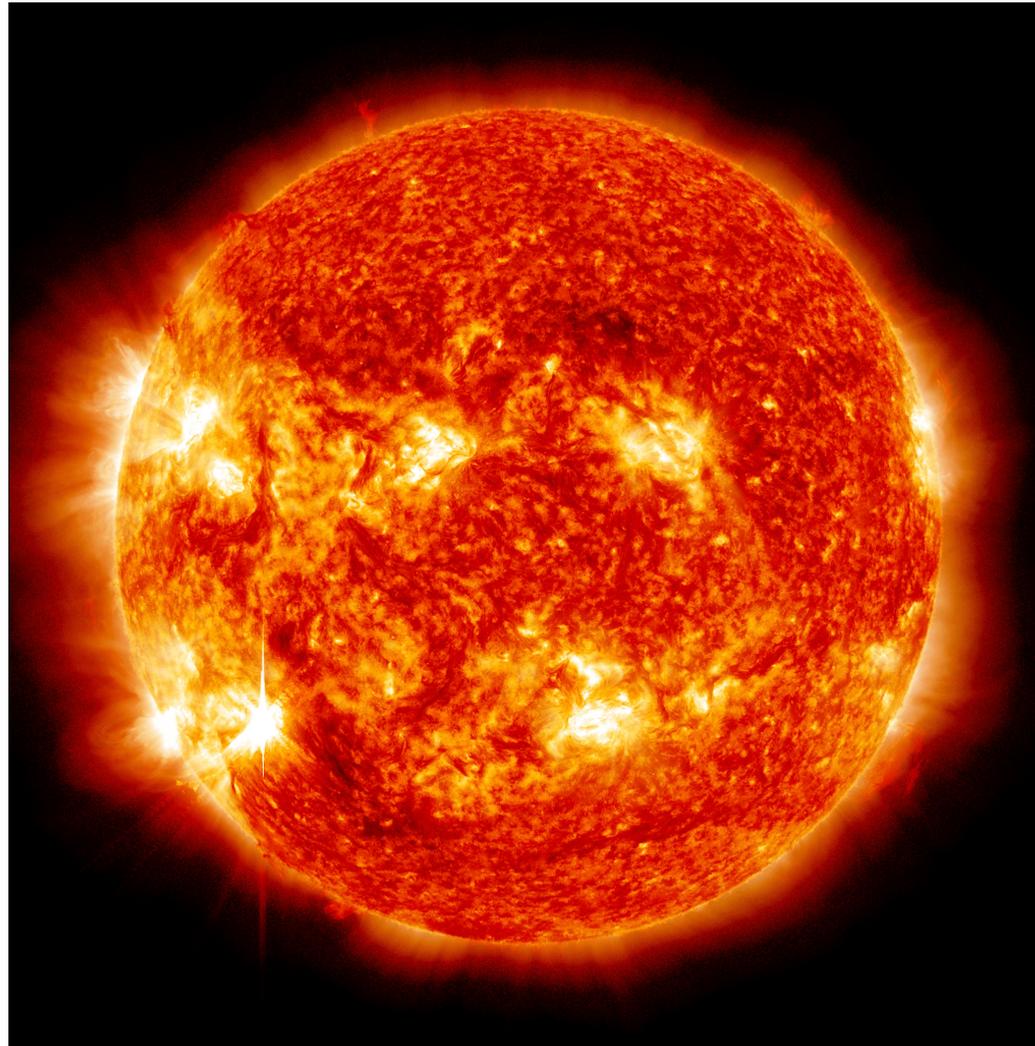


Music of the stars: Sun

Frequency spectrum of the Sun



What have we learned from helioseismology?

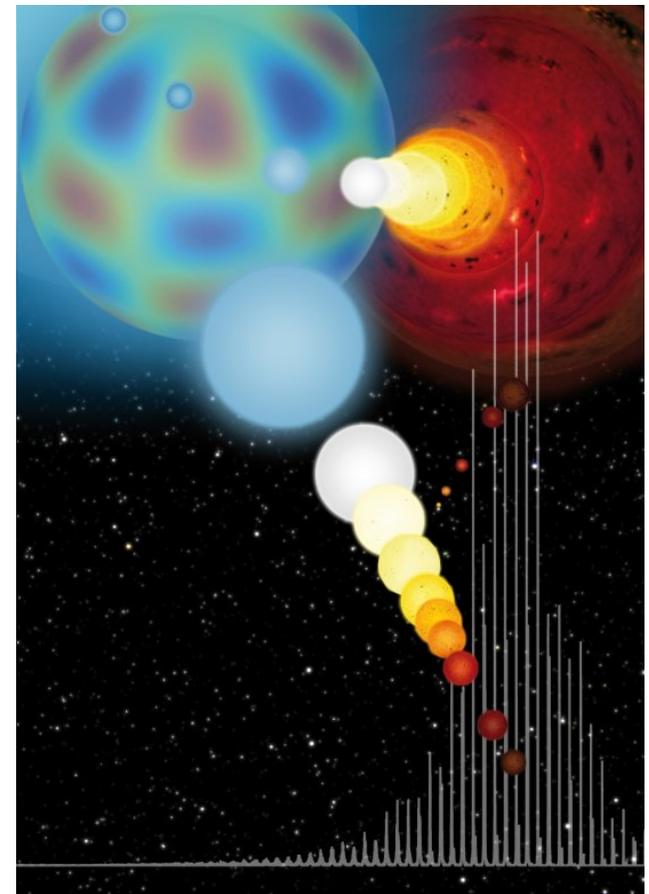


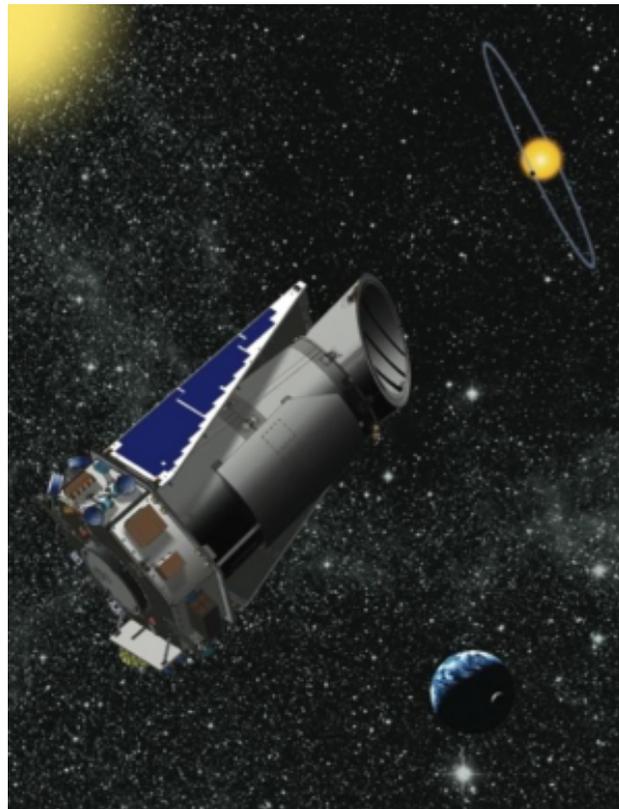
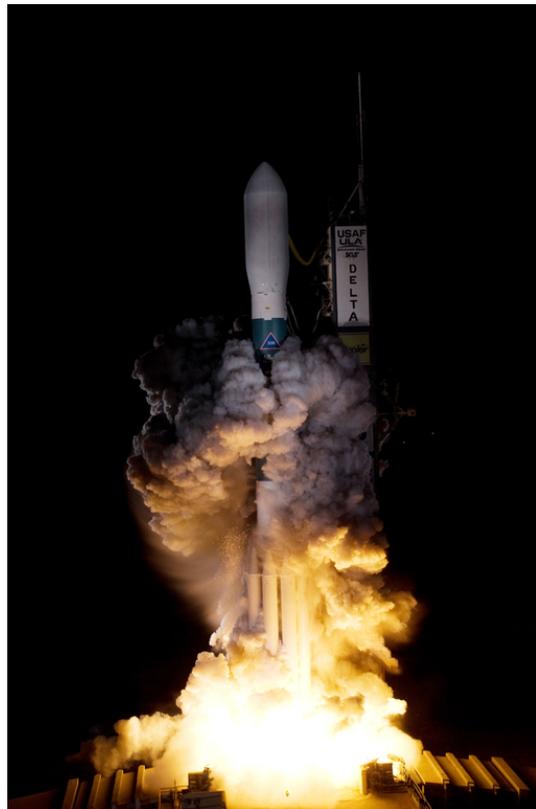
asteroseismology, *n.*

The study of the interior of stars by the observation and analysis of oscillations at their surface.

Cf. helioseismology

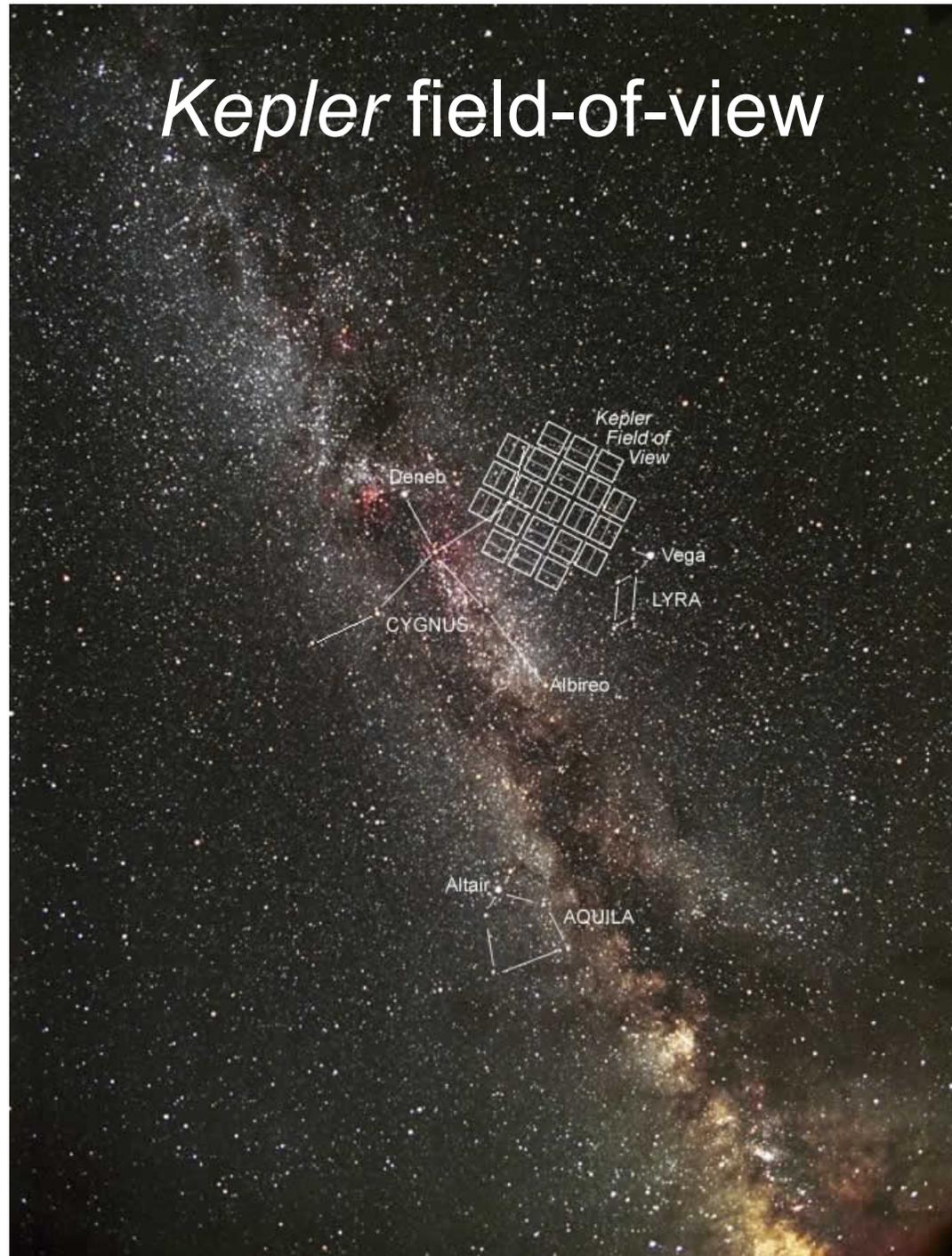
[Oxford English Dictionary]





<http://keplerscience.arc.nasa.gov/>

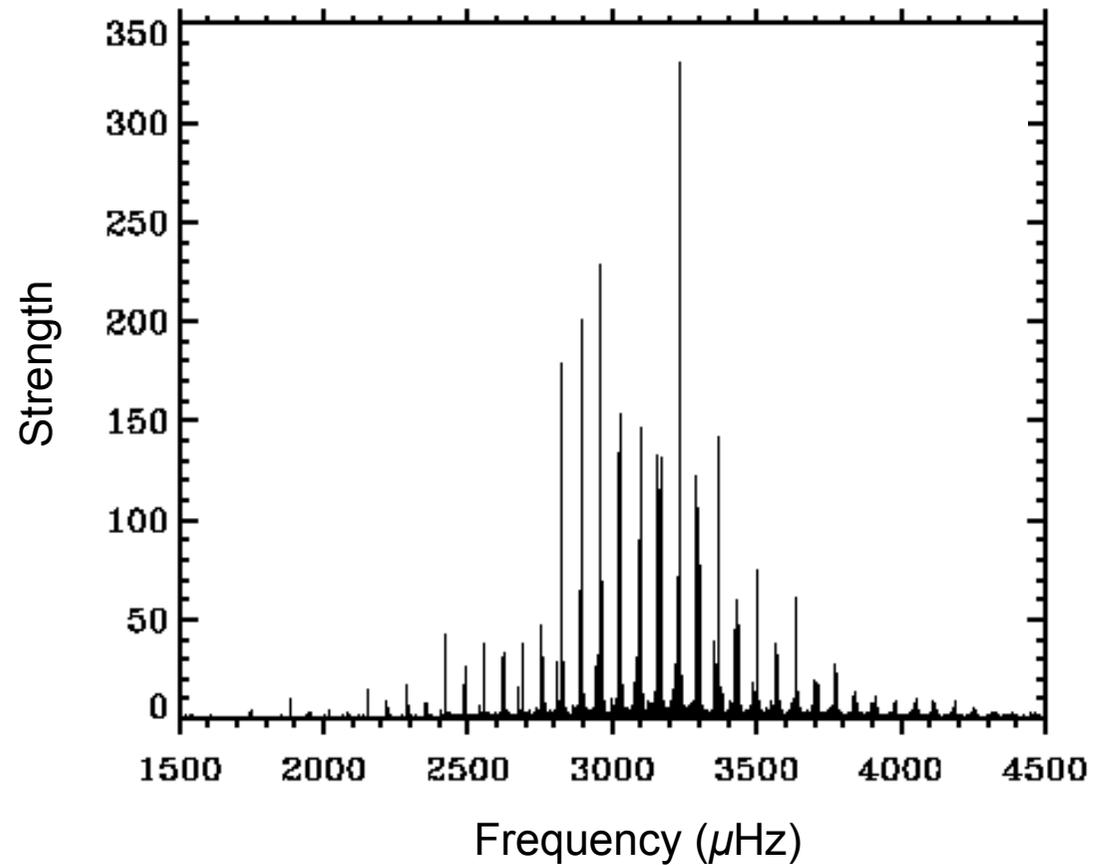
Kepler field-of-view



Music of the stars: Sun



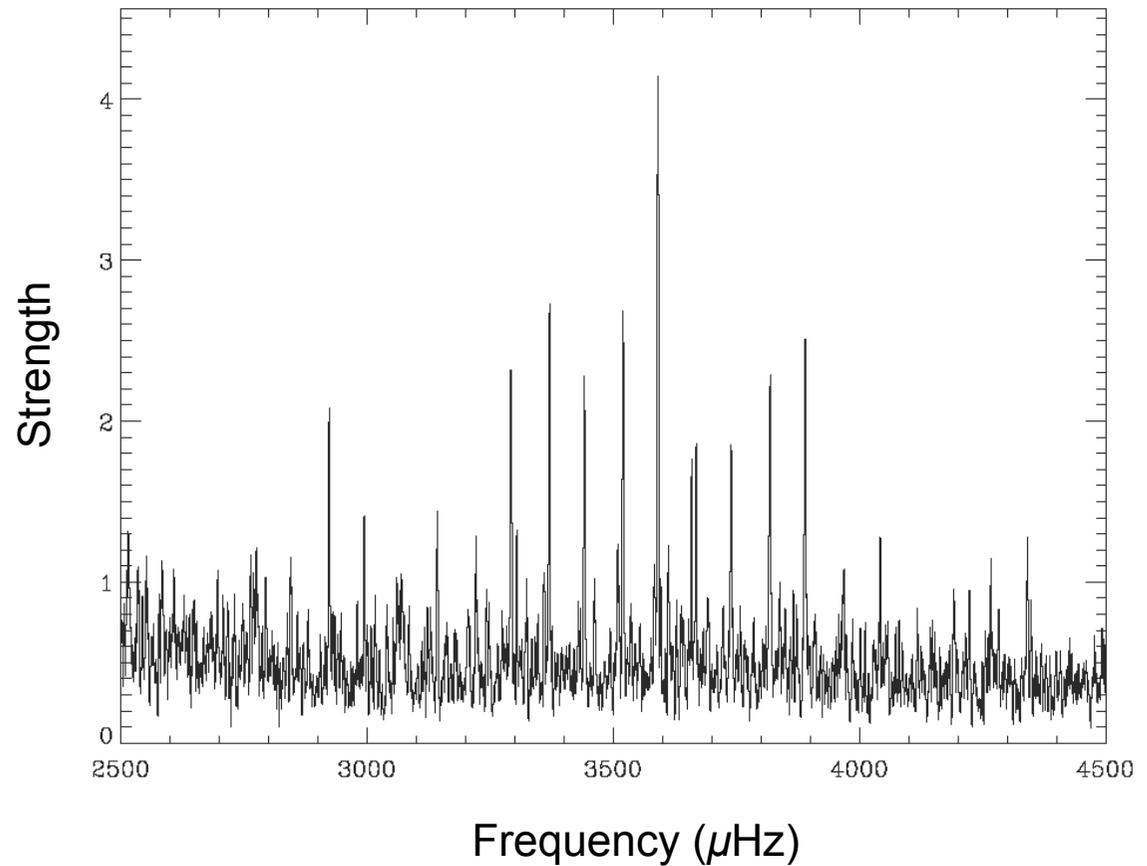
Frequency spectrum



Music of the stars: dwarf star



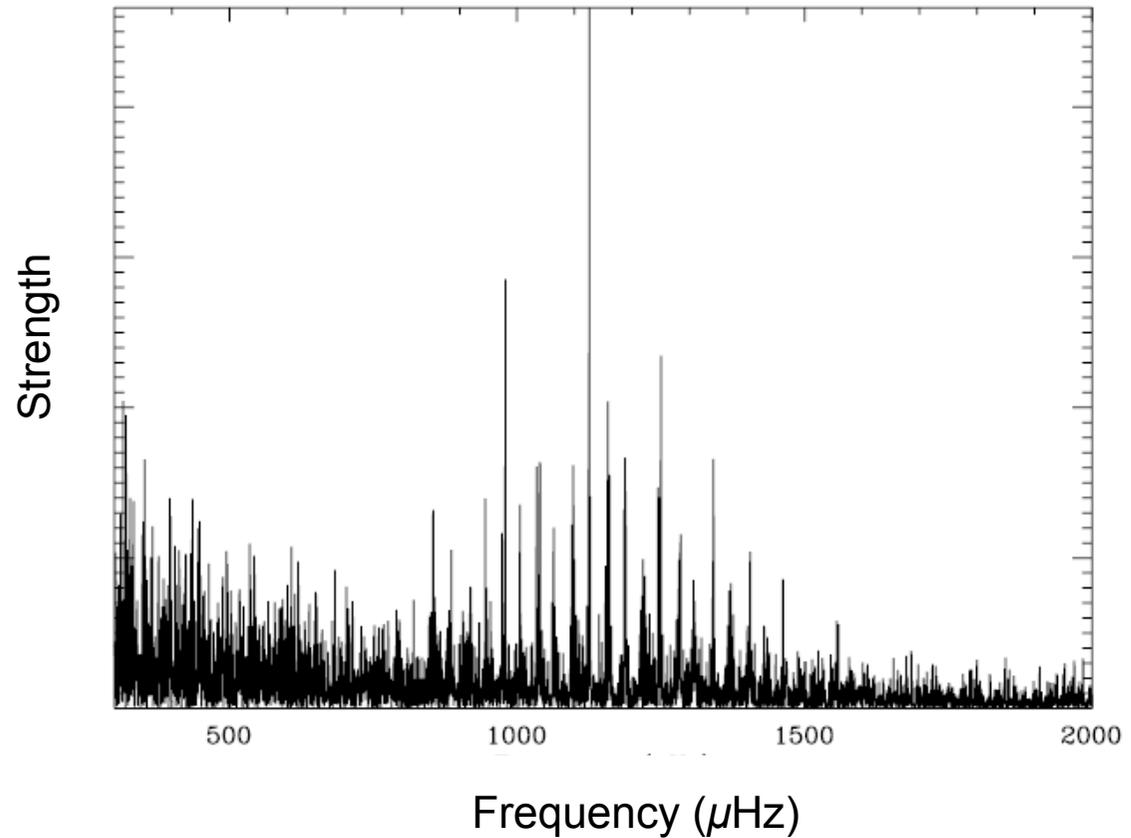
Frequency spectrum



Music of the stars: subgiant star



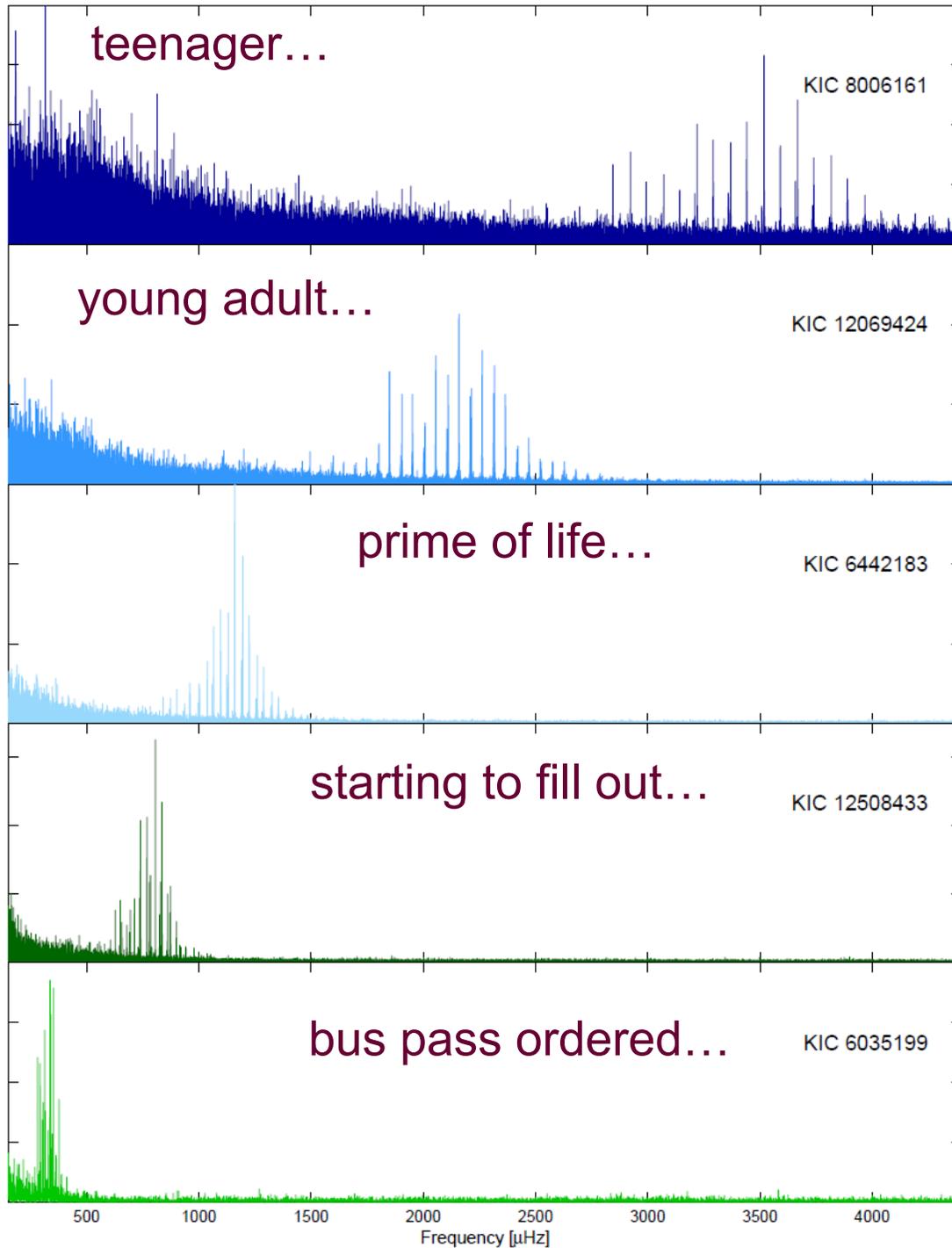
Frequency spectrum



“Sun in time”

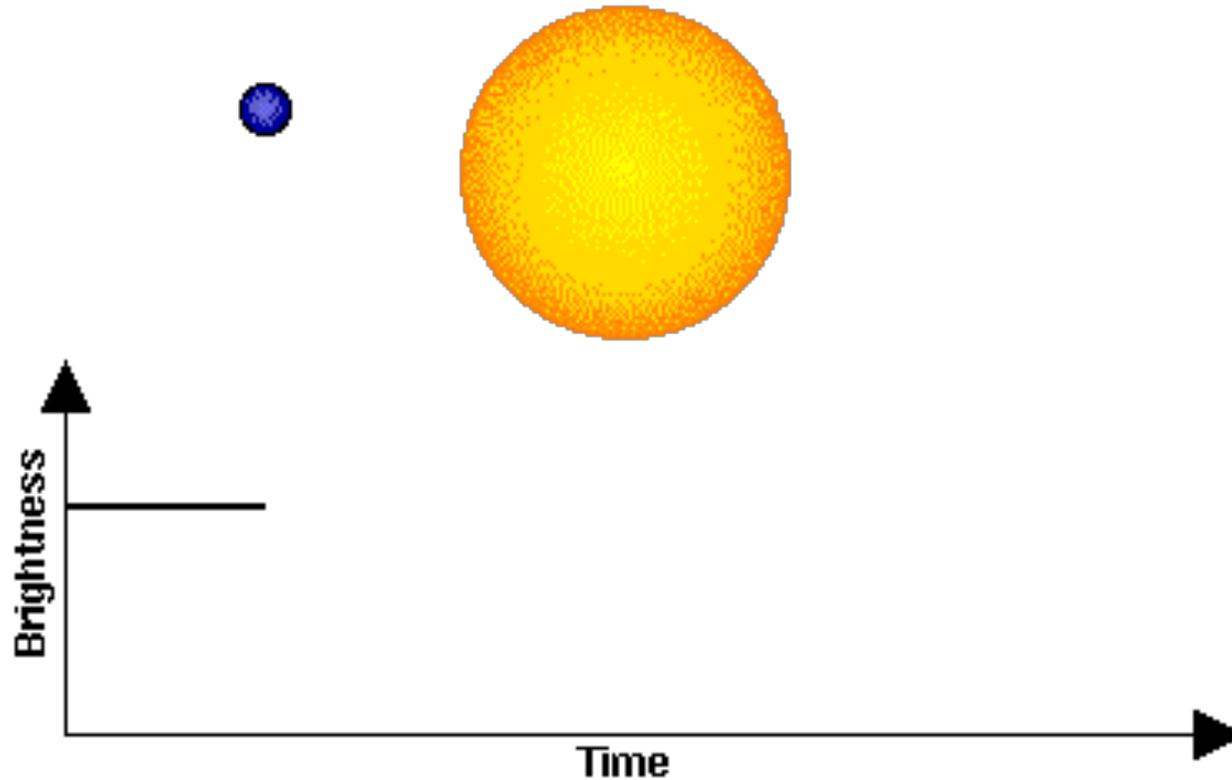
Kepler sequence of solar-mass stars

Increasing size, age



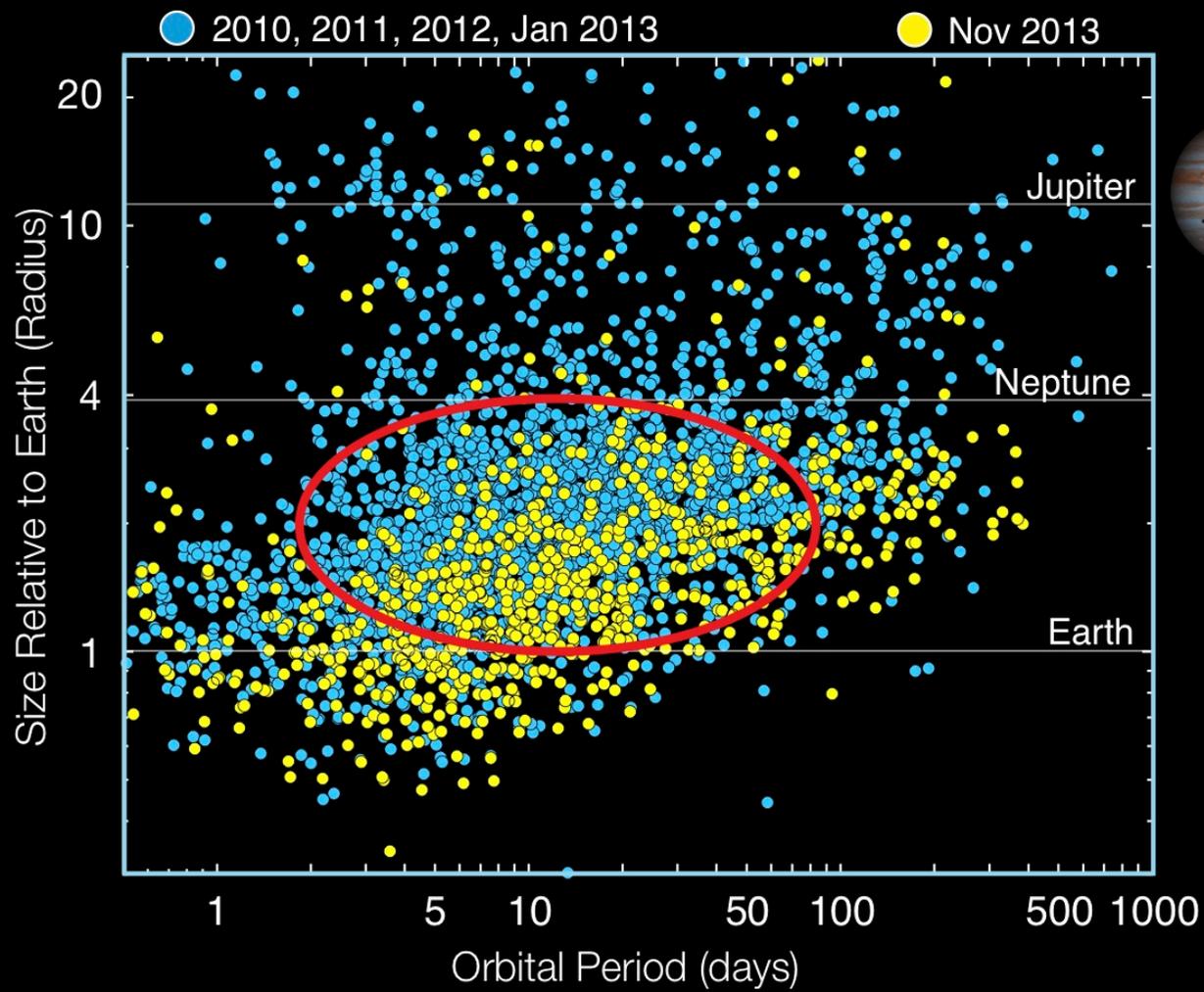
The transit method

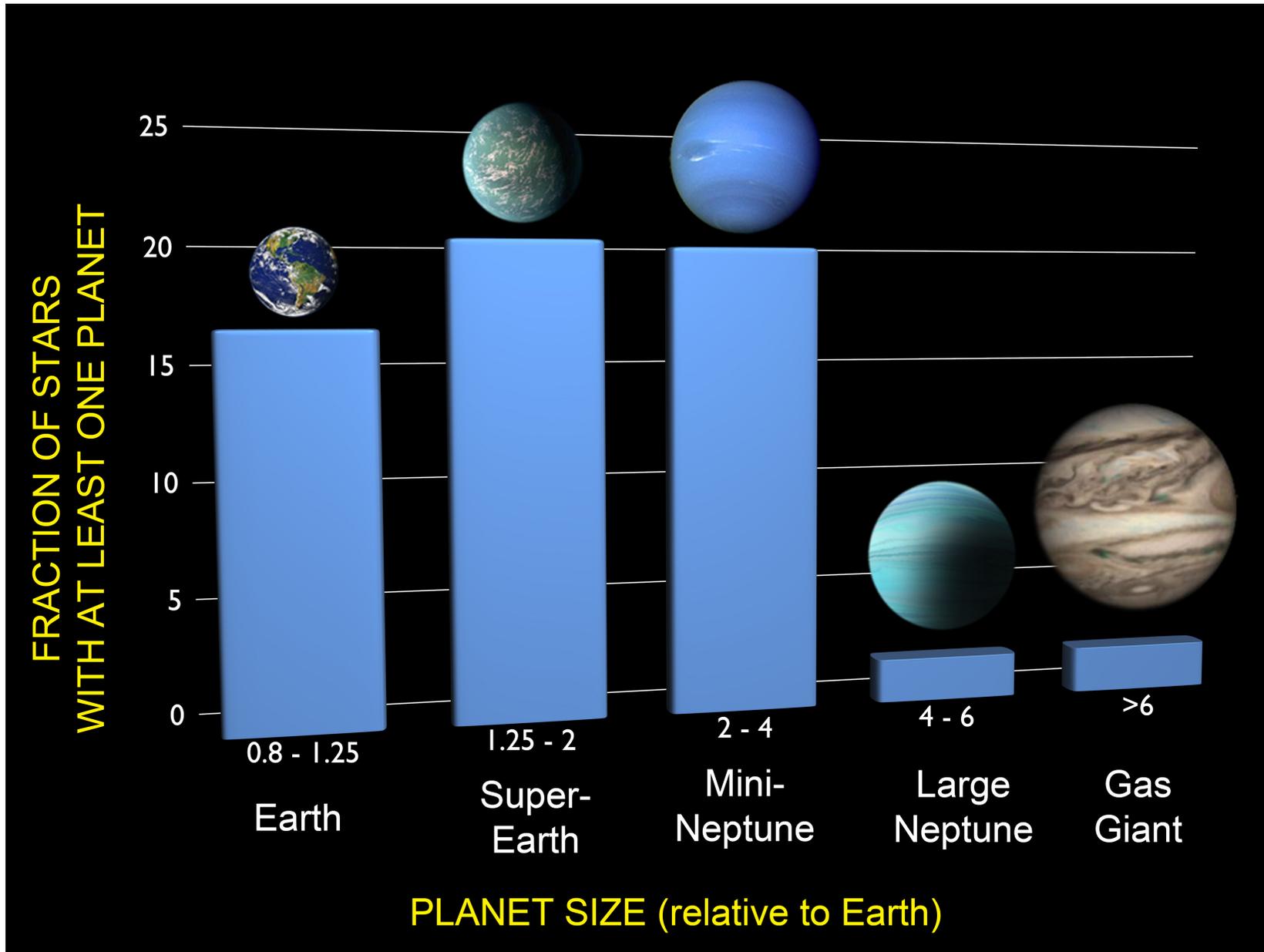
Detection of extrasolar planets



Kepler Planet Candidates

As of January 2014



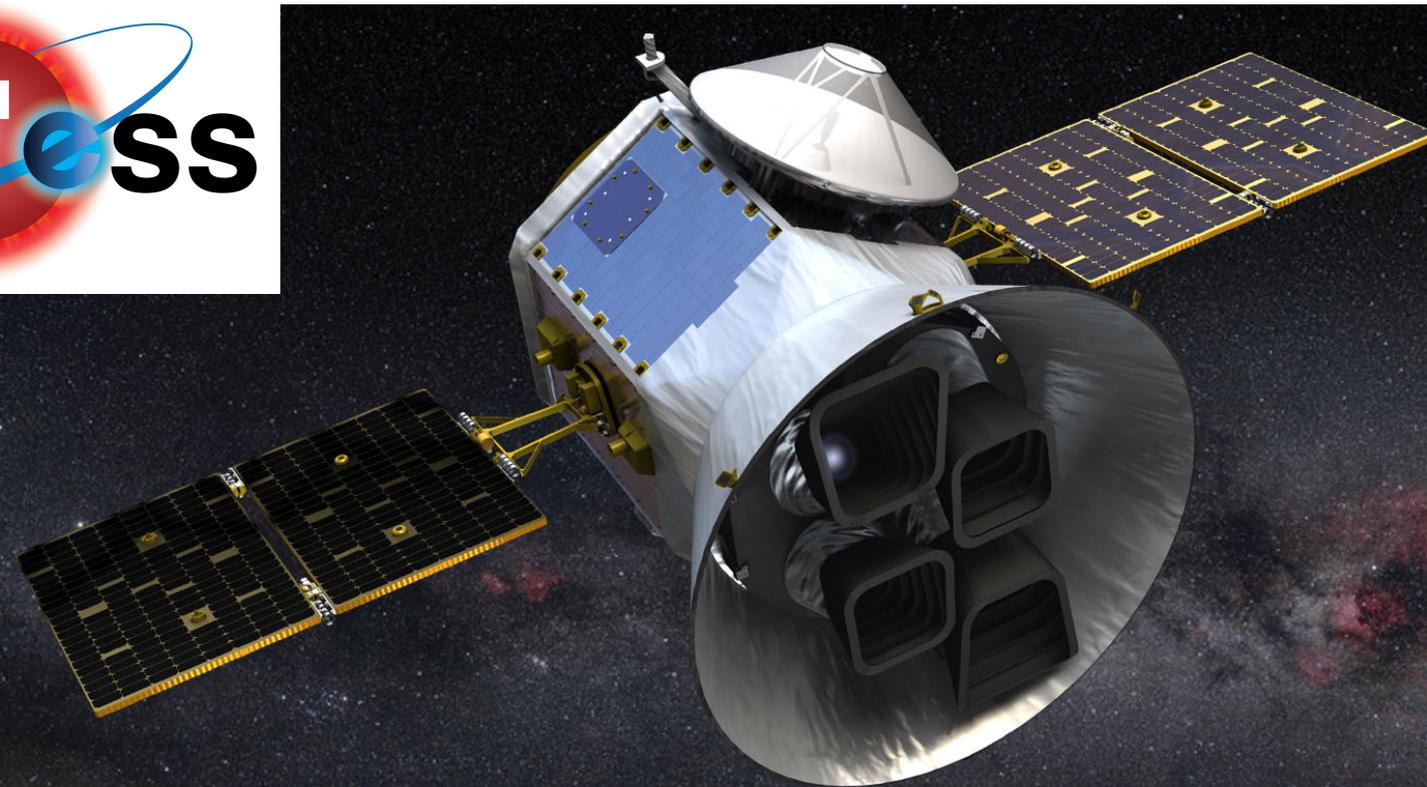


Kepler-444



11.2 billion years old!

Campante et al., 2015, *ApJ*, 799, 170



TRANSITING EXOPLANET SURVEY SATELLITE

*DISCOVERING NEW EARTHS AND SUPER-EARTHS
IN THE SOLAR NEIGHBORHOOD*

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Thank you for listening!

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