

NEW DISCOVERIES

Scientists value transits to find exoplanets--planets orbiting distant stars. The Kepler mission and amateurs alike are embarking on a new chapter of using transits to establish our place in the cosmos.

Hubble Space Telescope to Target 2012 Transit of Venus



SEPTEMBER_SHORT 09 | 14:13

Chuck

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The Hubble Space Telescope will be aimed at the moon to detect dips in brightness during the 2012 transit of Venus. In an [interview](#) explaining how the Space Telescope Science Institute (STScI) allocates time on the telescope, Dr. Matt Mountain, STScI Director, describes a clever, high risk project with potential for high return that was selected among the 1,000+ proposals.



Alfred Vidal-Madjar, CNRS, Institut d'Astrophysique de Paris, submitted the [proposal](#) entitled *Venus observed as an extrasolar planet*.

While astronomers can discern the atmosphere of big planets 150 light years away, they seek to detect the atmospheres of smaller earth-size planets as well. To mimic looking at a small exoplanet, the Hubble Space Telescope will measure small changes in light reflected off the moon as Venus diminishes the sunlight slightly when the inner planet passes between the sun and earth on June 5-6, 2012.

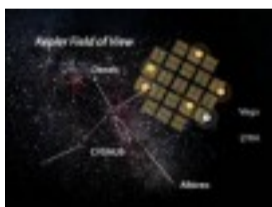
"We don't know if it will work, but it's worth a shot," Mountain said. "If it does work, we'll get an idea of what earth-size would look like...It will guide us in the future if we ever see dip like it; we're seeing a very small planet...It's quite a risky project, but the payoff would be quite remarkable, for we'd actually be able to measure the atmosphere of Venus using the Hubble Space Telescope."

[Read more: Hubble Space Telescope to Target 2012 Transit of Venus](#)

Links: Exoplanet Transits



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<http://kepler.nasa.gov>

"NASA Kepler Mission is searching the skies for planets that are the same size as Earth--worlds that could possibly be similar to our own." The spacecraft identifies transiting planets as it scans more than 100,000 stars near the constellation Cygnus, looking for recurring dips in the light curve. Excellent website with many resources, including:

- [Classroom Activities](#)
- [Formal Education, Informal Education, and Public Outreach](#)
- [Models and Simulations](#)
- and much more.

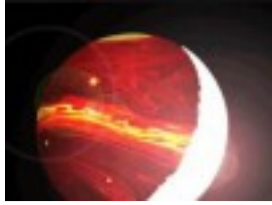


<http://planetquest.jpl.nasa.gov/>

PlanetQuest Exoplanet Exploration is an engaging site for news and multimedia about NASA's search for new worlds. Keep pace with current tally of new and candidate planets; get your questions answered by Astronomer Steve; create your planet with Extreme Makeover; check out the great videos from multiple NASA missions, and always see the latest exoplanet news at the forefront of science.

<http://kepler.nasa.gov/files/mws/TransitTracks-7-2010.pdf>

Transit Tracks is an investigation in which students describe a transit and the conditions when a transit may be seen; describe how a planet's size and distance from its star affects the behavior of transits; and interpret graphs of brightness vs time to deduce information about planet-star systems.



<http://oklo.org/>

The Systemic Weblog, written by [Greg Laughlin](#), reports recent developments in the field of extrasolar planets, with a particular focus on observational and theoretical astronomical research work. Tutorials show how to use the [Systemic Console](#), a program that "uses an intuitive graphical interface to analyze data in order to detect and characterize planets."



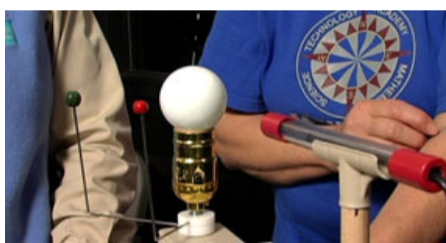
<http://www.transitsearch.org/>

An observing program whose purpose is "to coordinate and direct a cooperative observational effort which will allow experienced amateur astronomers and small college observatories to discover transiting extrasolar planets." To observe transiting planets around distant stars, you need a telescope with an accurate clock drive, a CCD camera, and appropriate computer software. Observers who obtain photometry of known transiting planets can submit their light curves. The transitsearch.org site currently functions primarily as an ephemeris information service.



<http://www.planethunters.org/>

Actually find new planets orbiting distant stars using the data from the Kepler mission. Participants steer astronomers to candidate stars by judging the existence of patterns in a light curve. From Planet Hunters.



<http://www.wnit.org/outdoorelements/1000/1003/1003.html>

Planetarium director Ruth Craft uses a photometer and orrery to simulate the Kepler spacecraft monitoring a star with transiting planets. In the demonstration, computer software generates a light curve that is projected on the domed ceiling, where visitors can discern the presence and characteristics of companion planets. See *How the Kepler Telescope Works* (Segment #3 of Episode #1003); from WNIT Outdoor Elements.



<http://smc.cnes.fr/COROT/>

COROT (CONvection, ROTation and planetary Transits) space telescope is international venture launched in December, 2006; it uses stellar seismology to examine the inner structure of stars and a CCD camera to detect the transits of extrasolar planets. See sidebar in [March 2009 Planetarian](#), page 10.

<http://www.mykepler.com/>

MyKepler is an educational program with a vision to involve 3,000 schools (1,000 in the USA) in the tracking and exploration of the Kepler telescope data to discover earth-like planets in the close Milky Way proximity.

http://www.planetary.org/explore/topics/extrasolar_planets/extrasolar/transit_photometry.html

Extrasolar Planets: Transit Photometry Method for Finding Earths; from Planetary Society.

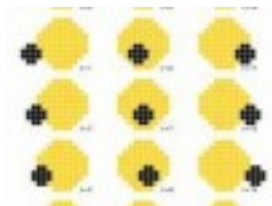
http://www.ati.ulg.ac.be/TRAPPIST/Trappist_main/Home.html

TRAPPIST: TRAnsitng Planets and Planetesimals Small Telescope



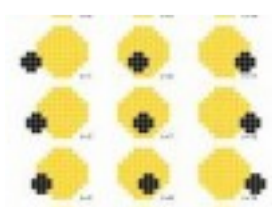
http://sunearthday.nasa.gov/2012/articles/ttt_75.php

Mathematical Problems Featuring Transit Applications, by Dr. Sten Odenwald. Transit Math book from NASA opens with dozens of math problems and answers related to eclipses, transits, and occultations, with an emphasis on transits of Venus through the centuries. Problems align with AAAS Project: 2061 Benchmarks as detailed in a Mathematics Topic Matrix. The PDF document includes summaries of the historic aspects of the transit and a diverse collection of modern images and historic images alike. Stated emphasis for Transit Introduction is on grades 3-8, while Transit Math challenges grades 5-12. "The problems were created to be authentic glimpses of modern science and engineering issues, often involving actual research data...The problems were designed to be 'one-pagers' with a detailed Answer Key as a second page."



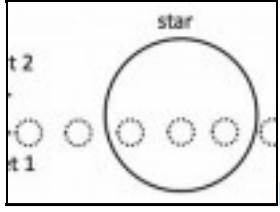
<http://transitofvenus.nl/wp/2011/11/08/classroom-activities/>

Free workbook (<http://www.transitofvenus.nl/files/TransitOfVenus.pdf>) from Steven van Roode addresses the frequency of the transit of Venus, angular measurements, parallax measurements to establish distances, and finding the physical properties of exoplanets from light curves. Also available as hard copy.



[education/science-math/316-activity-pixel-count](#)

Pixel Count Activity has student plot the decrease in light received from a star that has a planet transiting it; single activity is adapted from Steven van Roode workbook.



http://universe.utoronto.ca/wp-content/uploads/2012/02/12feb17_tdsb_eureka_transit_worksheet_v1.pdf

Using Transits to Find Exoplanets, from University of Toronto, gives diagrams and examples from which students derive answers and plot graphs about exoplanets.

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