

PRIMEFOCUS

Tri-Valley Stargazers



June 2011



Meeting Info

What:

Kepler's Vision: Exoplanets and Songs of the Stars

Who:

Dr. Steve Bryson

When:

June 17, 2011
Doors open at 7:00 p.m.
Lecture at 7:30 p.m.

Where:

Unitarian Universalist
Church in Livermore
1893 N. Vasco Road

Inside

News & Notes	2
Calendar of Events	3
What's Up	6
Journal Club	6
NASA's Space Place	7
Membership/Renewal Application	8

June Meeting

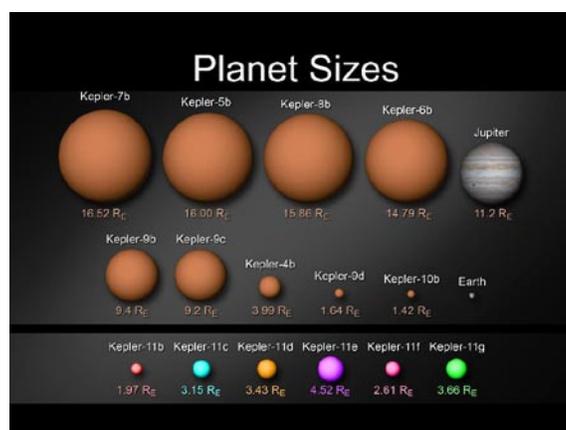
Kepler's Vision: Exoplanets and Songs of the Stars

Dr. Steve Bryson

Since mid-2009, NASA's Kepler space telescope has been constantly watching about 160,000 stars, looking for signs of planets orbiting those stars. As of February 2, 2011, 1235 candidate planets have been identified, 16 of which have been confirmed as exoplanets. This talk will start with the design and operation of the Kepler mission. We'll see how Kepler attains the amazing sensitivity required to see the very small dimming caused by a

planet passing in front of its star. We'll talk about the ways that we can be fooled by phenomena that mimic planets and how the Kepler team distinguishes these from planets. How a planet graduates from being a candidate to being confirmed is next, including the significant challenge of confirming Kepler's ultimate goal: Earth-size planets in Earth-like orbits around Sun-like stars. Along the way we'll hear about the revolution in our detailed understanding of the stars themselves: Kepler is so sensitive that we can detect stellar vibrations telling us what's happening inside the stars. We'll end with a survey of what Kepler is teaching us about planets around other stars, including multiple planet systems, Earth-size planets, and planets in the habitable zones of their stars. For more information see: <http://kepler.nasa.gov/>

Steve Bryson is Target Scientist for the Kepler Mission to find Earth-size planets around Sun-like stars. He also leads the false-positive identification effort and monitors Kepler performance at the pixel level. Prior to joining Kepler in 2005, Steve developed new, high-accuracy numerical methods for solving nonlinear differential equations and participated in the early development of virtual reality. Steve is an avid amateur astronomer, and worked at Chicago's Adler Planetarium in the late 70's. Steve has a PhD in computational mathematics from Stanford University, and for more than 10 years taught modern physics in adult education classes at the San Francisco Academy of Sciences. An active amateur musician/composer, Steve plays piano, organ, guitar and lute. His compositions have been used in planetarium sky shows and in various web sites, including the Kepler Carl Sagan Essay Contest.



Caption: Diagram showing relative sizes of all confirmed Kepler planet discoveries as of 2011 Feb 2, and comparison with Earth and Jupiter. Image credit: NASA.

News & Notes

2011 TVS Meeting Dates

The following lists the TVS meeting dates for 2011. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting.

Lecture Meeting	Board Meeting	Prime Focus Deadline
Jun. 17	Jun. 20	
Jul. 15	Jul. 18	Jun. 24
Aug. 19	Aug. 22	Jul. 29
Sep. 16	Sep. 19	Aug. 26
Oct. 21	Oct. 24	Sep. 30
Nov. 18	Nov. 21	Oct. 28
Dec. 16	Dec. 19	Nov. 25

Money Matters

Treasurer David Feindel indicates that as of February 12, 2011 the TVS account balances are:

Checking	\$5,823.09
CD #1	\$3,763.79 rolled over 2/17/2011
CD #2	\$2,656.35 rolled over 11/27/2010

TVS Positions Available

We still need people to fill the positions of Vice-President and Secretary, and to serve on the Board of Directors. Please consider offering some of your time to influence the future direction of TVS. If you wish to help with any of these positions, please contact any officer or board member.

H2O Open House Dates

On July 23 TVS will hold Open House's to visit the club observing site, H2O. Our Open Houses are meant to give members a guided tour of the site, and an opportunity to observe under dark skies. You will have the opportunity to observe through the club's 17.5-inch equatorially mounted Newtonian telescope, housed in a permanent roll-off roof observatory.

Non-key holding members and the general public must be escorted to, while at, and from the site by key holding members -- NO EXCEPTIONS. For those members who have yet to check out the site, it is about an hour's drive south of Livermore, along a very windy road. It is a primitive site—no water or electricity, with a couple of outhouses. What it lacks in amenities, it makes up for in dark skies.

Those interested should meet at the corner of Mines Road and Tesla Road at 6:45 pm. The caravan will depart at 7:00. There is a \$3 per car fee at H2O, which is part of our rental agreement for the hilltop.

Use Caution at H2O

On May 29 I (Ken S.) was at H2O by myself, leaving there at about 12:30am because of a coyote who seemed pretty menacing. I was observing with my Dob near the Herb Quick observatory when the coyote first showed up at about 11pm. I was looking through the eyepiece when I heard a long growl on the parking level above. At first I thought it might be a mountain lion, but the tone was fairly high pitched. My head-mounted red light was on, and I could see two closely spaced red eyes looking back at me, which also gave me hope that it wasn't a mountain lion. I made a fair bit of noise and made my way slowly to the safety of my car. The coyote paralleled my movements, and then came down to the level I was on. I put my car headlights on and (s)he was about 15-20 feet in front of my truck. I lightly beeped the horn a few times, turned the headlights on and off, and then threw a few rocks his (her) way. Eventually (s)he moved into the brush below, but the growl persisted. I waited about 10 minutes before heading back to the scope. At about 11:30 the coyote showed up again, this time from behind the Herb Quick dome, though I could not see him (her). The nasty growl let me know (s)he was close. I sent a few rocks in that direction and the noise stopped. Then about 11:45 the growling came from that direction again, but I could tell that it was closer. Figuring that the coyote was getting bolder and closer each time, I packed-up and left the site. This is the first time in 20 years that I felt unsafe at the site, and with no means to protect myself I felt it prudent to leave. It is possible that there may be a den with some pups near by, and the coyote was feeling threatened. It was a shame to have to leave, as the wind had settled down, the seeing had improved, and the transparency was better than expected.

Lava Beds National Monument: Assistance Wanted

On July 2nd, Lava Beds National Monument (LBNM) is having its First Annual Astronomy Day and Night Sky Event. LBNM is working on becoming a dark sky park and to this end we have installed many high efficiency, low glare lights. The afternoon/evening will feature a few astronomy/night sky activities/talks, an evening program and finally a chance to look through our two (basic) telescopes. In order to make this event a greater success we are hoping to interest night sky aficionados into attending this event to participate in our activities and see our Mag 6.5 dark skies in all their glory. If you would be willing to volunteer to provide the public with varied telescopes and/or your invaluable expertise, please call Ranger Carolyn Hunt at 530-667-8114 or e-mail her at Carolyn_Hunt at nps.gov During the day have fun hiking the

Header Image: Artists rendering of the Kepler spacecraft.
Credit: NASA (<http://kepler.nasa.gov/Mission/QuickGuide/MissionDesign/PhotometerAndSpacecraft>)

News and Notes (continued)

lava tubes that crisscross the park. The caves are cool and give respite from the summer daytime temperatures.

TVS Yosemite Dates

TVS' annual public star party weekend at Glacier Point will take place on September 2-4, the Labor Day weekend. TVS puts on a star party both nights in exchange for free camping at the Bridalveil Campgrounds. The Moon is close to First-Quarter, setting between ~10:20pm and midnight during this weekend. The public star party ends at about midnight, and then the rest of night is yours to observe/image under the excellent dark skies of Yosemite National Park. Those interested in participating should contact Bob McKoon (rmckoon at yahoo.com).

Calendar of Events

June 15, Noon - 1pm

What: Fly Cheap, Fly Often, Fly Safe — Science research & education opportunities on commercial sub-orbital vehicles

Who: Kim Ennico, Ames

Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview

Cost: Free

Access to suborbital space, the realm above 100 km altitude, by vehicles not traveling fast enough to go into orbit about the planet, has a long history, from the 1950's early unmanned scientific sounding rockets for meteorological and upper atmosphere studies, to Alan Shepard's historic Freedom 7 flight 50 years ago, continuing today with multi-science disciplined

sounding rocket programs launched from spaceports around the globe. These vehicles follow a parabolic-arc trajectory that also provides many minutes of low gravity enabling "microgravity" experiments. Access to suborbital space is soon to be revolutionized by a series of frequent flights by new providers from the commercial space sector. Dr. Ennico's talk will highlight these companies, their vehicles and their current timetables.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

June 21 - September 4, Tues.-Fri.: Noon - 3pm; Sat.-Sun: 1pm - 5pm

What: Solar Viewing

Who: Chabot

Where: 10000 Skyline Boulevard, Oakland, CA 94619

Cost: Free

At Chabot, when the Sun's up, the Sun comes out! With a spectrum of solar viewing aids, including Sun-watching scopes and filters as well as near-live satellite images and movies, explore the many faces of Earth's star. Sunspots, prominences, flares, and coronal mass ejections are all living solar events that you may witness personally. Chabot volunteers and staff will guide you through your personal solar experience, helping to give you a new appreciation of the power, the magnitude, and the sheer beauty of the Sun. Come and see... safely...

For more information see: <http://www.chabotspace.org/solar-viewing.htm>, or call (510) 336-7300.

June 22, Noon - 1pm

What: Laser Plasma Spectrochemistry

continued page 4

Officers

President:

Chuck Grant
cg@fx4m.com
925-422-7278

Vice-President:

unfilled

Treasurer:

David Feindel
feindel1@comcast.net

Secretary:

unfilled

Volunteer Positions

Librarian:

Jim Alves
ajaengr@yahoo.com
209-833-9623

Newsletter Editor:

Ken Sperber
sperbs13@yahoo.com
925-361-7435

Program Director:

Jim Alves
ajaengr@yahoo.com

Loaner Scope Manager:

John Swenson
johnswenson1@comcast.net

Webmaster:

Hilary Jones
hdjones@pacbell.net

**Observatory Director/
Key Master:**

Chuck Grant

Public Star Party Chair:

Wayne Miller
starpartytvs@gmail.com

Historian:

unfilled

Mentor:

Mike Rushford
rushford@eyes-on-the-skies.org

Refreshment Coordinator:

Laurie Grefsheim

Web & E-mail

www.trivalleystargazers.org
tvs@trivalleystargazers.org

Eyes on the Skies

Eyes on the Skies is a robotic solar telescope run by Mike Rushford (rushford@eyes-on-the-skies.org). You may access it by visiting www.eyes-on-the-skies.org.

TVS E-Group

So how do you join the TVS e-group, you ask? Just send an e-mail message to the TVS e-mail address (trivalleystargazers@gmail.com) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.

Calendar of Events (continued)

Who: Richard Russo, UC Berkeley Lawrence Berkeley Lab and Applied Spectra
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

Laser ablation (LA) with optical (LIBS) or mass (ICP-MS) detection is an excellent technology for direct sample analysis. Benefits of laser ablation include no sample preparation, no consumables, and real-time analysis. In general, LIBS provides ppm sensitivity for elemental analysis and molecular characterization based on database libraries and chemometrics. LA-ICP-MS provides ppb elemental analysis and isotopic ratios. New research shows the ability to perform isotope measurements in the laser plasma at atmospheric pressure. Dr. Russo will present a general overview of the underlying mechanisms for laser ablation, attributes of LIBS and LA-ICP-MS, the ability to measure isotopic signatures in laser ablation plasmas at atmospheric pressure, and the commercialization of analytical instruments for such measurements.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

June 29, Noon - 1pm

What: Looking back in time 13 billion years to when the Universe was young: searching for the earliest galaxies with Hubble
Who: Garth Illingworth, Lick Observatory, UC Santa Cruz
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

The Hubble Space Telescope recently finished taking the deepest image of the Universe ever in the near-infrared. This unique new image was assembled from data taken in 2009 and 2010, and has enabled us to look billions of years back in time to find some of the earliest galaxies that were forming when the Universe was very young, just 5% of its current age. These tiny galaxies are the seeds that grew into the myriad great galaxies of today, like the nearby Andromeda galaxy and our own Milky Way. In this talk, Dr. Illingworth will describe how we are exploring a never-before-seen time period in the Universe and learning about the origins of galaxies.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

July 6, 7:30pm

What: Moon Express - Pioneering the New Space Frontier
Who: Bob Richards, Moon Express, Inc.
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

No details of this talk are available.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

July 9, 8:30pm

What: Nature's Biggest Lenses
Who: Dr. Anja von der Linden, Stanford University
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Gravitational lensing allows us to study dark matter, find exoplanets, and see the first objects in the universe.

For more information see: <http://www.mttam.net/astronomy/schedule.html>

July 11, 7:30pm

What: Why Are There Stars?
Who: Dr. Steven W. Stahler, Dept. of Astronomy, University of California, Berkeley
Where: California Academy of Science, 55 Music Course Dr., Golden Gate Park, San Francisco, CA
Cost: Adults \$12, Seniors \$10, Academy members \$6. Reserve a Space Online or call 800-794-7576

Our galaxy, the Milky Way, contains one hundred billion stars and continues to form them today, some relatively near us. While nature clearly has no difficulty making these objects, astronomers have long struggled to understand this fundamental process. Stahler will describe the great strides we have made in understanding the process of star formation as a result of both improved observations and basic theoretical insights that have been developed in the past two decades. While mysteries remain, we now see how a star like our own Sun comes into existence.

See <http://www.calacademy.org/events/lectures/> for the lecture topic.

July 13, Noon - 1pm

What: Is there methane on Mars?
Who: Kevin Zahnle, Space Science Division, NASA Ames Research Center
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountainview
Cost: Free

Methane has been reported by several observers as a short-lived trace gas in the martian atmosphere. If verified, this would be an extraordinary result. Is the evidence for methane extraordinary? In this talk, Dr. Kevin Zahnle will discuss why one should remain skeptical of Methane on Mars.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.



Caption: On the night of May 29, Konrad Thuemer took this widefield image of the Virgo Cluster using his Orion ED80mm refractor and Canon 35mm DSLR. Six 2-minute images, taken at ISO 6400, were combined. This is a 2x enlargement of the image he posted. It has been rotated to be consistent with the close-up image below.



Caption: On the same night that Konrad took the image above, Gert Gottschalk took this image of the core of the Virgo Cluster using his AP130mm. This region corresponds to the lower-right quadrant of Konrad's image.

What's Up by Ken Sperber (adapted from The Year in Space and S&T)

All times Pacific Daylight Time, unless otherwise noted.

June

15 Wed Full Moon (1:14pm)

19-22 Sun- Mars and The Pleiades are within 5 degrees of each other, a fine binocular view (pre-dawn)

23 Thur Last-Quarter Moon (1:48am)

26 Sun Jupiter 5 degrees south of the Moon

28 Tue Pluto at opposition; Mars about 2 degrees south of the Moon

July

1 Fri New Moon (1:54am)

1-19 Fri- Mercury about 8 degrees above the west-northwest horizon about one-half hour after sunset

2 Sat Mercury 5 degrees north of the Moon

4 Mon Earth at aphelion

6 Wed Mars 5 degrees north of Aldebaran

7 Thur First-Quarter Moon (11:29pm) at perigee

8 Fri Saturn 8 degrees north of the Moon

10 Sun Uranus appears stationary

11 Mon Antares about 2 degrees below the Moon

14 Thur Full Moon (11:40pm)

Journal Club by Ken Sperber

Strange Stars

This month's column consists of a trio of reports on strange stars.

Scientists have reported finding a neutron star that weighs nearly 2 solar masses. The mass of the neutron star is accurately known since it is orbited by a white dwarf every nine days. This is considered very massive for a neutron star, as most are close to 1.4 solar masses in size. This neutron star, PSR J1614-2230, is a pulsar, a rapidly spinning neutron star (like that in the Crab Nebula), which in this case spins 317 times per second! It is believed that this fast rotation rate developed as a consequence of the exchange of angular momentum as the neutron star siphoned material off of the white dwarf companion. This result is borne out by numerical simulations that demonstrate the plausibility of this scenario, including the rarity with which it occurs. For more information see: <http://www.physorg.com/news/2011-05-probing-extreme-neutron-stars.html#comments>

Speaking of the Crab Nebula pulsar, it continues to confound scientists. About a year ago it was discovered to be emitting gamma-ray pulses that fluctuated every few days. However, this Spring the flares were five times more powerful than those observed previously, and they fluctuated on a time scale of

1-3 hours. The fluctuation time is important, as it constrains the size of the region over which the emission is taking place. In this case, the size of the emitting region must be smaller than the distance that light travels in 1-3 hours. Theoretical models suggest that the gamma-ray flares arise due to the acceleration of charged particles around the intense magnetic fields. The particle energy is further intensified as they interact with violent rearrangements of the magnetic field. See Science News, June 4, 2011 for more information.

Kepler is finding types of variable stars that have never before been observed. As discussed by Phil Scherrer in his April 2011 presentation to TVS, variations in a star's brightness can be caused by oscillations/pulsations of the star. Kepler has found a star that pulsates in a very strange fashion, with the northern and southern hemispheres alternating at rotating at different rates! Another object, KOI-54, brightens rapidly every ~42 days. It has been determined that this object is actually 2 stars in an extreme elliptical orbit. At closest approach the stars pass within about 9 million km of each other, and they "roast one another on their facing sides and heat up producing the brightness change." See Science News, June 4, 2011 for more information.



Finding Planets among the Stars

By Dr. Tony Phillips

Strange but true: When it comes to finding new extra-solar planets, or exoplanets, stars can be an incredible nuisance.

It's a matter of luminosity. Stars are bright, but their planets are not. Indeed, when an astronomer peers across light years to find a distant Earth-like world, what he often finds instead is an annoying glare. The light of the star itself makes the star's dim planetary system nearly impossible to see.

Talk about frustration! How would you like to be an astronomer who's constantly vexed by stars?

Fortunately, there may be a solution. It comes from NASA's Galaxy Evolution Explorer, an ultraviolet space telescope orbiting Earth since 2003. In a new study, researchers say the Galaxy Evolution Explorer is able to pinpoint dim stars that might not badly outshine their own planets.

"We've discovered a new technique of using ultraviolet light to search for young, low-mass stars near the Earth," said David Rodriguez, a graduate student of astronomy at UCLA, and the study's lead author. "These M-class stars, also known as red dwarfs, make excellent targets for future direct imaging of exoplanets."

Young red dwarfs produce a telltale glow in the ultraviolet part of the electromagnetic spectrum that Galaxy Evolution Explorer can sense. Because dwarf stars are so numerous—as a class, they account for more than two-thirds of the stars in the galaxy—astronomers could reap a rich bounty of targets.

In many ways, these stars represent a best-case scenario for planet hunting. They are close and in clear lines-of-sight, which generally makes viewing easier. Their low mass means they are dimmer than heavier stars, so their light is less likely to mask the feeble light of a planet. And because they are young, their planets are freshly formed, and thus warmer and brighter than older planetary bodies.

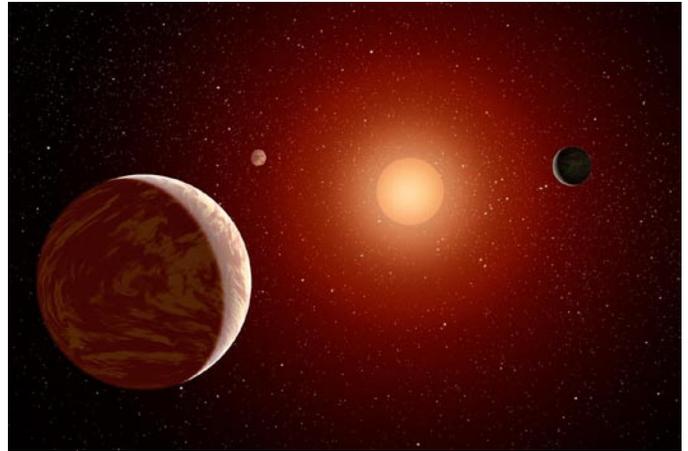
Astronomers know of more than five hundred distant planets, but very few have actually been seen. Many exoplanets are detected indirectly by means of their "wobbles"—the gravitational tugs they exert on their central stars. Some are found when they transit the parent star, momentarily dimming the glare, but not dimming it enough to reveal the planet itself.

The new Galaxy Evolution Explorer technique might eventually lead to planets that can be seen directly. That would be good because, as Rodriguez points out, "seeing is believing."

And it just might make astronomers feel a little better about the stars.

The Galaxy Evolution Explorer Web site at <http://www.galex.caltech.edu> describes many of the other discoveries and accomplishments of this mission. And for kids, how do astronomers know how far away a star or galaxy is? Play "How Old do I Look" on The Space Place at <http://spaceplace.nasa.gov/whats-older> and find out!

This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption: Artist's rendering: Exoplanets are easier to see directly when their star is a dim, red dwarf.

Tri-Valley Stargazers
P.O. Box 2476
Livermore, CA 94551



PRIMEFOCUS

Tri-Valley Stargazers Membership Application

Member agrees to hold Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function.

Name _____ Phone _____ e-mail _____

Address _____

Do not release my: _____ address, _____ phone, or _____ e-mail information to other TVS members.

- Membership category: _____ \$5 Student.
_____ \$30 Basic. You will receive e-mail notification when the PDF version of Prime Focus is available for download off the TVS web site.
_____ \$10 Hidden Hill Observatory (H2O) yearly access fee. You need to be a key holder to access the site.
_____ \$20 H2O key holder fee. (A refundable key deposit—key property of TVS).
_____ \$40 Patron Membership. Must be a member for at least a year and a key holder.
_____ \$34 One year subscription to Astronomy magazine.
_____ \$60 Two year subscription to Astronomy magazine.
_____ \$32.95 One year subscription to Sky & Telescope magazine. Note: Subscription to S&T is for new subscribers only. Existing subscribers please renew directly through S&T.
\$ _____ Tax deductible contribution to Tri-Valley Stargazers.
\$ _____ TOTAL – Return to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551

Membership information: Term is one calendar year, January through December. Student members must be less than 18 years old or still in high school.