PRIMEFOCUS

Tri-Valley Stargazers

March 2020

Meeting Info:

Who:

When:
March 20, 2020
Doors open at 7
Meeting at 7
Lecture at

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Cancelled

Inside

March Meeting: CANCELLED

In consideration of the health of our members and guests, this month's meeting has been cancelled. If you are considering attending any of the functions listed in the "Calendar of Events" please check to see if they are cancelled.

Don't fret, you can still get your astronomical fix this month, as there is interesting information and articles inside this issue of PrimeFocus. See the list of star parties for the upcoming summer, learn how to get more involved with the club in the "President's Corner," appreciate the outreach of the club in the report on the "Expanding Your Horizons Fair," and in "Journal Club" learn about the latest research investigating the dimming of Betelgeuse, Betelgeuse, Betelgeuse!

Is there a Star Party in Your Future? There Should Be!

By Dr. Curtis Macchioni

The severe light pollution levels in the urban and suburban are we live make it nearly impossible to see the Milky Way and greatly l else that we are able to see from our backyards or even nearb lution filters and narrow band imaging help to cut through ckground noise, but they can not truly reproduce the experie e night sky from a Bortle 1 or 2 location. This is why like-min nomers gather together at almost monthly star parties held al ry at remote locations in the four corners of the country (Mai ys, Washington State, Southern California) and all points in be ven't availed yourself of one of these multi-night events you a a great opportunity to be blown away at how the night sky w . Even if you have attended a major star party or two, the talk est and should help you in planning your next star party outi

In this talk I will provide se you to get out of your comfort zone and attend your first remo . The most obvious is dark skies, but how dark? In addition t are the many other great reasons to attend your first multi-d e'll talk about those as well. And no star party would be com me great daytime adventures. We'll look at some examples f ent star parties.

If you h ed one of these multi-day star parties you will have lots of q you may have avoided attending because you are unsure of wha ow do I plan my adventure? What should I bring? Where will I sleep? out food and water? Will there be bathrooms and showers? What else do I ne d to bring to make sure that I have a good time? While every star party is unique, this talk will go over the common features of any start party to give you a leg up on preparing to have a great time. We will discuss star party etiquette and

To Be RESCHEDULED

News & Notes

2020 TVS Meeting Dates

Below are the TVS meeting dates for 2020. 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**
	Mar. 23	
Apr. 17	Apr. 20	Apr. 03
May 15	May 18	May 01
Jun. 19	Jun. 22	Jun. 05
Jul. 17	Jul. 20	Jul. 03
Aug. 21	Aug. 24	Aug. 07
Sep. 18	Sep. 21	Sep. 04
Oct. 16	Oct. 19	Oct. 02
Nov. 20	Nov. 23	Nov. 06
Dec. 18	Dec. 21	Dec. 04

Money Matters

As of the last Treasurer's Report on 02/24/20, our club's checking account balance is $12,871.51.

TVS Welcome to New Members

TVS would like to welcome new members Anirudh and Kirin Adhikary, Gordy Cooper, Gene Cross, Michael Evans, Allen Rush, and Yuanyi Xue. Please say hello and chat with them at upcoming club meetings.

H2O and Del Valle Lock Combinations Changed

As in customary in early March, the lock combinations have been changed at the H2O and Del Valle sites. The updated combinations have gone out via email to all H2O keyholders and registered Del Valle users. If someone thinks they should have gotten a combination and didn't, please contact TVS Secretary Ross Gaunt (secretary"at"trivalleystargazers.org).

TVS Star Party Descriptions

Del Valle star parties are also public outreach events. They are jointly hosted with the EBRPD and held at the Arroyo Staging Area. The public is invited for the first 1.5-2 hours, while club members can stay the remainder of the night.

Tesla Vintners star parties are open to only club members and their guests. These star parties end at midnight, but participants can leave earlier, should they wish.

H2O star parties are open to the public. The open house ends at midnight, and all participants are encouraged to stay the duration. The drive to H2O takes about 1 hour, and the caravan leaves promptly from the corner of Mines and Tesla Rds.

Outreach Star Party Schedule

April 23: Muslim Community Center, 5724 West Las Positas, Pleasanton, set-up 7:15pm

April 24: Sycamore Grove Park, 1051 Wetmore Rd., Livemore, set-up 7:00pm

May 2: Bankhead Theater Innovation Fair 10am-3pm

August 22: Bankhead Theater

Contact Eric Dueltgen if you are interested in participating (outreach"at"trivalleystargazers.org).

2020 Club Star Party Schedule

April 25: Del Valle, Arroyo Road Staging Area, set-up 7:00pm

May 9: H2O

June 13: Tesla Vintners

July 25: Del Valle Arroyo

August 15: H2O

September 12: Tesla Vintners

September 19: Del Valle Arroyo

October 17: Tesla Vintners

Barcroft High-Altitude Star Party: Reservations

Reservations for the Eastbay Astronomical Society's Barcroft High-Altitude Star Party are now open to members of both the EAS and Tri-Valley Stargazers clubs. This year's event will be held from Sunday August 16 through Friday August 21 (with departure by noon of Saturday August 22). That's six nights.

Before sending payments for reservations ($60 per night, per person), even if you've been there before, please contact Don Saito FIRST (donsaito@yahoo.com) to ensure the dates you wish to attend are available. You will also be asked to read the Barcroft Write-up, as it provides the information you'll need to have a safe, comfortable stay, and what is expected of guests to this University of California research facility.

Space at Barcroft is limited to a maximum of 12 people per day, so to ensure you get the days you want, make your reservations early.

Barcroft is one the premier amateur astronomy view sites in the world, and it's less than a day's drive from the Bay Area to its location in the White Mountains.

Reservations and information can be found at: http://eastbayastro.org/events/ where links to other star parties can be found, including Spring CalStar and the Golden State Star Party.

Calendar of Events

March 24, 7:15pm

What: All About the Chabot Space & Science Center

Header Image: Some of the TVS members who attended the 2019 Golden State Star Party. Credit: Ken Sperber

Calendar of Events (continued)

Who: Adam Tobin, Executive Director/CEO, Chabot Space & Science Center
Where: Mt. Diablo Astronomical Society, Lindsay Wildlife Experience, Community Room, 1931 First St., Walnut Creek, CA 94597
Cost: Free.

Details not available.

For more information see: https://nightsky.jpl.nasa.gov/event-view.cfm?Event_ID=104036

April 6, 7:30pm

What: Are Red Dwarf Planets Habitable?
Who: Prof. Gibor Basri, University of California
Where: California Academy of Sciences, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA
Cost: Advanced ticketing required. Academy members $12, Seniors $12, General $15. Reserve a space online or call 1-877-227-1831.

The most common stars in the Universe are red dwarfs. These are small, faint, cool stars that range from one-tenth to one-half the diameter of the Sun and which have extraordinarily-long lifetimes. Recent surveys have discovered Earth-size planets around several red dwarf stars, including Proxima Centauri (the nearest star to the Sun). What might conditions be like on worlds orbiting such unusual stars, and could any of them be habitable? Have any been identified as "best candidates" to consider as abodes for life?

April 11, 10:00am-5:00pm

What: Apollo 13 50th Anniversary
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Members Free, Adult $18, Youth $14, Seniors $15

50 years after launch, we're looking back on the Apollo 13 mission, source of the infamous "Houston, we have a problem" message. Join us for a day of astronaut activities and a special screening of Apollo 13 (1995).

See http://www.chabotspace.org/events.htm for more information, or call (510) 336-7373.

April 13, 7:30pm

What: Interspecies Communication and the Search for Extraterrestrial Intelligence
Who: Dr. Laurance Doyle, SETI Institute
Where: San Francisco Jazz Center
Cost: On sale 1 month before the event.

Dr. Laurance Doyle is an astrophysicist and principal investigator at SETI (Search for Extraterrestrial Intelligence) with expertise in diverse subjects including extrasolar planets, signal processing and communications theory. He has worked on image analysis from the Voyager mission and Halley's Comet, developed statistical methodologies to search for extrasolar planets, and is applying those tools to analyze complex patterns and search for meaning in animal communications.

For more information see: http://longnow.org/seminars/02020/apr/13/interspecies-communication-and-search-extraterrestrial-intelligence/

April 21, 7:30pm-9:30pm

What: San Jose Astronomical Association Imaging Meeting
Who: Bruce B.

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Calendar of Events (continued)

Where: Houge Park, 3972 Twilight Drive, San Jose, CA
Cost: Free

The Imaging SIG meets roughly every month at Houge Park to discuss topics about imaging. The SIG is open to people with absolutely no experience but want to learn what it's all about, but experienced imagers are also more than welcome, indeed, encouraged to participate.

For more information, see: https://www.meetup.com/SJ-Astronomy/events/lkxnnmybcfbwb/

The President's Corner: Getting Involved in Small Ways By Roland Albers

TVS is a completely volunteer run organization, so we rely upon the involvement of our members for the success of all our activities. I know that many of you would like to contribute to the club by becoming involved but can't volunteer much time due to the demands of your work and your family commitments. Fortunately, there are many ways to get involved with TVS that don't involve a lot of time. Here are a few examples:

•Give a short presentation at a club meeting. Be it a monthly "What's Up" talk about a recent observing session or your upcoming observing plans, a Show & Tell about some newly acquired equipment or software, or an astronomy-related Trip Report, your fellow club members would love to hear from you. Member presentations need be only a few minutes long and can be prepared in .pdf or PowerPoint format. If interested, please contact me at president"at"trivalleystargazers .org.

•Contribute an article to our newsletter. If you'd like to write about an astronomy-related topic, please consider contributing to our newsletter. Articles need not be long, and all articles will reach our full club membership. If interested, please contact our Newsletter Editor, Ken Sperber, at newsletter"at" trivalleystargazers.org.

•Participate at an outreach event. TVS holds star parties throughout the year for a wide variety of educational and recreational groups. These events are an opportunity for our members to share their enthusiasm for the night sky with the public and to promote amateur astronomy. If you are interested in helping out at an event, please contact our Outreach Coordinator, Eric Dueltgen, at outreach"at"trivalleystargazers. org.

•Suggest a featured speaker for a TVS Monthly Meeting. You have the ability to shape the focus of the monthly club meetings and broaden the scope of astronomical topics covered by presenters. If you have a suggestion for a featured speaker, please contact our Programs Coordinator, Dan Helmer, at programs"at"trivalleystargazers.org.

•Start or contribute to a topic on our email group. All members are encouraged to become members of our groups.io email group, "trivalleystargazers". Registration is free and it puts you in touch with a large portion of the club membership. Feel free to share news about upcoming events in the night sky, club activites, or anything else astronomy related.

•Invite a friend to a club meeting or a Del Valle star party! It only takes a minute, and you could possibly inspire a new amateur astronomer.

Our club is only what we make of it. If you can contribute an hour or two of your time now and then, please consider enriching TVS with your involvement. As a side benefit, becoming involved is also a great way to meet other club members. And you'll probably also learn something new about astronomy in the process!

Expanding Your Horizons Fair
By Jenny Siders

TVS had a very successful table at the Expanding Your Horizons Fair, at Dublin High, on February 22, 2020. Jennifer Siders and her student, Signa Mascot, talked to close to 300 girls (6th-9th grade) about astronomy. We had 2 small spectroscopes for the girls to look through and observe the spectrum of sunlight and the LED lights above our table. The girls saw that while the sunlight produced a continuous rainbow (spectrum), the LED light produced 5 bars, each a different color. So without touching the light bulb we were able to determine that it had 5 different LEDs in it and likewise we can look at the spectrum of stars and determine what they are made of. Then we used the Key to the Rainbow outreach materials from the Night Sky Network to show a simplified spectrum of our sun with absorption lines and how they are used to determine the elements in the outer layer of the sun. We were also able to show them that the same method can be used to determine the atmosphere of exoplanets (very few had even heard of exoplanets).

Image Caption: Signa Mascot, a student of TVS Member Jennifer Siders, assisted in outreach at the Expanding Your Horizons Conference. Image Credit: Jennifer Siders

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Expanding Your Horizons Fair
(continued)

All the brochures and business cards that we had on the table were gone by the end of the 2 hours! Hopefully we'll see some of these kids at future meetings and star parties. This event is a great way to reach a lot of girls and we should definitely participate in it again next year and put on a workshop (90 min class for the girls), along with the table.

Co-Chairs of the 2020 Expanding Your Horizons Fair, Sarah Gonzalez and Sheila Dixson, wrote TVS to show their appreciation for the effort TVS put forward, stating: "We wanted to take a moment to thank all of you for participating in the 2020 Expanding Your Horizons Career Fair. Thanks to you and your involvement, our event was a huge success. Please be sure to extend our thanks to the volunteers who helped at your booth. Below are some stats from the event:

317 registered attendees, grades 6-9 from 48 schools were represented, 17 workshops, 16 career fair booths, and lots of fun!

If you have any feedback, we'd love to hear from you so we can improve the experience for next year's attendees. Thanks again and we hope to see you in 2021."

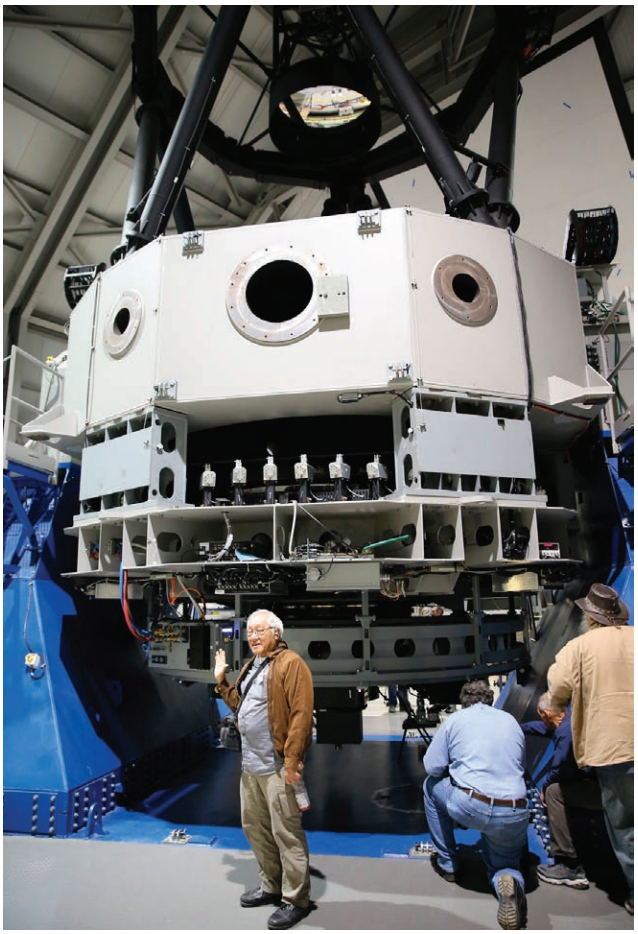
Journal Club **By Ken Sperber**

This autumn and winter one of the hot news topics has been the dimming of Betelgeuse, a red supergiant (RSG) star located in the constellation of Orion. While on the main sequence, Betelgeuse was believed to have had a mass of about 20x that of the Sun. Massive stars such as Betelgeuse (and up to 40x solar mass) only remain on the main sequence for 5-20 million years since the nuclear fusion in their cores proceeds at a much more rapid pace compared to the Sun due to the higher temperature and density in their cores.

When such massive stars have exhausted the hydrogen fuel in their cores they exit the main sequence. They then fuse hydrogen in a shell around the helium core, at which time the star begins to cool and expand. While the temperature of Betelgeuse is ~3650K (the Sun has a temperature of ~5000K), its radius is ~887x that of the Sun. Though cooler than the Sun, with its larger surface area it is ~10,000x more luminous than the Sun. With such a large diameter the surface gravity is low and with the large luminosity RSG stars shed mass at prodigious rates. As this mass loss continues, helium fusion in the core only lasts about 1 million years, with fusion of carbon and subsequently heavier elements progressing rapidly and in only a few thousand years the star explodes as a Type II Supernova, typically when the mass has reduced to ~10x solar.

Mass loss could be responsible for the dimming of Betelgeuse, since this would obscure light emitted from the star. The optical photons would be absorbed by the shed material and remitted at longer infrared wavelengths. A second alternative is deep convection, which is typical in RSG stars. In this case material from deep within the star would rise to the photosphere and cool before sinking back down. With cooler temperatures less optical light would be emitted. The third possibility is intrinsic normal mode pulsations caused by sound waves that result in the star expanding and contracting, thus causing variations in temperature and luminosity.

To investigate these hypotheses for the recent dimming of Betelgeuse, Levesque and Massey (2020, https://arxiv.org/abs/2002.10463), used the Discovery Channel Telescope (see image below), a 4.3m telescope operated by Lowell Observatory and located about 50 miles south of Flagstaff, AZ, to take a spectrum of Betelgeuse on February 15, 2020. This spectrum was compared with one obtained in 2004. The spectral peaks in the two spectra are very similar, but that from 2020 shows more Titanium oxide (TiO) compared to 2004. Evaluation of the spectral lines of TiO is a well-established method for determining the temperature of RSG stars. The authors found Betelgeuse to be ~25K cooler in 2020 compared to 2004. This reduction in temperature was determined to be too small to account for Betelgeuse's observed 1.6 magnitude dimming, indicating that normal mode oscillations or convective overturning are insufficient to explain the dimming.



Caption: Frequent TVS presenter Ken Lum stands in front of the 4.3m Discovery Channel Telescope. Credit K. Sperber

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

All times are Pacific Daylight Time

March

16	Mon	Last-Quarter Moon (2:34am)
18	Wed	The Moon, Mars, and Jupiter form a triangle with Saturn ~7^{o} to their left (Dawn)
19	Thu	Algol at minimum brightness for ~2 hours centered on 10:40pm
20	Fri	Mars catches up to Jupiter, less than 1^{o} apart (Dawn)
21	Sat	Thin crescent Moon and Mercury are ~6^{o} apart in the east-southeast (Dawn)
24	Tue	New Moon (2:28am)
24	Tue	Venus, high in the west, is at greatest eastern elongation (Evening)
28	Sat	The crescent Moon, Venus, and Aldebaran form a triangle in the west (Dusk)
31	Tue	Mars catches up to Saturn, less than 1^{o} apart, with Jupiter 5^{o} to their upper-right (Dawn)

April

1	Wed	Saturn and Mars < 1^{o} apart with Jupiter 6^{o} to their upper-right (Dawn)
1	Wed	First-Quarter Moon (3:21am)
3	Fri	Venus makes its closest approach to the Pleiades, M45, until April 2028 (Evening)
7	Tue	Full Moon (7:35pm)
11	Sat	Algol at minimum brightness for ~2 hours centered on 9:14pm
14	Tue	The Moon, Jupiter, Saturn, and Mars form a 20^{o} arc in the south-southwest (Dawn)
14	Tue	Last-Quarter Moon (3:56pm)
14	Tue	Algol at minimum brightness for ~2 hours centered on 9:03pm
15	Wed	The Moon is 3^{o} below Saturn with Jupiter and Mars flanking the pair (Dawn)
16	Thu	The Moon is ~3^{o} to the lower-left of Mars (Dawn)
22	Wed	The Lyrid Meteor Shower peaks in the early morning hours
22	Wed	New Moon (7:26pm)

Journal Club (continued)

The remaining hypotheses for dimming, extinction due to dust from mass loss, must explain the reduced energy flux measured between 4300-6700 angstroms observed in 2020 compared to 2004. This requires modelling of the properties of the dust shed in a mass loss event. However, using the "standard model" for dust was unable to reproduce the reduced optical flux. However, it was determined that larger grains of dust could account for the reduced flux. These larger dust grains provide extinction that is nearly uniform as a function of wavelength (referred to as "grey") as opposed to the standard dust model that absorbs blue light more readily than red light-and is not supported by the observations.

A free prepint of the research article can be found at: https://arxiv.org/abs/2002.10463 and more information can be found at: https://astrobites.org/2020/02/27/you-were-cool-betelgeuse/, https://www.eso.org/public/images/eso2003d/, and https://www.universetoday.com/145334/it-looks-like-betelgeuse-was-dimming-because-it-was-dusty-after-all/

NASA Night Sky Notes

Dim Delights in Cancer

By David Prosper

Cancer the Crab is a dim constellation, yet it contains one of the most beautiful and easy-to-spot star clusters in our sky: the Beehive Cluster. Cancer also possesses one of the most studied exoplanets: the superhot super-Earth, 55 Cancri e.

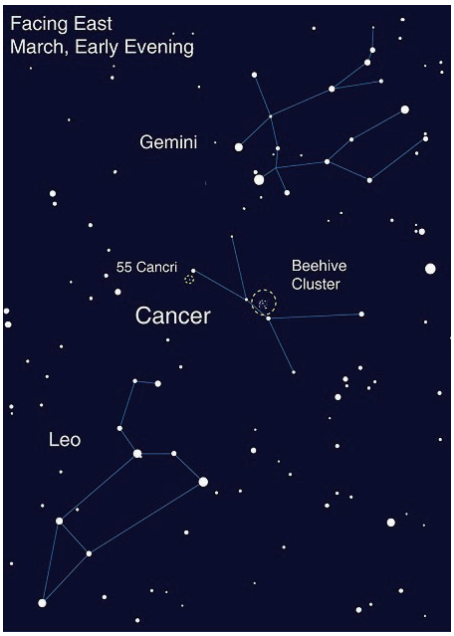
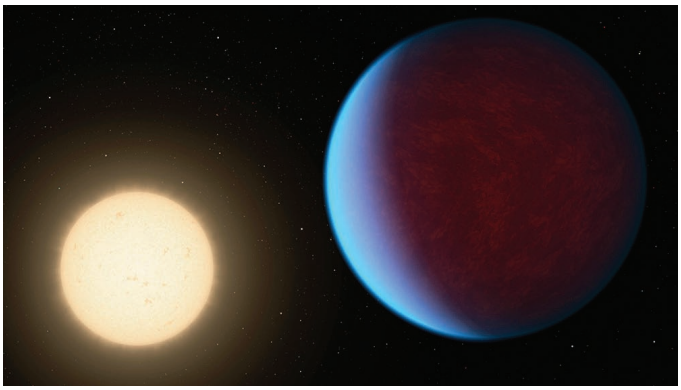


Image Caption: Look for Cancer in between the "Sickle" or "Question Mark" of Leo and the bright twin stars of Gemini. You can't see the planets around 55 Cancri, but if skies are dark enough you can see the star itself. Can you see the Beehive Cluster?

Find Cancer's dim stars by looking in between the brighter neighboring constellations of Gemini and Leo. Don't get frustrated if you can't find it at first, since Cancer isn't easily visible from moderately light polluted areas. Once you find Cancer, look for its most famous deep-sky object: the Beehive Cluster! It's a large open cluster of young stars, three times larger than our Moon in the sky. The Beehive is visible to unaided eyes under good sky conditions as a faint cloudy patch, but is stunning when viewed through binoculars or a wide-field telescope. It was one of the earliest deep-sky objects noticed by ancient astronomers, and so the Beehive has many other names, including Praesepe, Nubilum, M44, the Ghost, and Jishi qi. Take a look at it on a clear night through binoculars. Do these stars look like a hive of buzzing bees? Or do you see something else? There's no wrong answer, since this large star cluster has intrigued imaginative observers for thousands of years.

55 Cancri is a nearby binary star system, about 41 light years from us and faintly visible under excellent dark sky conditions. The larger star is orbited by at least five planets including 55 Cancri e, (a.k.a. Janssen, named after one of the first telescope makers). Janssen is a "super-earth," a large rocky world 8 times the mass of our Earth, and orbits its star every 18 hours, giving it one of the shortest years of all known planets! Janssen was the first exoplanet to have its atmosphere successfully analyzed. Both the Hubble and recently-retired Spitzer space telescopes confirmed that the hot world is enveloped by an atmosphere of helium and hydrogen with traces of hydrogen cyanide: not a likely place to find life, especially since the surface is probably scorching hot rock. The NASA Exoplanet Catalog has more details about this and many other exoplanets at bit.ly/nasa55cancrie.



Caption: Artist concept of 55 Cancri e orbiting its nearby host star. Find details from the Spitzer Space Telescope's close study of its atmosphere at: bit.ly/spitzer55cancrie and the Hubble Space Telescope's observations at bit.ly/hubble55cancrie Credit: NASA/JPL-Caltech

How do astronomers find planets around other star systems? The Night Sky Network's "How We Find Planets" activity helps demonstrate both the transit and wobble methods of exoplanet detection: bit.ly/findplanets. Notably, 55 Cancri e was discovered via the wobble method in 2004, and then the transit method confirmed the planet's orbital period in 2011!

Want to learn more about exoplanets? Get the latest NASA news about worlds beyond our solar system at nasa.gov.

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

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

Tri-Valley Stargazers Membership Application

Contact information:

Name: _____ Phone: _____

Street Address: _____

City, State, Zip: _____

Email Address: _____

Status (select one): _____ New member _____ Renewing or returning member

Membership category (select one): Membership term is for one calendar year, January through December.

_____ Student member ($10). Must be a full-time high-school or college student.

_____ Regular member ($30).

_____ Patron member ($100). Patron membership grants use of the club's 17.5" reflector at H2O. You must be a member in good standing for at least one year, hold a key to H2O, and receive board approval.

Hidden Hill Observatory Access (optional): Must be 18 or older.

_____ One-time key deposit ($20). This is a refundable deposit for a key to H2O. New key holders must first hear an orientation lecture and sign a usage agreement form before using the observing site.

_____ Annual access fee ($10). You must also be a key holder to access the site.

Donation (optional):

_____ Tax-deductible contribution to Tri-Valley Stargazers

Total enclosed: $ _____

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. TVS will not share information with anyone except as detailed in our Privacy Policy (http://www.trivalleystargazers.org/privacy.shtml).

Mail this completed form along with a check to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551.