

PrimeFocus


WHEN:

November 18, 2022
Meeting at 7:30pm
Lecture at 8:00pm

WHERE:

Unitarian Church
1893 North Vasco Rd.
Livermore, CA 94551

and via Zoom

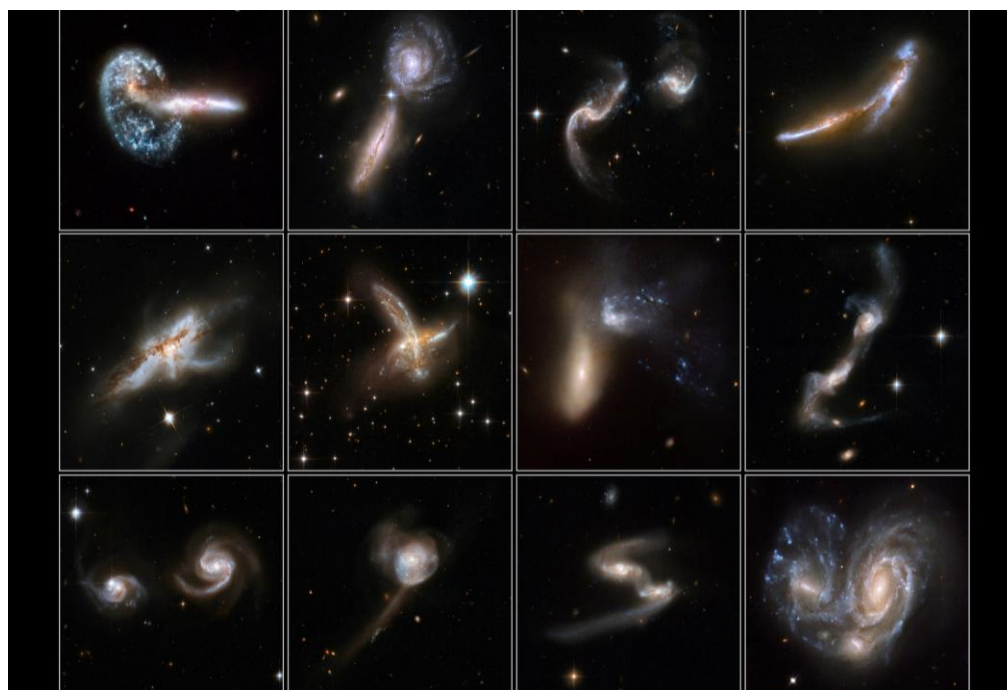
TVS QR Code

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Pulling Back the Dusty Curtain on Luminous Infrared Galaxies Dr. Jeff Rich, Carnegie Observatories

Luminous Infrared Galaxies are some of the brightest and most active galaxies in the Universe. The enormous amounts of infrared light given off by these systems is driven by huge bouts of star formation and by gas accretion onto supermassive black holes. In the nearby Universe, the process driving the intense physical conditions is often a merger of two massive spiral galaxies, ultimately resulting in a final coalesced system which has exhausted the fuel needed to sustain its activity. Large surveys in Radio, X-Ray, UV, visible, and infrared light are being used to study these systems and investigate how they relate to the history of star formation and galaxy evolution throughout cosmic time. I will discuss how these luminous galaxies light up and present JWST observations that reveal never before seen details in their dusty cores.



Caption: Interacting galaxies are found throughout the Universe, sometimes dramatic collisions that trigger bursts of star formation, on other occasions as stealthy mergers that form new galaxies.

Image Credit: NASA/ ESA/ STScI/AURA (The Hubble Heritage Team) - ESA/Hubble Collaboration/ University of Virginia, Charlottesville, NRAO, Stony Brook University (A. Evans)/ STScI (K. Noll)/ Caltech (J. Westphal)

Dr. Jeff Rich grew up in Washington state, studied Astronomy at the University of Southern California as an undergraduate, and completed his PhD in Astronomy at the University of Hawai'i at Manoa in 2012. Starting in fall of 2012, Jeff worked for four years as a postdoctoral researcher in Pasadena at the Carnegie Observatories and Caltech. Jeff continues his research work as an Astronomer and since 2016 has run the outreach and education program at the Carnegie Observatories. His research includes observing nearby galaxies to study galaxy formation and evolution with the Great Observatory All Sky LIRG Survey group and the Las Campanas TYPHOON project.

News and Notes

2022-2023 Meeting Dates

Lecture Meeting	Board Meeting	PrimeFocus Deadline
Nov. 18	Nov. 21	
Dec. 16	Dec. 19	Dec. 2
Jan. 20	Jan. 23	Jan. 6
Feb. 17	Feb. 20	Feb. 3
Mar. 17	Mar. 20	Mar. 3
Apr. 21	Apr. 24	Apr. 7
May 19	May 22	May 5
Jun. 16	Jun. 19	Jun. 2
Jul. 21	Jul. 24	Jul. 7
Aug. 18	Aug. 21	Aug. 4
Sep. 15	Sep. 18	Sep. 1
Oct. 20	Oct. 23	Oct. 6
Nov. 17	Nov. 20	Nov. 3
Dec. 15	Dec. 18	Dec. 1

Money Matters

As of the last Treasurer's Report on 10/24/22, our club's account balance is \$66,866.24. This includes \$43,125.90 in the H2O Rebuild fund.

TVS Elections in November

TVS will be electing new members for the board. The slate of candidates is:

President: Open but with Ron Kane as an alternate

Vice-President: Eric Dueltgen

Secretary: Open

Treasurer: John Forrest

Please nominate candidates to replace members who will be retiring this year, namely for the positions of President and Secretary. Contact any club officer with your suggestions, including self-nomination. This is your opportunity to impact the future direction of the club!

TVS Welcomes New Members

TVS welcomes new members Ziad Ali, Greg Brandt, Hai Du, Chaitanya Karlekar, Ravi Ramkissoon, Nithila Sankar, Robert Schwartz, Pritesh Solanki, Ajith Thoutu, and Prashant Vaidya. Please say hello and chat with them during our meetings.

Time to Renew Club Membership for 2023

Now is a great time to become part of TVS. Membership is open to anyone with an interest in astronomy. Amateurs and professionals are equally welcome; skilled amateurs comprise the majority of the membership. You do not have to own a telescope in order to be a member.

Those renewing their club membership are encouraged to do so by using the online application before the end of December. Normally our memberships are only good for the calendar

year, but anyone joining after October 1st will be given a membership for the remainder of 2022 and all of 2023.

The regular club membership remains a bargain at \$30. Student membership (full-time High School or College student) is only \$10! To become a key holder to H2O, you must be 18 or older. There is a one-time \$20 Key deposit and a \$10 annual access fee.

You can join TVS or renew your membership online at: <http://www.trivalleystargazers.org/membership.shtml> After filling out the application form you are connected to the PayPal payment form. You do not need to have a PayPal account to pay online, since PayPal will accept credit cards. Everyone is encouraged to use the online application. Alternatively, you can mail in the Membership Application on the last page of this newsletter along with a check to the Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551-2476. Note that TVS will not share your information with anyone. We only use the e-mail address to notify you when the newsletter becomes available.

All members agree to hold the 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.

2022 Club Star Party Schedule

Save the dates for the 2022 Club Star Parties.

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 Open House 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. No gas stations are available on the route, so be prepared. Admission is \$3/car-bring exact change. H2O is a primitive site with two porta-potties. Bring water, food, and warm clothing, as needed. Red flashlights are to be used so observer's can preserve their night vision.

November 26: Public Stargazing at Sunol Regional Wilderness, 1895 Geary Road, Sunol, Exact location TBD, setup at 4:30pm, Public 5:00-6:30pm

TVS Telescopes for Sale

If you have been wanting to purchase a telescope, TVS has numerous options available. These include a 12-inch Dobsonian, Celestron and Meade Schmidt-Cassegrain's

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News and Notes (con't)

ranging in size from 4-8 inches, and Meade and Celestron Maksutov telescopes. Also, available is a tabletop classic 4-inch Astroscan. Full descriptions of the available equipment can be found at: [TVS Telescope Sales](#).

Calendar of Events

November 24-25, 5:00-7:00pm

What: Family Starlight Workshop
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619
Cost: Adult \$25, Youth \$15

Kick off the holiday season with a festive family workshop all about the stars and then stay for complimentary viewing. Guests will receive complimentary hot cider, hot chocolate, and cookies. The program does not include after-hours general admission or planetarium shows.

For more information, see:
<https://chabot.space.org/events/events-listing/>

December 2, 6:00pm-10:00pm

What: First Friday: Moving to Mars
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619
Cost: Adult \$15, Kids/Seniors \$10, Members \$5

This year, in early December, it will be the best time to view Mars and it is a great time to look forward to NASA's Mission to Mars. Join NASA and SETI scientist Pascal Lee as they explore the beauty of the Martian landscape and discuss how art has influenced modern spacecraft and rocketry. The event will showcase a 1/4 functional scale model of the Curiosity Mars rover along with fun hands-on activities that will spark your imagination. Delve into some space art making for the whole family and learn things behave differently in the vacuum of space than they do under the influence of a Martian atmosphere. Come experiment with how different materials behave in a real vacuum chamber to understand why atmospheric pressure is so important! Music, beer, wine and food available.

For more information, see:
<https://chabot.space.org/events/events-listing/>

December 5, 7:30pm

What: Asteroid Mining: Stepping Stones to Solar System Exploration
Who: Dr. Robert Jedicke (University of Hawai'i)
Where: Golden Gate Park, 55 Music Concourse Drive, San Francisco
Cost: Members and Seniors \$12, Guests \$15

Since its inception, NASA has promoted a vision of space exploration that involves missions and outposts within the inner solar system with supplies delivered from Earth's surface, the Moon, or Mars. Recent research suggests an additional scenario in which humans live in space supported by

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Officers

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OPEN

Webmaster

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info@trivalleystargazers.org

TVS E-Group

To join the TVS e-group just send an email message to TVS at: info@trivalleystargazers.org 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 (con't)

resources extracted from asteroids, beginning with the most accessible Near Earth Objects (NEOs). NEOs are a cost-effective approach because they contain available, exploitable extraterrestrial resources that are delivered to the inner solar system by gravitational perturbations from the planets, they have been naturally preprocessed into objects the ideal size for industrial operations, and they contain critical materials for cost-effective self-sustaining activities in space. For more information, see: [Benjamin Dean Astronomy Lecture](#)

California Dark Sky Festival

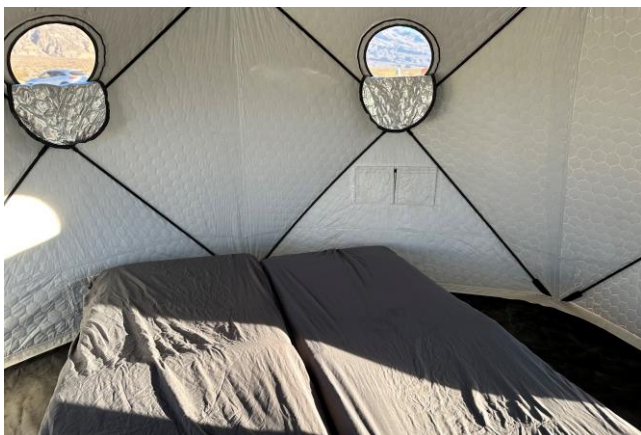
By Prashant Kulkarni & Scott Schneider

The inaugural California Dark Sky Festival took place in the beautifully mesmerizing desert landscape of Panamint Valley, located just outside the western flanks of Death Valley National Park. About 250 people assembled in the valley, from seasoned astrophotographers to those just looking to get under the stars for a few nights.



Caption: Panamint Valley campsite

Prashant, Scott, & Scott's 7-year-old son Roger arrived in separate vehicles on Thursday afternoon. While Scott and his son stayed in their family tent, Prashant opted to stay in one of the fabulous Shiftpods, which later turned out to be a refuge – more on that to come.



Caption: Shiftpod

Each night included a lecture on astrophysics followed by observing the night sky through a couple of very large aperture Dobsonian telescopes, one of which was 32 inches. On the first night, Prashant went to the evening lecture delivered by Caltech astrophysicist Dr. Cameron Hummel who discussed asteroids, meteorites, and formation of the Solar system. Scott was eager to get his telescope up and running so that he could begin imaging Sh2-188, a planetary nebula otherwise known as the Dolphin Nebula found in the constellation of Cassiopeia. This night was also the peak of the Orionids meteor shower, few of those were witnessed by the audience.

The second night, Prashant, Roger, and Scott started the evening off by listening to the lecture on Evolution of Galaxies by Dr. Hummels, who described how galaxies formed in the primordially universe and their evolution. Dr. Hummels specializes in Galaxy evolution and simulation at Caltech where he gets to run simulations on the supercomputer at NASA Ames research center in Mountain View. The lecture was incredible and showed various stages of simulation by galaxy mergers AND compared that with actual Hubble images. The lecture was followed by an astrophotography workshop by Oshin Zak, an LA based astrophotographer.



Caption: Lenticular Clouds over the eastern peaks

It was a warm summer night with a light breeze. This was a night to remember – we'd no idea how the next day would turn out! As there was a slight breeze, a little too much to try imaging, Roger went to bed under the sea of stars illuminating in the Milky Way. Scott and Prashant, along with another camper Allen Johnston, who lives near Sacramento, chatted about astronomy while watching the Pleiades and Orion the hunter rise from behind the 10,000 foot mountains to the east, even catching a glimpse of the Orionids meteors blazing across the sky. This was an exhilarating view! The next morning, it looked like the day was going to be wonderful. The breeze we experienced the night before had dissipated and Prashant was able to catch a bit of an image of the Orion Nebula with his Redcat51 before the sun came up.

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TVS Astrophotography By Ken Sperber



Caption: Karen and I went to the Big Island of Hawai'i to observe and image the November 8, 2022 lunar eclipse. Despite dire predictions, the weather cooperated and we had clear conditions for the majority of the eclipse, including all of totality. The Moon was so high in the sky that we couldn't get a picture of the Moon with the glow of lava from Kilauea Halema'uma'u crater in the same field of view. Even so, it was a magical setting to witness an eclipse. For the above (cropped) image I used a Canon 6D at ISO-800, 1.6 sec with my zoom lens set to 200mm at f/4.

What's Up By Ken Sperber (adapted from S&T)

All times are Pacific Standard Time

November

16 Wed Last-Quarter Moon (5:27am)

16 Wed Algol at minimum brightness for two hours centered on 10:26pm

17 Thu The Moon and Regulus are separated by 6° , high in the SE (Morning)

17-19 Thu-Sat The Leonid Meteor shower peaks in the predawn hours of the 18th (see p.50, November S&T)

19 Sat Algol at minimum brightness for two hours centered on 7:25pm

21 Mon The Moon trails Spica by $\sim 4^\circ$ (Morning)

23 Wed New Moon (2:47pm)

28 Mon The crescent Moon is $\sim 6^\circ$ below Saturn (Evening)

30 Wed First-Quarter Moon (6:37am)

December

1 Thu The Moon is $\sim 2.5^\circ$ below Jupiter (Evening)

6 Tue The Moon is located between the Hyades and the Pleiades (Evening)

7 Wed The Moon occults Mars for much of North America (Evening, see p.49 December S&T)

7 Wed Full Moon (8:08pm)

9 Fri Algol at minimum brightness for two hours centered on 9:08pm

10 Sat The Moon, Castor, and Pollux form a triangle above the NE horizon (Evening)

13-14 Tue- Wed The Geminid Meteor Shower peaks the morning of the 14th

14 Wed The Moon is $\sim 4^\circ$ to the upper left of Regulus (Morning)

16 Fri Last-Quarter Moon (12:56am)

18 Sun The Moon is separated from Spica by $\sim 5^\circ$ (Morning)

23 Fri New Moon (2:17am)

24 Sat The Moon, Venus, and Mercury form a triangle near the SW horizon (Dusk)

26 Mon The crescent Moon is $\sim 5^\circ$ left of Saturn (Dusk)

28-29 Wed- Thu Mercury and Venus are $< 2^\circ$ apart in the SW (Dusk)

29 Thu First-Quarter Moon (5:21pm)

Calendar of Events (con't)



Caption: Sandstorm

While we were making plans to head into Death Valley National Park, we noticed something peculiar forming in the sky above the mountains – lenticular clouds (see p.4). About 9:30am the wind picked up. Soon, the beautiful sky was no longer seen and we had an oncoming storm. We took refuge in Prashant's Shiftpod, where Roger entertained us with a

bunch of holiday songs. We thought the wind would die down and we would once again have a great night, but it was soon clear that was not going to be the case. The wind picked up to a speed of about 65mph and the storm turned into a sandstorm. So, at around 2pm we made a decision to leave for home. It took us a while to wind down tents amid an onslaught of sand. Finally, we were on our way. We reached home just past midnight with our faces red and hair full of sand! A warm shower and comfy cozy bed are what we needed. This was quite a trip to remember, even though we cut it short, the sky full of stars and beautiful Milky Way band made it all worth it!

For information on next years Spring and Autumn events, see: <https://www.eastersierraobservatory.com/california-dark-sky-festival>

NASA Night Sky Notes



Cepheus: A House Fit for a King

By David Prosper

Sometimes constellations look like their namesake, and sometimes these starry patterns look like something else entirely. That's the case for many stargazers upon identifying the constellation of Cepheus for the first time. These stars represent Cepheus, the King of Ethiopia, sitting on his throne. However, many present-day observers see the outline of a simple house, complete with peaked roof, instead – quite a difference! Astronomers have another association with this northern constellation; inside its borders lies the namesake of one of the most important types of stars in modern astronomy: Delta Cephei, the original Cepheid Variable.

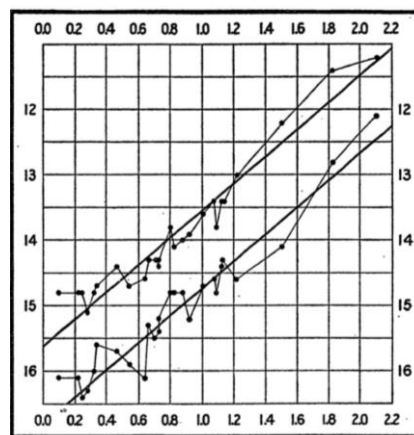
Cepheus is a circumpolar constellation for most observers located in mid-northern latitudes and above, meaning it does not set, or dip below the horizon. This means Cepheus is visible all night long and can be observed to swing around the northern celestial pole, anchored by Polaris, the current North Star. Other circumpolar constellations include Cassiopeia, Ursa Major, Ursa Minor, Draco, and Camelopardalis. Its all-night position for many stargazers brings with it some interesting objects to observe. Among them: the “Garnet Star” Mu Cephei, a supergiant star with an especially deep red hue; several binary stars; several nebulae, including the notable reflection nebula NGC 7023; and the “Fireworks Galaxy” NGC 6946, known for a surprising amount of supernovae.



Caption: The stars of Cepheus are visible all year round for many in the Northern Hemisphere, but fall months offer some of the best views of this circumpolar constellation to warmly-dressed observers. Just look northwards! Image created with assistance from Stellarium: stellarium.org.

Perhaps the most famous, and certainly the most notable object in Cepheus, is the star **Delta Cephei**. Its variable nature was first discovered by John Goodricke, whose observations of the star began in October 1784. Slightly more than a century later, Henrietta Leavitt studied the variable stars found in the Magellanic Clouds in 1908 and discovered that the type of variable stars represented by Delta Cephei possessed very consistent relationships between their luminosity (total amount of light emitted), and their pulsation period (generally, the length of time in which the star goes through a cycle of

where it dims and then brightens). Once the period for a Cepheid Variable (or **Cepheid**) is known, its luminosity can be calculated by using the scale originally developed by Henrietta Leavitt, now called “Leavitt’s Law.”. So, if a star is found to be a Cepheid, its actual brightness can be calculated versus its observed brightness. From that difference, the Cepheid’s distance can then be estimated with a great deal of precision. This revolutionary discovery unlocked a key to measuring vast distances across the cosmos, and in 1924 observations of Cepheids by Edwin Hubble in what was then called the Andromeda Nebula proved that this “nebula” was actually another galaxy outside of our own Milky Way! You may now know this object as the “Andromeda Galaxy” or M31. Further observations of Cepheids in other galaxies gave rise to another astounding discovery: that our universe is not static, but expanding!



Caption: This historical diagram from Henrietta Leavitt’s revolutionary publication shows the luminosity of a selection of Cepheid Variables on the vertical axis, and the log of their periods on the horizontal axis. The line drawn through these points shows how tight that relationship is between all the stars in the series. From Henrietta Leavitt and Edward Pickering’s 1912 paper, “Periods of 25 Variable Stars in the Small Magellanic Cloud,” a copy of which can be found at: [Henrietta Leavitt Cepheid Diagram](#)

Because of their importance as a “standard candle” in measuring cosmic distances, astronomers continue to study the nature of Cepheids. Their studies revealed that there are two distinct types of Cepheids: Classical and Type II. Delta Cephei is the second closest Cepheid to Earth after Polaris, and was even studied in detail by Edwin Hubble’s namesake telescope, NASA’s Hubble Space Telescope, in 2008. These studies, along with others performed by the ESA’s Hipparcos mission and other observatories, help to further refine the accuracy of distance measurements derived from observations of Cepheids. What will further observations of Delta Cephei and other Cepheids reveal about our universe? Follow NASA’s latest observations of stars and galaxies across our universe 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).

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.