

# PrimeFocus



## WHEN:

October 15, 2021  
Meeting at 7:30pm  
Lecture at 8:00pm

## WHERE:

Virtual Meeting using Zoom  
See the April 2020 issue of PrimeFocus for info on getting connected using Zoom

## TVS QR Code



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## Chasing Shadows in the Night: How NASA's Kepler and TESS Missions Are Revolutionizing Exoplanet Science Dr. Jon Jenkins, NASA Ames Research Center

The first planet outside our own solar system was discovered almost thirty years ago in an extremely unlikely place, orbiting a pulsar, and the first exoplanet orbiting a Sun-like star was discovered nearly 26 years ago. In the time since, we've detected over 4500 planets and over 75% of these have been detected by transit surveys. The Kepler Mission, launched in 2009, has found the lion's share of these exoplanets (>2800), and demonstrated that each star in the night sky has, on average, at least one planet. Kepler's success spurred NASA and ESA to select several exoplanet-themed missions to move the field of exoplanet science forward from discovery to characterization: How do these planets form and evolve? What is the structure and composition of the atmospheres and interiors of these planets? Can we detect biomarkers in the atmospheres of these planets and learn the answer to the fundamental question, are we alone? NASA selected the Transiting Exoplanet Survey Satellite (TESS) in 2014 to conduct a nearly all-sky survey for transiting planets with the goal of identifying at least 50 small planets (<4 Earth radii) with measured masses that can be followed up by large telescopic assets, such as the upcoming James Webb Space Telescope. TESS has discovered 152 exoplanets so far, 69 of which are <4 Earth radii with measured masses. In this talk I will describe how we detect weak transit signatures in noisy but beautiful transit survey data sets and present some of the most compelling discoveries made so far by Kepler and TESS.



Caption: Many parts come together for TESS to operate. Image credit NASA GSFC

Jon Jenkins is a research scientist and project manager at NASA Ames Research Center where he conducts research on transiting extrasolar planets. He is co-investigator for the Kepler Mission, and for NASA's TESS Mission, launched in 2018 to identify Earth's nearest neighbors for follow-up and characterization. Dr. Jenkins led the design, development, and operations of the science data pipelines for both Kepler and TESS. He received a Bachelor's degree in Electrical Engineering, a Bachelor of Science degree in Applied Mathematics, a Master of Science degree in Electrical Engineering and a Ph.D. in Electrical Engineering from the Georgia Institute of Technology in Atlanta, Georgia.

# News and Notes

## 2021-2022 Meeting Dates

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

## Money Matters

As of the last Treasurer's Report on 9/20/21, our club's account balance is \$64,303.95. This includes \$43,994.22 in the H2O Rebuild fund.

## TVS Welcomes New Members

TVS welcomes new members John Barclay, Jason Libby, and Bhanu Shankar. Please say hello and chat with them during our Zoom meetings.

## H2O and Del Valle Observing Sites Reopened

The Del Valle and Hidden Hill Observatory sites have reopened for observing by those who have paid their 2021 TVS Membership dues and are approved key holders.

As of June 15, California state guidance on COVID-19 indicates that use of masks is not required for **outdoor** activities. However, common sense dictates that club members and guests

\*Do not use either observing site if you are not feeling well or suspect you were recently exposed to the virus

\*You use each observing site at your own risk and agree to hold the club and the landowners free of all liability

\*H2O users should wear a mask while at the landowner's home depositing the daily usage fee

\*H2O keyholders who wish to use the Quick Dome should first contact Ross Gaunt (secretary"at"trivalleystargazers.org) to reserve it for individual use for the day

Ross Gaunt, our club secretary, emailed the updated lock combinations and usage instructions for each site to all H2O key holders and all Del Valle registered users. If you are a H2O

key holder or Del Valle registered user and didn't get Ross's email, please let Ron (president"at"trivalleystargazers.org) or Ross know and we'll straighten it out.

## Outreach and Club Star Party Schedule

Unvaxed persons are required to wear masks for all indoor settings. For indoor Outreach Events, both vaxed and unvaxed persons are required to wear masks for events at K-12 Schools and at long term care facilities. For more information on COVID Guidance see:

<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/guidance-for-face-coverings.aspx>

<https://covid19.ca.gov/safely-reopening/>

Save the dates for the 2021 Outreach and 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.

October 9, 6:00pm: Outreach party at Del Valle Arroyo staging area

October 13, 6:30pm: Science Night, John Green School, Dublin

October 14, 6:30pm: Public Stargazing at Livermore Library, Observe the Moon program

November 7, 4:00pm: Outreach party at Sycamore Grove, near Arroyo and Veterans Roads

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

## Telescope Donation

Hilary Jones, longtime TVS club member, has donated his 18" Ultra-Compact Obsession telescope to TVS. This telescope will soon be available for use at H2O by club members. This is a high-end Dobsonian telescope with Argo Navis Digital Setting Circles. After a two-star alignment, one manually moves the telescope to the selected object until the digital setting circles indicate the object to be centered in the field of view. At f/4.5, the scope is short enough that a ladder is typically not necessary to view objects. The donation also includes a laser collimator, a 2-inch TeleVue Paracorr Coma Corrector, and 2-inch and 1.25-inch eyepiece adaptors. Numerous other items are included to ensure great nights of observing!

## News and Notes (con't)

### H2O Rebuild

Numerous work parties were held at H2O to construct the new storage shed. Images of the progress are shown on p. 5 of this newsletter. The ground was leveled and paving stones were put in place. Then, on Saturday and Sunday, Oct. 2 and 3, the shed was constructed. Back-to-back work parties were necessary to finish shed construction to ensure structural integrity under adverse weather conditions.

## Calendar of Events

### Available Anytime

What: Clues to the Origin of Life in Our Solar System  
Who: Dr. Elizabeth Turtle (Johns Hopkins) and Dr. Morgan Cable (NASA JPL)

Sponsor: SETI Institute

Online: <https://www.youtube.com/watch?v=ggNmG3-8Hhg>

When people think about the search for life beyond Earth they often think about looking beyond our solar system and even beyond our galaxy. But what about looking closer to home? Titan, Saturn's largest moon has a dense atmosphere, an internal liquid water ocean, and stable bodies of liquid methane on its surface. While we have not found any evidence of life on Titan, its chemistry and environment make it an interesting place to explore. Europa is a moon of Jupiter with a water-ice crust and liquid ocean underneath. Its atmosphere is very thin, but it's composed mostly of oxygen.

### Available Anytime

What: How to Put Your Own Spin on JunoCam Images  
Who: Dr. Candice Hansen (Planetary Science Institute)  
Sponsor: SETI Institute  
Online: <https://www.youtube.com/watch?v=anonva8Dwg0>

JunoCam takes images of Jupiter during the spacecraft's numerous flybys, and those raw images are available for citizen scientists and artists to process.

For more information on Juno, see:

[https://www.nasa.gov/mission\\_pages/juno/main/index.html](https://www.nasa.gov/mission_pages/juno/main/index.html)

### October 12, 7:00pm

What: Interactive Stargazing  
Who: Lowell Observatory and Staff: Hailey and Wesley  
Sponsor: Lowell Observatory  
Online: <https://youtu.be/W1ebjSx3QTE>

Weather permitting, Lowell Observatory is hosting interactive observing at the Giovale Open Deck Observatory through their 14" PlaneWave CDK Telescope.

### October 16, 7:30pm

What: Galactic Archaeology: Galaxy Assembly with Globular Star Clusters  
Who: Prof. Charli Sakari (San Francisco State University)  
Sponsor: Mt. Tam Astronomy Program  
Online: <https://us02web.zoom.us/j/89697734661>

Globular star clusters are among the oldest objects in the Universe. Accordingly, they can provide valuable information about the early evolution of the galaxies they inhabit. This

#### **Officers**

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#### **Volunteer Positions**

##### **Astronomical League Rep.**

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#### **TVS E-Group**

To join the TVS e-group just send an email message to TVS at: [info@trivalleystargazers.org](mailto: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)

presentation, focusing on the Milky Way and Andromeda galaxies, will show what globular clusters reveal about their host galaxies' chemical composition. We will also explore the mysteries that still surround globular cluster formation, and possibilities for future observations.

For more information see:

<https://www.mttamastronomy.org/calendar> and  
<https://youtube.com/MtTamAstronomy>

### October 16, 23, 30, 9:00pm-10:30pm

What: Virtual Telescope Viewing

Who: Chabot Staff

Sponsor: Chabot Space and Science Center

Online: <https://www.youtube.com/c/ChabotSpace>

Join our resident astronomers on Facebook Live and YouTube every Saturday evening live from Chabot's Observation deck!

Each week, our astronomers will guide us through spectacular night sky viewing through Nellie, Chabot's most powerful telescope. Weather permitting, we will be able to view objects live through the telescopes and our astronomers will be available for an open forum for all of your most pressing astronomy questions.

Nellie is a 36-inch reflector telescope, housed in a rolling roof observatory that allows access to 180 degrees of sky. This modern, research-quality telescope offers breathtaking views of the cosmos.

For more information, see:

<https://chabot.space.org/events/events-listing/>

### October 20, 7:00pm

What: Black Holes are Real: How Do They Shape the Structure and Evolution of Our Universe?

Who: Dr. Laura Brenneman (Harvard Smithsonian Center for Astrophysics) and Dr. Dan Wilkins (Kavali Institute, Stanford University)

Sponsor: SETI Institute

Online: REGISTRATION REQUIRED

<https://www.eventbrite.com/e/seti-talks-black-holes-are-real-tickets-186999930827>

Fantastical though they may seem, black holes are real, not just science fiction or ideas from the imaginations of theorists. Scientists are now able to study black holes, in detail, throughout our Universe.

Researchers are gaining different, complementary views of black holes using multiple techniques, but we are still a long way from putting a complete picture together. In April 2019, an international collaboration called the Event Horizon Telescope (EHT) produced the first image of a black hole found in the heart of the nearby galaxy Messier 87. The LIGO

gravitational wave detector has even been able to spot the ripples created in space itself when black holes collide.

When gas falls into a black hole, it releases an enormous amount of energy. As strange as it seems, this means that black holes can give rise to some of the brightest objects in the known Universe, especially in the X-ray waveband. Observing the X-rays emitted as gas falls into a black hole gives us a close-up view of what's happening just outside of the event horizon. Future space telescopes, such as the European Space Agency's Athena mission, will reveal supermassive black holes in the early Universe and help us understand how black holes grow and helped shape our Universe.

For more information, see: <https://www.seti.org/talks>

### November 10, 5:00pm

What: The James Webb Space Telescope

Who: Lowell Observatory and NASA Staff

Sponsor: Lowell Observatory

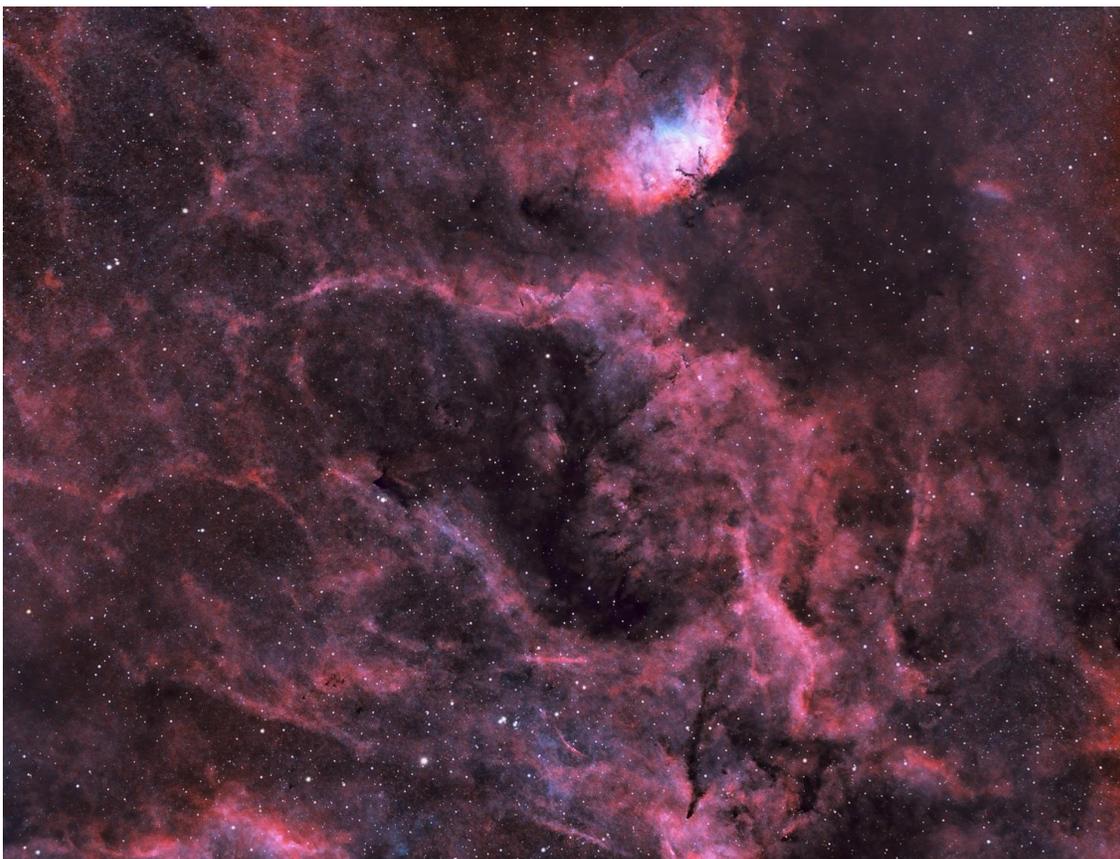
Online: <https://youtu.be/TnZx1oHvAEE>

Lowell Observatory is excited to partner with NASA in celebrating the imminent launch of the long-awaited James Webb Space Telescope. Lowell educators and astronomers will discuss how JWST will revolutionize the science of astronomy as we know it. We'll also be welcoming a NASA subject matter expert who will answer your questions about the JWST mission.

For more information, see:

<https://lowell.edu/event/national-astronomy-day-2021-the-mystery-of-young-stars/>

## TVS Astrophotos and H2O Rebuild



Caption: Moe Yassine imaged SH2-101, The Tulip Nebula, and its surroundings using a Williams Optics GT81 APO with a ZWO ASI1600MM-Pro camera. The exposure duration was 30 hours using 5-minute subframes. He used Optolong H-alpha, OIII, and SII filters. The images were obtained from his backyard in San Ramon!!! For more details, see: <https://www.astrobin.com/ciyqhl/>



Left: During the Sept. 26 work party, John Barclay, Matt Tarlach, Chuck Grant, Bhanu Shankar, Ron Kane (left to right) and Jesse Burns and Ross Gaunt (both not pictured) levelled and set the paving stones for the storage shed. Image Credit: Ross Gaunt. Right: On October 2 and 3, the storage shed was constructed. The shed will house two telescopes for club member use - an 18" Obsession Dobsonian telescope, recently donated to TVS by long-time club member Hilary Jones, and a 10" Schmidt-Cassegrain with GPS and computer control on an Alt-Az mount. Image Credit Ron Kane.

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

All times are Pacific Daylight time until Nov. 7, 2am; Pacific Standard Time thereafter

## October

- 12 Tue First-Quarter Moon (8:25pm)**  
14 Thu The Moon, Jupiter, and Saturn form a triangle in the south-southeast (Dusk)  
15 Fri Venus is  $\sim 1.5^\circ$  from Antares (Dusk)  
20 Wed Mercury and Porrima (Gamma Virginis) rise together in the east. Use binoculars (Dawn)  
**20 Wed Full Moon (7:57am)**  
21 Thu The Orionid Meteor shower peaks in the early hours, but the nearly Full Moon hampers viewing (Morning)  
23 Sat The Moon is  $\sim 4^\circ$  left the Pleiades (Dawn)  
24 Sun The Moon is  $\sim 6.5^\circ$  to the upper right of Aldebaran (Dawn)  
25 Mon Algol at minimum brightness for 2 hours centered on 8:54pm  
27 Wed The Moon is  $\sim 5^\circ$  to the lower right of Pollux (Dawn)  
**28 Thu Last-Quarter Moon (1:05pm)**  
28 Thu Algol at minimum brightness for 2 hours centered on 8:43pm  
31 Sun Mercury leads Spica by  $\sim 5^\circ$  in the east southeast (Dawn)

## November

- 1 Mon Mercury and Spica, separated by  $\sim 4^\circ$ , rise in the east-southeast (Dawn)  
3 Wed The Moon, Mercury, and Spica form a triangle in the east-southeast (Dawn; see November S&T, p.46)  
**4 Thu New Moon (2:15pm)**  
7 Sun The Moon and Venus are  $\sim 3.5^\circ$  apart in the southwest (Dusk)  
9 Tue The Moon, Jupiter, and Saturn, form a line  $\sim 25^\circ$  long in the south, with Venus in the southwest (Dusk)  
10 Wed The Moon, Jupiter, and Saturn form a triangle (Dusk)  
**11 Thu First-Quarter Moon (4:46am)**  
11 Thu The Moon is  $\sim 5^\circ$  to the lower left of Jupiter in the south (Dusk)  
14 Sun Algol at minimum brightness for 2 hours centered on 9:36pm  
17 Wed The Leonid Meteor shower is hampered by the nearly Full Moon (Morning)  
17 Wed Algol at minimum brightness for 2 hours centered on 6:25pm  
18-19 Thu-ALMOST Total Lunar Eclipse (97%): Partial umbral phase begins at 11:18pm on the 18th, greatest eclipse Occurs at 1:03am on the 19<sup>th</sup>, exiting the umbra at 2:47am. Near maximum eclipse, the disk color could be yellow-orange or even ruddy brown. For more details, see November S&T, p.48  
**19 Fri Full Moon (0:57am)**  
19 Fri The Moon rises, being located between the Pleiades and the Hyades (Dusk)  
23 Tue The Moon is  $\sim 3^\circ$  from Pollux (Evening)  
24 Wed The Moon is  $\sim 3^\circ$  from M44, the Beehive Cluster (Evening)  
**27 Sat Last-Quarter Moon (4:28am)**  
27 Sat The Moon is  $\sim 5^\circ$  from Regulus in Leo (Dawn)



## Weird Ways to Observe the Moon

By David Prosper

International Observe the Moon Night is on October 16 this year— but you can observe the Moon whenever it's up, day or night! While binoculars and telescopes certainly reveal incredible details of our neighbor's surface, bringing out dark seas, bright craters, and numerous odd fissures and cracks, these tools are not the only way to observe details about our Moon. There are more ways to observe the Moon than you might expect, just using common household materials.

Put on a pair of sunglasses, especially **polarized sunglasses!** You may think this is a joke, but polarized sunglasses dramatically reduce glare, and so they allow your eyes to pick out some lunar details! Surprisingly, wearing sunglasses even helps during daytime observations of the Moon.

One unlikely tool is the humble **plastic bottle cap!** John Goss from the Roanoke Valley Astronomical Society shared these directions on how to make your own bottle cap lunar viewer, which was also suggested to him by Fred Schaaf many years ago as a way to also view the thin crescent of Venus when close to the Sun: "The full Moon is very bright, so much that details are overwhelmed by the glare. Here is an easy way to see more! Start by drilling a 1/16-inch (1.5 mm) diameter hole in a plastic soft drink bottle cap. Make sure it is an unobstructed, round hole. Now look through the hole at the bright Moon. The image brightness will be much dimmer than normal – over 90% dimmer – reducing or eliminating any lunar glare. The image should also be much sharper because the bottle cap blocks light from entering the outer portion of your pupil, where imperfections of the eye's curving optical path likely lie." Many report seeing a startling amount of lunar detail!

You can **project the Moon!** Have you heard of a "Sun Funnel"? It's a way to safely view the Sun by projecting the image from an eyepiece to fabric stretched across a funnel mounted on top. It's easy to make at home, too – directions are here: [bit.ly/sunfunnel](http://bit.ly/sunfunnel). Depending on your equipment, a Sun Funnel can view the Moon as well as the Sun— a full Moon gives off more than enough light to project from even relatively small telescopes. Large telescopes will project the full Moon and its phases, with varying levels of detail; while not as crisp as direct eyepiece viewing, it's still an impressive sight! You can also mount your smartphone or tablet to your eyepiece for a similar Moon-viewing experience, but the funnel doesn't need batteries.

Of course, you can join folks in person or online for a celebration of our Moon on October 16, with International Observe the Moon Night – find details at [moon.nasa.gov/observe](http://moon.nasa.gov/observe). NASA has big plans for a return to the Moon with the Artemis program, and you can find the latest news on their upcoming lunar explorations at [nasa.gov](http://nasa.gov).



Caption: Sun Funnels in action! Starting clockwise from the bottom left, a standalone Sun Funnel; attached to a small refractor to observe the transit of Mercury in 2019; attached to a large telescope in preparation for evening lunar observing; projection of the Moon onto a funnel from a medium-size scope (5 inches).

**Safety tip:** NEVER use a large telescope with a Sun Funnel to observe the Sun, as they are designed to project the Sun using small telescopes only. Some eager astronomers have melted their Sun Funnels, and parts of their own telescopes, by pointing them at the Sun - large telescopes create far too much heat, sometimes within seconds! However, large instruments are safe and ideal for projecting the much dimmer Moon. Small telescopes can't gather enough light to decently project the Moon, but larger scopes will work.

You can download and print NASA's observer's map of the Moon for International Observe the Moon Night! This map shows the view from the Northern Hemisphere on October 16 with the seas labeled, but you can download both this map and one of for Southern Hemisphere observers, at: [bit.ly/moonmap2021](http://bit.ly/moonmap2021) The maps contain multiple pages of observing tips.

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](http://nightsky.jpl.nasa.gov) to find local clubs, events, stargazing info and more.



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[www.trivalleystargazers.org](http://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.