PrimeFocus

January 2024

WHEN:

January 19, 2024
Doors open at 7:00pm
Meeting at 7:30pm
Lecture at 8:00pm

WHERE:

Unitarian Church
1893 North Vasco Rd.
Livermore, CA 94551

and via Zoom

TVS QR CODE

INSIDE THIS ISSUE:

POSTCARDS FROM THE MOON; ROBERT REEVES

Robert Reeves has been exploring the cosmos since 1958 and took his first lunar photograph in 1959. He began telescopic astronomy with a four-inch Criterion Dynascope, his Christmas present in 1960. Robert began photographically exploring the Moon while in high school and his Moon photography entry in the 1965 Alamo Regional Science Fair won him a trip to the Johnson Space Center during the groundbreaking 8-day flight of Gemini 5 in the summer of 1965. In 1975 he acquired a Celestron 8 telescope, which he still uses today. In 1977, Robert acquired a Celestron 8-inch Schmidt camera that he used for a quarter century for deep sky photography. Today, Reeves uses a Celestron 11 Edge HD and a Sky-Watcher 180mm Maksutov for lunar photography from his Perspective Observatory located in central Texas. Robert also uses a Sky-Watcher 20-inch Stargate telescope for visual observation and a Celestron 14 with a HyperStar for deep-sky photography.

The near side of Earth's Moon. https://moon.nasa.gov/resources/127/lunar-near-side/

In 1984 Reeves began publishing articles about astrophotography in Astronomy

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Postcards From the Moon Continued

magazine. Since then, Robert has published over 250 magazine articles and 250 newspaper columns about astronomy. His articles have appeared in Sky and Telescope, Astronomy, Deep Sky, Deep Sky Journal, Amateur Astronomy, and The Astrograph. In 1994 Reeves published his first book, The Superpower Space Race, followed by The Conquest of Space, co-authored with Fritz Bronner. In 2000, Robert published Wide-Field Astrophotography, followed by Introduction to Digital Astrophotography in 2005 and Introduction to Webcam Astrophotography in 2006. Robert's latest book, Exploring the Moon with Robert Reeves, was released in August of 2023.

Although Robert Reeves is an accomplished deep sky astrophotographer, his current passion is re-popularizing the Moon within the amateur astronomy community by explaining the origin of the Moon, the evolution of its face, and introducing its geology to Moon lovers everywhere. Robert has perfected image processing techniques that allow the amateur astronomer, using modest equipment, to exceed the quality of Earth-based professional lunar photographs taken during the Apollo era.

Robert Reeves enjoys speaking about astronomy and spreading his passion for the Moon and photographing the heavens. In addition to appearances and Zoom presentations to interested groups, Reeves has been a keynote speaker at the Winter Star Party, Apollo Rendezvous, the Advanced Imaging Conference, the Okie-Tex Star Party, the Southwest Astrophoto Seminar, AstroImage, ALCON, NEAF, NEAIC, and the Texas Star Party. Robert has also been the Master of Ceremonies for both ALCON and the Arizona Science and Astronomy Expo. His recent activities include a five-city speaking tour in China where Reeves was the first westerner to address the Chinese astronomy community about the Moon. Reeves also represents the Celestron telescope company at national astronomical conventions. For many years Robert published a different lunar photograph with a descriptive text in his daily posting called 365 Days of the Moon. Today, Robert Reeves continues this tradition with his daily Postcard from the Moon, highlighting different lunar features each day.

Asteroid 26591 Robertreeves is named in his honor and asteroid 26592 Maryrenfro bears his wife's name. Robert and Mary Reeves are the only husband and wife team to have sequentially numbered asteroids.

NEWS AND NOTES

2024 Meeting Dates

Club Meeting	Board Meeting	PrimeFocus Deadline
Jan. 19	Jan. 22	
Feb. 16	Feb. 19	Feb. 2
Mar. 15	Mar. 18	Mar. 1

Money Matters

As of the last Treasurer's Report on 12/18/23, our club's account balance is $58,066.72. This includes $26,145.47 in the H2O Rebuild fund.

TVS Welcomes New Members

TVS welcomes new members Mingchao Shao and Sebastian Karwczuk. Please say hello and chat with them during our meetings.

2024 Club Star Party Schedule

Save the dates for the 2024 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 only club members and their guests. 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 observers can preserve their night vision.

January 17: School star party at Hart Middle School in Pleasanton. Set up 5:15 pm, start observing 6:00 pm.

January 18: School star party at Croce Elementary School in Livermore, in conjunction with their family science night. Set up 5:00, observing 6:00 to 7:30. We plan to do indoor activities instead in case of rain or heavy clouds.

January 25: School star party at Dublin Elementary in conjunction with their STEAM night. The event goes from 5:00 to 8:00 pm.

February 1: School star party at St. Michael school in downtown Livermore. Set up 6:00 in the central courtyard. Start observing 7:00.

CALENDAR OF EVENTS

January 19, 20, 26, 27, February 1, 3, 9, 10, 16, 17, 7:30-10:30 PM
What: Free Telescope Viewing
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619
Cost: Free
Join Chabot astronomers on the Observatory Deck for a free telescope viewing! Weather permitting, this is a chance to explore stars, planets and more through Chabot's historic telescopes. Chabot's three large historic telescopes offer a unique way to experience the awe and wonder of the Universe. Three observatory domes house the Center's 8-inch (Leah, 1883) and 20-inch (Rachel, 1916) refracting telescopes, along with a 36-inch reflecting telescope (Nellie, 2003).

Are the skies clear for viewing tonight? Viewing can be impacted by rain, clouds, humidity and other weather conditions. Conditions can be unique to Chabot because of its unique location in Joaquin Miller Park. Before your visit, check out the Weather Station to see the current conditions at Chabot.

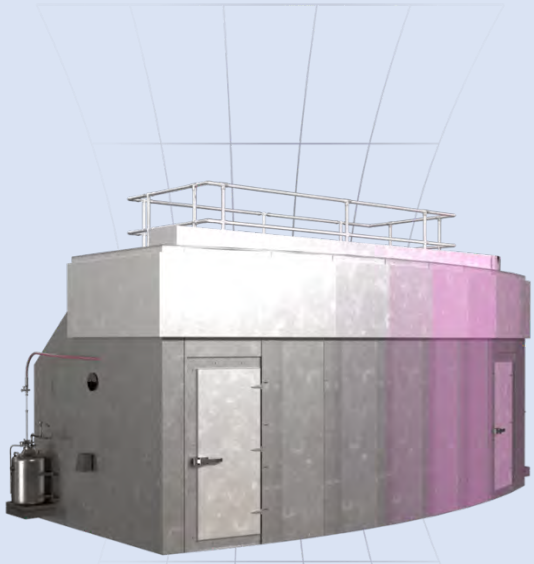
For more information, see:
https://chabotspace.org/events/events-listing/

January 23, 7:15 PM
What: Astronomy Lecture: The Hubble Deep Field
Who: Mt. Diablo Astronomical Society
Where: Lindsay Wildlife Experience Community Room, 1931 First Avenue, Walnut Creek, CA 94597
Cost: Free
Please join the Mt. Diablo Astronomical Society for our January 23 general meeting featuring Jeff Adkins, Physics and Astronomy professor at Los Medanos College and Deer Valley High School teacher. He will lead an interactive demonstration on how to use the Hubble Deep Field to estimate the number of stars and galaxies in the universe. This presentation will cover the Hubble Deep Field Project and what was learned from it, and then we will use the deep field to estimate the number of galaxies in the universe. Then we'll estimate how many stars and how many planets too.

For more information, see:
https://www.meetup.com/a-a-n-c/events/298430102/?utm_medium=referral&utm_campaign=share-btn_savedevents_share_modal&utm_source=link

February 2, 6:00-10:00 PM
What: First Friday: Celestial Cinema
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619
Cost: $15 Adults, $10 Youth, $5Members
Join Chabot in a galaxy far, far away to get a behind-the-scenes look at how space films are made and put the science in science fiction with experts in the field of filmmaking. Create your own flipbook sci-fi adventure, attend hands-on workshops and guest lectures, and take a trip to a distant galaxy in our Planetarium. First Friday: Celestial Cinema is a sci-fi fantasy adventure the whole family can enjoy!

For more information, see:
https://chabotspace.org/calendar/first-friday-celestial-cinema/



The Large Earth Finder instrument. Picture credit: Giant

THE NEXT GENERATION OF TELESCOPES; BY SAANIKA KULKARNI

With the advent of new technology–AI, machine learning techniques, and other data mining techniques–astronomy has become a truly interdisciplinary field. Because of this, scientists are seeking to develop cutting-edge instruments and telescopes that can fit their needs in data production and scientific achievement. Looking beyond ever-changing technology, many taxpayers, politicians, and even scientists question the need for a "new fleet" of

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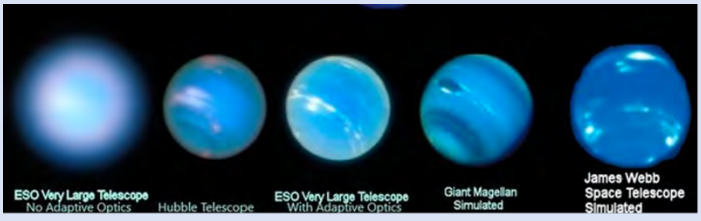
The Next Generation of Telescopes Continued

astronomical instruments. The word of the fact is this: Earth's climate is changing, and scientists need a way of understanding its next development steps; looking to other planets using more than capable instruments can be vital to understanding our fate. NASA's 2017 Decadal Survey proved the need for these capable instruments.

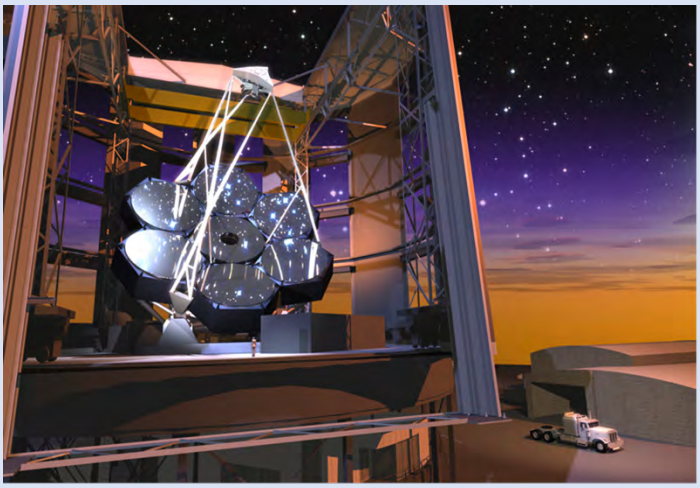
In addition to the James Webb Space Telescope, Hubble, and TESS, many telescopes are being developed to study exoplanets (planets outside of our solar system). One example is the Giant Magellan Telescope (GMT). One of the distinctive features of the GMT is its immense collecting area, a result of its innovative design incorporating seven extremely large mirrors. This colossal aperture provides astronomers with unprecedented light-gathering capabilities, enabling them to scrutinize distant exoplanets with enhanced precision and sensitivity. The GMT's superior resolution and light-collecting power offer a unique advantage for studying the atmospheres and compositions of exoplanets in greater detail than ever before. In addition to its excellent light-gathering capacity, GMT will also be equipped with instruments that will make exoplanet hunting easier, such as the Large Earth Finder, which will find Large Earths (as implied by the name) and also search for bioindicators (chemical signals like nitrogen and oxygen) that could signal the possibility of life.

Ground-based telescopes come with a few limitations, however. One is atmospheric turbulence, which blurs images. However, all modern telescopes have adaptive optics, which correct the disruptive effects of the Earth's atmosphere by fixing the disruption in real time. GMT will have a very advanced version of adaptive optics, which guarantees sharper images and more accurate data when investigating exoplanets, contributing crucial insights into their characteristics, climates, and potential habitability.

GMT will not just study exoplanets, though. Thanks to its huge mirror area (around 3,691 square feet), GMT will be able to peer further into the universe than any space-based telescope can right now. GMT will have 20 times the light-gathering power of JWST, which will allow it to resolve more minute details.



GMT's simulated images compared to existing telescopes. Note: this image was made before JWST data was



The Giant Magellan Telescope, to be located in the Atacama Desert of Chile. Credit:

This amazing resolving capability means GMT will be able to study early galaxies and their evolution, one of the project's main goals. Since visual data is not enough to understand early galaxy evolution, spectral analysis will be needed. The GMT will have two spectrographs for that purpose: the Multi-Object and the Integral-Field Spectrograph. With the Integral-Field Spectrograph, astrophysicists will be able to study the physics of how galaxies come to be: how do they assemble? What forces drive the assembly? These are all questions GMT will be seeking to answer in its mission.

Earlier, I touched upon the advent of various technologies and how that's fueling astrophysicists to combine astronomy with other fields like data science. One such project that's already doing that and will continue to do so is the Vera C. Rubin Observatory (also called LSST). It's a survey telescope designed to discover more about dark matter and dark energy. Through its systematic and repetitive imaging of the entire southern hemisphere's night sky, the LSST is designed to capture dynamic and time-dependent celestial events (known as transients), thereby providing an extensive dataset that is instrumental in elucidating the nature of these elusive objects. A distinctive feature of the LSST lies in its capacity to generate an unprecedented volume of astronomical data, amounting to petabytes over its anticipated operational lifespan. This deluge of data prompts a symbiotic relationship between astrophysics and data science. Astrophysicists are compelled to harness the power of advanced algorithms, machine learning, and data mining techniques to distill meaningful insights from this colossal dataset.

The LSST has already released data previews, which

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The Next Generation of Telescopes Continued

include a few nights of collected data. This is free and open to everyone; LSST's website has already given tutorials and project ideas on how to utilize the data, including Python functions, and ADQL recipes (dataset manipulation).

The Vera C. Rubin Observatory, which began construction in the Atacama Desert of Chile.

In conclusion, the advent of next-generation telescopes, exemplified by projects like the Vera C. Rubin Observatory (LSST) and the Giant Magellan Telescope, heralds a transformative era for astrophysics. These cutting-edge instruments, equipped with advanced technologies and expansive datasets, will empower astrophysicists to delve deeper into the mysteries of the cosmos, unlocking unprecedented insights into phenomena such as dark matter, dark energy, and exoplanets. The seamless integration of observational astronomy with data science not only expands the frontiers of scientific exploration but also fosters a collaborative and inclusive approach, ensuring that the collective knowledge gleaned from these telescopes enriches our understanding of the universe and inspires future generations of researchers.

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TVS E-Group
To Join the TVS E-Group just send an email to TVS at info@trivalleystargazers.org asking to join the group. Make sure you specify the email address you want to use to read and post to the group.

TVS ASTROPHOTOGRAPHY

The Lagoon Nebula, By Imran Badr.
14hrs integration of narrowband (SII, Ha, OIII), Sky-watcher Esprit 100ED on a ZWO AM5 Mount.

The Christmas Tree Cluster and Cone Nebula, by Aris Pope
https://www.astrobin.com/qnzzrp/C/?q=Aris%20Pope

WHATS UP

Adapted from Sky & Telescope

All times are Pacific Standard Time

January

3	Wed	Moon at last quarter
4	Thu	Quadrantid meteor shower peak
8	Mon	Moon near Venus, conjunction distance 5° 42' at 12:12pm
9	Tue	Moon near Mercury, conjunction distance 6° 35' at 10:49am
11	**Thu**	**New Moon**
12	Fri	Mercury at greatest western elongation, best time to photograph Mercury (Look just before sunrise)
17	Wed	Moon at first quarter
25	**Thu**	**Full Moon**
27	Sat	Mercury near Mars (look before sunrise)

February

1	Thu	In the hours just before dawn, the wanning gibbous Moon and Virgo's brightest star, Spica, are separated by less than 1° high in the South
2	Fri	Moon at last quarter
5	Mon	The Moon follows the supergiant Antares, they will be just 5.5° apart as the rise in the southeast
7	Wed	Moon, Venus, and Mars form an isosceles triangle with the sides less than 7° in length
9	**Fri**	**New Moon**
14	Wed	At dusk, the moon will be 4° right of Jupiter
16	Fri	Moon at first quarter

NASA NIGHT SKY NOTES

Connecting the 'Dots' with Asterisms

By Kat Troche

In our December Night Sky Notes, we mentioned that the Orion constellation has a distinct hourglass shape that makes it easy to spot in the night sky. But what if we told you that this is not the complete constellation, but rather, an *asterism*?

An asterism is a pattern of stars in the night sky, forming shapes that make picking out constellations easy. Cultures throughout history have created these patterns as part of storytelling, honoring ancestors, and timekeeping. Orion's hourglass is just one of many examples of this, but did you know Orion's brightest knee is part of another asterism that spans six constellations, weaving together the Winter night sky? Many asterisms feature bright stars that are easily visible to the naked eye. Identify these key stars, and then connect the dots to reveal the shape.

Try looking for these asterisms this season and beyond:

- **Winter Circle** – this asterism, also known as the Winter Hexagon, makes up a large portion of the Winter sky using stars Rigel, Aldebaran, Capella, Pollux, Procyon, and Sirius as its points. Similarly, the **Winter Triangle** can be found using Procyon, Sirius, and Betelgeuse as points. **Orion's Belt** is also considered an asterism.
- **Diamond of Virgo** – this springtime asterism consists of the following stars: Arcturus, in the constellation Boötes; Cor Caroli, in Canes Venatici; Denebola in Leo, and Spica in Virgo. Sparkling at the center of this diamond is the bright cluster **Coma Berenices**, or Bernice's Hair – an ancient asterism turned constellation!
- **Summer Triangle** – as the nights warm up, the Summer Triangle dominates the heavens. Comprising the bright stars Vega in Lyra, Deneb in Cygnus, and Altair in Aquila, this prominent asterism is the inspiration behind the cultural festival Tanabata. Also found is Cygnus the Swan, which makes up the **Northern Cross** asterism.

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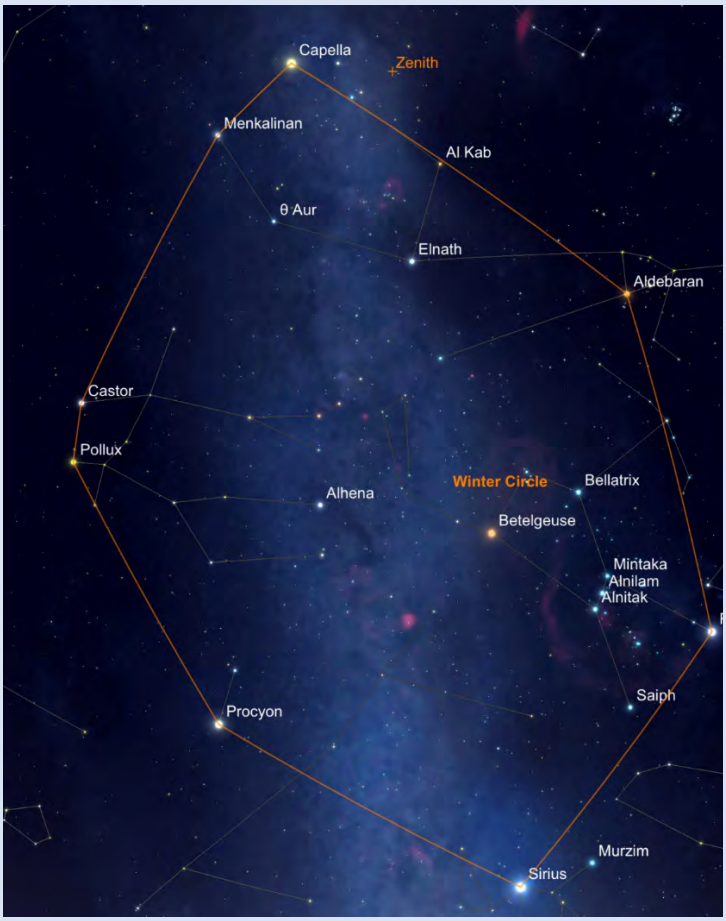
Connecting the Dots continued

Asterisms Through the Seasons



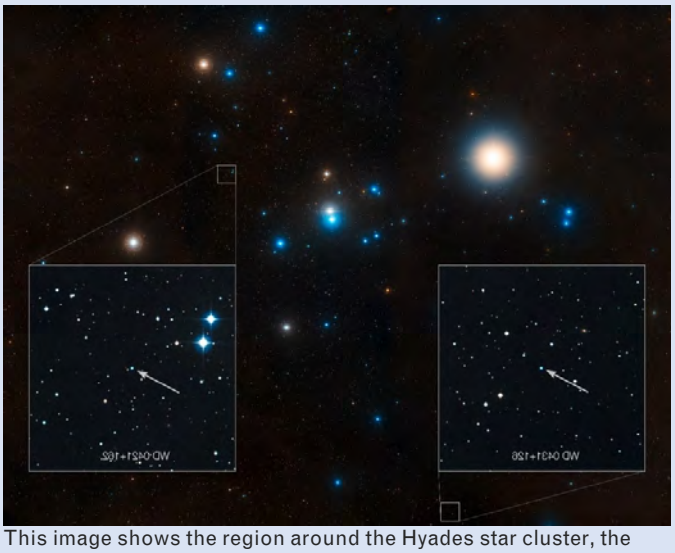
Stars that make up the Winter Circle, as seen on January 1, 2024
Sky Safari

Great Square of Pegasus – by Autumn, the Great Square of Pegasus can be seen. This square-shaped asterism takes up a large portion of the sky, and consists of the stars: Scheat, Alpheratz, Markab and Algenib

Tracing these outlines can guide you to objects like galaxies and star clusters. The Hyades, for example, is an open star cluster in the Taurus constellation with evidence of rocky planetary debris. In 2013, Hubble Space Telescope's Cosmic Origins Spectrograph was responsible for breaking down light into individual components. This observation detected low levels of carbon and silicon – a major chemical for planetary bodies. The Hyades can be found just outside the Winter Circle and is a favorite of both amateur and professional astronomers alike.

How to Spot Asterisms

- **Use Star Maps and Star Apps** – Using star maps or stargazing apps can help familiarize yourself with the constellations and asterisms of the night sky.
- **Get Familiar with Constellations** – Learning the major constellations and their broader shapes visible each season will make spotting asterisms easier.
- **Use Celestial Landmarks** – Orient yourself by using bright stars, or recognizable constellations. This will help you navigate the night sky and pinpoint specific asterisms. Vega in the Lyra constellation is a great example of this.



This image shows the region around the Hyades star cluster, the nearest open cluster to us. The Hyades cluster is very well-studied due to its location, but previous searches for planets have produced only one. A new study led by Jay Farihi of the University of Cambridge, UK, has now found the atmospheres of two burnt-out stars in this cluster — known as white dwarfs — to be "polluted" by rocky debris circling the star. Inset, the locations of these white dwarf stars are indicated — stars known as WD 0421+162, and WD 0431+126.

NASA, ESA, STScI, and Z. Levay (STScI)

Learn more about how to stay warm while observing this Winter with our upcoming mid-month article on the Night Sky Network page through NASA's website!

This article is distributed by NASA's Night Sky Network (NSN).
The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, 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.