

# PRIMEFOCUS

Tri-Valley Stargazers



February 2018



## Meeting Info Exploring the Solar System with Gamma Rays

**Who:**  
Dr. Morgan Burks, LLNL

**When:**  
February 16, 2018  
Doors open at 7:00 p.m.  
Meeting at 7:30 p.m.  
Lecture at 8:00 p.m.

**Where:**  
Unitarian Universalist  
Church in Livermore  
1893 N. Vasco Road

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## February Meeting

### Exploring the Solar System with Gamma Rays

#### Dr. Morgan Burks - Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory built the gamma-ray spectrometer that flew on NASA's MESSENGER spacecraft to the planet Mercury. We are presently building two new gamma-ray instruments to visit an exotic metal asteroid called 16-Psyche, and to visit the moons of Mars (Phobos and Deimos). Gamma-rays represent the highest-energy region of the electromagnetic spectrum. They are scientifically useful because they help reveal the elemental composition of these planetary bodies, which in turn helps us understand their formation and evolution. This talk will focus on the technical challenges of building an instrument for deep space exploration, as well as the interesting science revealed by gamma-ray spectroscopy at Mercury, 16-Psyche, and Phobos/Deimos.

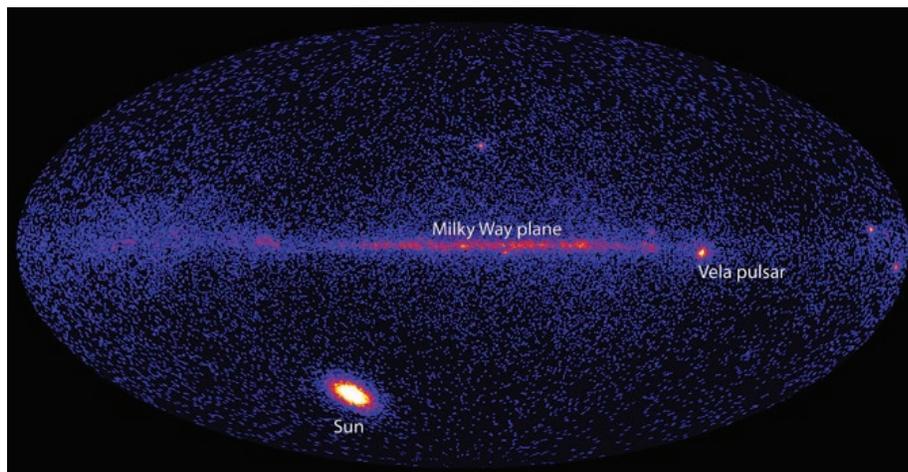


Image Caption: Fermi's Large Area Telescope (LAT) shows how the entire sky looked on March 7, 2012 in the light of gamma rays with energies beyond 100 MeV. Although the Vela pulsar is the brightest continuous LAT source, it was outmatched this day by the X5.4 solar flare, which brightened the gamma-ray sun by 1,000 times. Image Credit: NASA/DOE/Fermi LAT Collaboration; [www.nasa.gov/mission\\_pages/GLAST/news/highest-energy.html](http://www.nasa.gov/mission_pages/GLAST/news/highest-energy.html)

Dr. Morgan Burks is a physicist specializing in instrumentation for high-resolution gamma-ray spectroscopy and gamma-ray imaging. He has worked at LLNL since 2002, and at Berkeley lab before that. During this time he helped develop the first hand-held gamma-ray spectrometer based on germanium crystals, as well as the first instrument that could take 360 degree gamma-ray images. Morgan helped build the gamma-ray spectrometer that flew on NASA's MESSENGER mission to Mercury. That instrument took the first ever gamma-ray data of the planet and the results have overturned our understanding of how Mercury formed. Morgan is currently the principal investigator responsible for building instruments for a NASA mission to 16-Psyche and another to the Moons of Mars.

## News & Notes

### 2018 TVS Meeting Dates

Below are the TVS meeting dates for 2018. 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
Feb. 16	Feb. 19	
Mar. 16	Mar. 19	Feb. 23
Apr. 20	Apr. 23	Mar. 30
May 18	May 21	Apr. 27
Jun. 15	Jun. 18	May 25
Jul. 20	Jul. 23	Jun. 29
Aug. 17	Aug. 20	Jul. 27
Sep. 21	Sep. 24	Aug. 31
Oct. 19	Oct. 22	Sep. 28
Nov. 16	Nov. 19	Oct. 26
Dec. 21	Dec. 17	Nov. 30

### Money Matters

As of the last Treasurer's Report on 01/22/18, our club's checking account balance is \$17350.00.

### Time to Renew Club Membership for 2018

TVS membership is open to anyone with an interest in astronomy. Amateurs and professionals are 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. The term of membership is one calendar year - January through December. The regular club membership remains a bargain at \$30. Student membership (High School or College) is only \$5! Alternatively, Patron Membership, which grants use of the club's 17.5" reflector at H2O, is available at the annual rate of \$100.00.

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.

Note: TVS will no longer be processing new subscriptions to Sky & Telescope or Astronomy Magazine through the club. Instead, any club member wishing to subscribe to either magazine at the astronomy club rate (\$32.95/year for S&T and \$34.00/year for Astronomy) should request on-line subscription instructions from Roland Albers (email: treasurer@trivalleystargazers.org). He will then email you a subscription web-link and discount code (if needed) so the you can subscribe directly. By eliminating TVS as the middleman, subscribing will now be both faster and more reliable. Renewals will be just as easy. Sky & Telescope will continue to offer subscribers the club rate in all their renewal notifications. Astronomy can be renewed at the club rate by using the same web-link and discount code used for the initial subscription.

### Outreach Star Party: Help Needed

Wednesday, February 21: Dougherty Elementary School, 5301 Hibernia Drive in Dublin, set up at 5:30

Wednesday, February 28: Altamont Elementary School, 452 W Saint Francis in Mountain House (if you search for directions, it will come up as Tracy), set up at 5:30

Wednesday, March 7: Marylin Avenue School, 800 Marylin Avenue in Livermore, set up at 6:00

### TVS President's Message

New Year, New Happenings

As we start the New Year, TVS has a number of positive changes occurring. Our membership continues to increase significantly, the number of outreach star parties is at a record high, and we are trying out a new location for the board meetings, at The Switch / Robot Garden, 1911 2nd St in Livermore. As always curious members are welcome to attend. See our website for details. Especially significant are the new partnerships we have with the East Bay Regional Parks, with arrangements for use of the staging area near the base of Lake Del Valle dam, and a revamped agreement for use of the gated area just before the entrance to Lake Del Valle (see article on p. 3). These are great locations, close to population centers, yet reasonably dark. And we continue to use the site at Tesla Vintners, thanks to Steven Powell, the Singing Winemaker. Projects to upgrade the Jack Marling scope at H2O are progressing. And we continue to build our relationships with other organizations, such as the NASA Night Sky Network, International Dark Sky Association, Astronomical League, just to name a few. Loaner scopes, observing awards, star parties at Glacier Point in Yosemite- we have something for everyone interested in the Cosmos. Looks like 2018 will be a "stellar" year! ...Rich Combs, 2018 President TVS

Header Image: On the evening of the total lunar eclipse, January 31, 2018, K. Sperber took this image of the rising Super Moon using a modified Canon 6D, ISO-200, 1/640sec, and a Tamron zoom lens set at 600mm, f/6.3.

## News & Notes (continued)

### Observing at the Del Valle EBRPD Site

In late 2017 the East Bay Regional Park District (EBRPD) changed the rules for our usage of the Del Valle site for observing. Previously, they had limited access to 20 named individuals (10 from TVS, 10 from TAC). Under the new rules, ANY approved TVS member can observe at the site, following a few simple rules and procedures. There are no additional fees for using the Del Valle site.

The Del Valle site is a semi-dark sky site within the Del Valle Regional Park, about 10 miles south of downtown Livermore off Mines Road. Low hills surrounding the site provide some shielding from the Livermore, Pleasanton, and San Jose light domes. Many times you can see the 7 major stars in the Little Dipper, but none within the bowl of the Little Dipper itself. (Contrast this to the Club's own H2O dark sky site, where all 7 are normally visible, and usually some within the bowl.) You get almost 360° unobstructed views, with a few trees as the exceptions. It's convenient, fairly dark, and normally quiet.

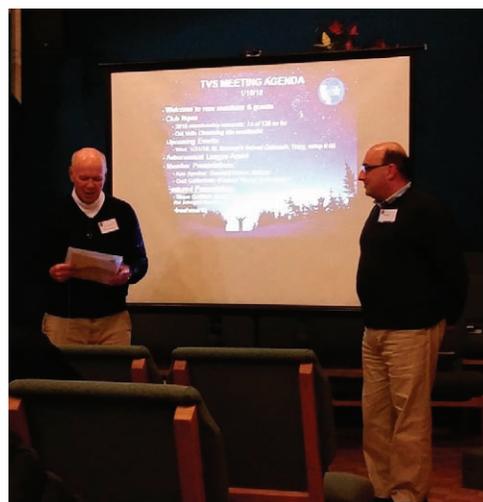
So how do you get approved? To get approved, download the *Del Valle User Agreement* from [www.trivalleystargazers.org/delvalle.shtml](http://www.trivalleystargazers.org/delvalle.shtml) (the link to the PDF file is at the end of the first paragraph), fill out and sign the form, and send it back through either email ([delvalle@trivalleystargazers.org](mailto:delvalle@trivalleystargazers.org)), the USPS, or hand it to a club officer at a regular meeting. Once you've been verified as a club member in good standing, you'll be given directions to the site, the combination to the lock on the gate, and your counter-signed form. Keep your counter-signed form with you when you use the Del Valle site in case a Park Ranger questions your presence.

So how do you observe there? You MUST call the park the day before or before noon on the day you want to observe.

Let them know when you expect to arrive and depart, and how many cars. We'd like it if you would also post your intent to observe on the TVS Yahoo group list, which will encourage others to join you. And then...just show up, unlock the gate, drive through the gate, lock it behind you, and proceed carefully down the dirt road to the observing area, and observe! When you leave, be sure and lock the gate behind you.

### Astronomical League Award

At the January TVS Meeting, Ozgur Aktas (right) received his Astronomical League Award Certificate for completing the Lunar Observing Program.



After Dennis Beckley, the Astronomical League Coordinator for TVS, presented the award, Ozgur was asked to read one of his observing entries. He waxed poetic about the circumstances of his observation, inspiring even the most seasoned observer to improve descriptions of their visual impressions.

#### Officers

**President:**  
Rich Combs  
[president@trivalleystargazers.org](mailto:president@trivalleystargazers.org)

**Vice-President:**  
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**Past President:**  
Chuck Grant  
[past\\_president@trivalleystargazers.org](mailto:past_president@trivalleystargazers.org)

#### Volunteer Positions

**Astronomical League Rep.:**  
Dennis Beckley  
[alrep@trivalleystargazers.org](mailto:alrep@trivalleystargazers.org)

**Club Star Party Coordinator:**  
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**Del Valle Coordinator:**  
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**Historian:**  
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**Internat. Dark-Sky Assoc. Rep.:**  
TBD  
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**Librarian:**  
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**Loaner Scope Manager:**  
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#### Night Sky Network Rep.:

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**Newsletter Editor:**  
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[newsletter@trivalleystargazers.org](mailto:newsletter@trivalleystargazers.org)  
925-361-7435

**Observatory Director/Key Master:**  
Chuck Grant  
[observatory@trivalleystargazers.org](mailto:observatory@trivalleystargazers.org)

**Outreach Coordinator:**  
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**Potluck Coordinator:**  
Jill Evanko  
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Lance Simms and Tina Chou  
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**Publicity Coordinator:**  
Jim Theberge  
[publicity@trivalleystargazers.org](mailto:publicity@trivalleystargazers.org)

#### Refreshment Coordinator:

Laurie Grefsheim

**Webmaster:**  
Hilary Jones  
[webmaster@trivalleystargazers.org](mailto:webmaster@trivalleystargazers.org)

**Web & E-mail**  
[www.trivalleystargazers.org](http://www.trivalleystargazers.org)  
[info@trivalleystargazers.org](mailto:info@trivalleystargazers.org)

#### TVS E-Group

To join the TVS e-group just send an e-mail message to the TVS e-mail address ([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

### February 17, 11:00am

**What:** Cosmic Gold: Neutron Star Mergers, Gravitational Waves, and the Origin of the Heavy Elements  
**Who:** Prof. Eliot Quataert, UC Berkeley  
**Where:** UC Berkeley, 131 Campbell Hall  
**Cost:** Free, limited hourly pay parking on/nearby campus. The venue is within walking distance of BART and bus lines.

Scientists have recently developed a new way to “see” the universe, using the gravitational waves predicted by Einstein nearly a century ago. These waves can teach us about some of the most exotic objects known, including star “corpses” known as black holes and neutron stars. Remarkably, they have also helped solve a long-standing puzzle about where in the Universe some of the elements we know and love here on Earth are produced, including gold, platinum, uranium, and even Californium!

For more information see: <https://foothill.edu/astronomy/> or phone 650-949-7888.

### February 20, 7:30pm-10:00pm

**What:** SJAA Imaging SIG Meeting  
**Who:** Pending  
**Where:** Houge Park, 3972 Twilight Dr · 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/243778387/>

### February 21, 7:00pm

**What:** Big Astronomy Begins: Searching for Exoplanets with AI  
**Who:** Jeff Smith, SETI Institute and Chris Shallue, Google  
**Where:** SRI Conference Center, 301 Ravenswood Ave., Menlo Park, CA 94205 (Enter from Middlefield Rd.)  
**Cost:** Free, Due to popularity of SETI events, registration in advance is strongly suggested

To uncover the mysteries of the universe, astronomers are becoming greedy, making more observations than they can possibly analyze manually. Large photometric surveys from space telescopes like Kepler and the future TESS are no exception and today modern astronomers use artificial Intelligence (AI) algorithms to help them reveal the existence of exoplanets hidden in many years of observations of hundreds of thousands of stars. For this SETI Talk, we invited two researchers involved in the Kepler mission and AI to discuss the potential of neural networks to transform astronomy. Jeff Smith, Data scientist at the SETI Institute, has developed

data processing and planet detection algorithms for Kepler since 2010 and is now involved in developing the pipeline for the future TESS mission. Chris Shallue, a senior software engineer at Google AI has used a neural network to analyze archival data from the Kepler Space Telescope to reveal the existence of two unknown exoplanets, named Kepler-90i and Kepler-80g. After presenting their recent work, we will discuss the impact of this new mode of scientific discovery, where artificial intelligence can assist humans in mapping out parts of the galaxy that have not yet been fully revealed.

For more information see: <http://www.seti.org/talks>, e-mail [info@seti.org](mailto:info@seti.org), or phone 650-961-6633.

### February 28, 7:00pm

**What:** When Mars Was Like Earth: Five Years of Exploration with NASA’s Curiosity Mars Rover  
**Who:** Dr. Ashwin Vasavada, NASA JPL  
**Where:** Smithwick Theatre, 12345 El Monte Road, Los Altos Hills, CA 94022  
**Cost:** Free, \$3 parking (Credit Cards or \$1 dollar bills)

More than five years after its dramatic arrival at Mars, the car-sized Curiosity rover continues to reveal Mars as a once-habitable planet. Early in Mars’ history, rivers and lakes persisted for millions of years and created the landforms that Curiosity explores today. The rover is climbing the foothills of a martian mountain, where rock layers have recorded the passage of time and a changing climate. This talk will cover the latest findings from the mission, the challenges of remote robotic exploration, and what lies ahead.

For more information see: <https://foothill.edu/astronomy/> or phone 650-949-7888.

### March 2, 6:00pm-10:00pm

**What:** \$5 First Fridays: Exploring Sound  
**Who:** You  
**Where:** Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619  
**Cost:** \$5; <http://www.chabotspace.org/first-fridays.htm>

Learn about the science of sound and listen to what outer space sounds like! Create your own musical instrument and tinker with new and interesting ways to create sound. Explore sound in various forms as our community partners lead hands-on and interactive making activities that the entire family can enjoy!

Pre-purchase your tickets for \$5 First Friday at: <http://www.chabotspace.org/first-fridays.htm> or for more information, call (510) 336-7373.

### March 19, 7:30pm

**What:** Seeing Our Universe in New Ways – the Infrared Sky Re-imagined  
**Who:** Kimberly Ennico Smith, NASA Ames

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## Club Member Astrophotos



Image Caption: On January 31, 2018 at ~6:03am, K. Sperber took this image of the Super Blue Blood Moon about 5 minutes before it began to exit the umbra of Earth's shadow. The image was taken from Treasure Island with a modified Canon 6D, ISO-800, 2 second exposure with a Tamron Zoom lens set at 600mm, f/6.3.

## Calendar of Events (continued)

**Where:** California Academy of Science, 55 Music Con-  
course 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.

See [www.calacademy.org/events/benjamin-dean-astronomy-lectures](http://www.calacademy.org/events/benjamin-dean-astronomy-lectures) for lecture and reservation information.

In recent decades, our ability to study the universe with telescopes detecting a range of wavelengths of light - enabled by placing them on mountain tops, on airplanes, on balloons, to rockets and satellites in orbit - has revealed a beautiful, mystifying, dynamic, and rather extraordinary place. Infrared light, in particular, penetrating deep into dark clouds, allows us to observe the birth of stars, measure the re-emission of the dust left behind by violent supernovae stellar deaths, and study the environments of gas and dust from which stars and planets form. Will these new observations bring us closer to learning how our universe works and where we come from?

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

All times are Pacific Standard Time until March 11, Daylight Savings Time thereafter

### February

- 11 Sun Crescent Moon  $2^{\circ}$  above Saturn-which is  $3^{\circ}$  above the teapot in Sagittarius (Dawn)
- 15 Thu **New Moon (1:05am)**
- 19 Mon Algol at minimum brightness for 2 hours centered on 1:26am
- 23 Fri **First-Quarter Moon (12:09am)**
- 24 Sat Algol at minimum brightness for 2 hours centered on 7:06pm

### March

- 1 Thu The Moon leads Jupiter, Mars, and Saturn across the sky (Dawn)
- 1 Thu **Full Moon (4:51pm)**
- 3 Sat Venus and Mercury separated by  $\sim 1^{\circ}$  (Dusk)
- 5-18 Mon- Zodiacal Light visible toward the west (after Sunset)
- 7 Wed The Moon and Jupiter are less than  $4^{\circ}$  apart
- 9 Fri **Last-Quarter Moon (3:20am)**
- 11 Sun Daylight Savings Time Begins (2am)
- 11 Sun Algol at minimum brightness for 2 hours centered on 9:50pm
- 17 Sat **New Moon (6:12am)**
- 22 Thu The Crescent Moon is less than  $1^{\circ}$  from Aldebaran
- 24 Sat **First-Quarter Moon (8:35am)**
- 28 Wed Venus and Uranus are less than  $4^{\circ}$  apart (Dusk)
- 29 Thu In Sagittarius Mars and Saturn are separated by  $2^{\circ}$ , with M22  $1.5^{\circ}$  below (Morning)
- 31 Sat **Full Moon (5:37am)**

## Sixty Years of Observing Our Earth

By Teagan Wall

Satellites are a part of our everyday life. We use global positioning system (GPS) satellites to help us find directions. Satellite television and telephones bring us entertainment, and they connect people all over the world. Weather satellites help us create forecasts, and if there's a disaster—such as a hurricane or a large fire—they can help track what's happening. Then, communication satellites can help us warn people in harm's way.



There are many different types of satellites. Some are smaller than a shoebox, while others are bigger than a school bus. In all, there are more than 1,000 satellites orbiting Earth. With that many always around, it can be easy to take them for granted. However, we haven't always had these helpful eyes in the sky.

The United States launched its first satellite on Jan. 31, 1958. It was called Explorer 1, and it weighed in at only about 30 pounds. This little satellite carried America's first scientific instruments into space: temperature sensors, a microphone, radiation detectors and more.

Explorer 1 sent back data for four months, but remained in orbit for more than 10 years. This small, relatively simple satellite kicked off the American space age. Now, just 60 years later, we depend on satellites every day. Through these satellites, scientists have learned all sorts of things about our planet.

For example, we can now use satellites to measure the height of the land and sea with instruments called altimeters. Altimeters bounce a microwave or laser pulse off Earth and measure how long it takes to come back. Since the speed of light is known very accurately, scientists can use that measurement to calculate the height of a mountain, for example, or the changing levels of Earth's seas.

Satellites also help us to study Earth's atmosphere. The atmosphere is made up of layers of gases that surround Earth. Before satellites, we had very little information about these layers. However, with satellites' view from space, NASA scientists can study how the atmosphere's layers interact with light. This tells us which gases are in the air and how much of each gas can be found in the atmosphere. Satellites also help us learn about the clouds and small particles in the atmosphere, too.

When there's an earthquake, we can use radar in satellites to figure out how much Earth has moved during a quake. In fact, satellites allow NASA scientists to observe all kinds of changes in Earth over months, years or even decades.

Satellites have also allowed us—for the first time in civilization—to have pictures of our home planet from space. Earth is big, so to take a picture of the whole thing, you need to be far away. Apollo 17 astronauts took the first photo of the whole Earth in 1972. Today, we're able to capture new pictures of our planet many times every day.

Today, many satellites are buzzing around Earth, and each one plays an important part in how we understand our planet and live life here. These satellite explorers are possible because of what we learned from our first voyage into space with Explorer 1—and the decades of hard work and scientific advances since then.

To learn more about satellites, including where they go when they die, check out NASA Space Place: <https://spaceplace.nasa.gov/spacecraft-graveyard>



Image Caption: the launch of Explorer 1 from Cape Canaveral, Fla., on Jan. 31, 1958. Explorer 1 is the small section on top of the large Jupiter-C rocket that blasted it into orbit. With the launch of Explorer 1, the United States officially entered the space age. Image credit: NASA



Tri-Valley Stargazers  
P.O. Box 2476  
Livermore, CA 94551  
[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 (\$5). 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):

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 ([www.trivalleystargazers.org/privacy.shtml](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.