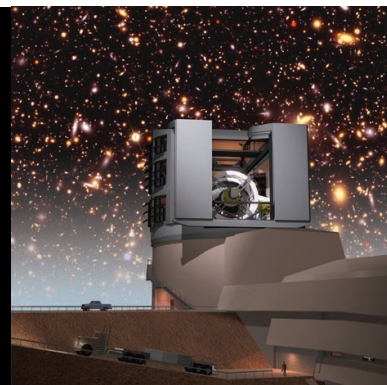


PRIMEFOCUS

Tri-Valley Stargazers



August 2014



Meeting Info

What:

Large Synoptic Survey Telescope (LSST)

Who:

Dr. Don Dossa

When:

August 15, 2014
Doors open at 7:00 p.m.
Lecture at 7:30 p.m.

Where:

Unitarian Universalist
Church in Livermore
1893 N. Vasco Road

Inside

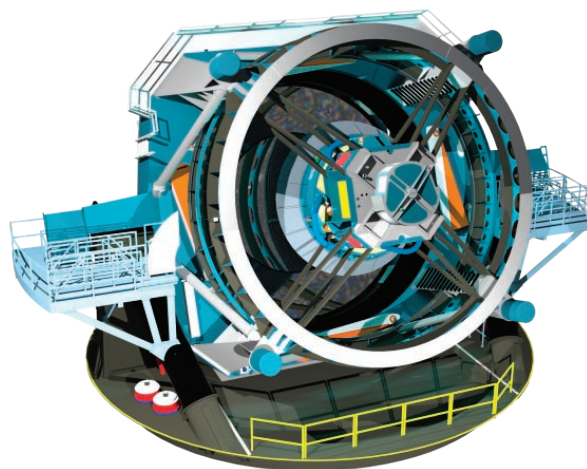
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August Meeting

Large Synoptic Survey Telescope (LSST)

Dr. Don Dossa

The LSST is an 8.4-meter telescope under construction in Chile. The talk will describe some features of the telescope and significant differences from other 8-meter telescopes. An interesting aspect of the telescope is the problem of managing the vast amount of data it will generate every night, far exceeding the sum of all other optical telescopes. The scientific goals of LSST and its mode of operation will give amateur astronomers immediate direct access to all of the images, better, faster and deeper than SDSS. LLNL has made significant contributions to this project.



Caption: Artist's rendering of the LSST. Credit: LSST

While working at LLNL, Don Dossa has been involved in the design of the LSST data management system. A few of his previous projects at the lab included project management for the acquisition of BlueGene/L, at the time the fastest computer in the world, and as software manager for a large computer program for modeling stellar evolution. Prior to coming to the lab, he worked at Digital Equipment Corp. in hardware and software engineering. The Russian Academy of Science granted him observing time on the Russian 6-meter telescope to search for an optical pulsar. He has PhD in theoretical physics.

Star Party Assistance Required: August 29

Jill Evanko was contacted by the Pleasanton Senior Center (5353 Sunol Blvd.) to provide a star party for 20+ people from 7-9pm. The seniors will use TVS donated astronomy magazines to learn a bit about the night sky, and then do an art project. Jill requests participation from TVS members who can bring telescopes so that the attendees can view the Moon, Saturn, and Mars. Please contact Jill if you can assist (secretary@trivalleystargazers.org).

News & Notes

2014 TVS Meeting Dates

The following lists the TVS meeting dates for 2014. 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
Aug. 15	Aug. 18	
Sep. 19	Sep. 22	Aug. 29
Oct. 17	Oct. 20	Sep. 26
Nov. 21	Nov. 24	Oct. 31
Dec. 19	Dec. 22	Nov. 28

Money Matters

Treasurer Roland Albers indicates that as of July 21, 2014 the TVS checking account balance is: \$12,730.75

2014 Barcroft High-Altitude Star Party

The East Bay Astronomical Society and the Tri-Valley Stargazers have reserved Sunday, Sept. 21 - Friday, Sept. 26 for a star party at Barcroft High-Altitude Research Center. Barcroft is located in the White Mountains at about 12,450 ft above sea level. In order to acclimatize to the high altitude it is recommended that one should spend at least one night at about 8000ft, such as a motel in Mammoth Lakes, or at Grandview Campground in the White Mountains. Oxygen is NO LONGER PROVIDED at Barcroft Station, though the EAS is planning on donating an oxygen concentrator to Barcroft. For more information see: <http://www.eastbayastro.org/index/Barcroft.htm>

TVS Open House: August 16

The remaining TVS Open House for 2014 will be on Saturday, August 16. Interested parties, especially those who are not keyholders to H2O, will meet at the corner of Mines Rd. and Tesla Rd., and depart to H2O at 6:30pm in a caravan led by Chuck Grant. Admission is \$3/car; please bring the exact amount. The site is primitive, with 2 pit toilets, and no running water. Bring warm clothes, and food and water for the evening. Use a flashlight with a red filter so that people's dark adaptation is not ruined by white light.

TVS: Vintage Telescope for Sale

TVS has one vintage telescope left for sale. It is the Cave Optical 6-inch Newtonian. For just \$10, some lucky club member could have one of the most highly respected reflecting telescopes of its time.

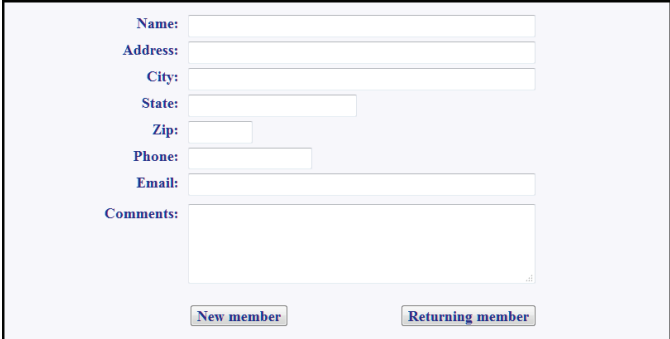
TVS Web Site Update by Hilary Jones

For about 15 years Ron Wickersham has hosted our web site at no charge to us. He has always given us good service, and we do appreciate all that he has done for us. But we have

now decided to move on to a commercial web hosting service called iPage. You don't need to do anything special to use the new web site. It is still there at <http://www.trivalleystargazers.org>, and for the most part nothing has changed. But the new web hosting service has given us a little more control over the system, and that has let us do some new and interesting things.

For one thing, now we can easily create new email accounts, and we have taken advantage of that. For example, you no longer need to remember Chuck's email address. Instead you can contact him using president@trivalleystargazers.org. And people wanting general information about the club can get it at info@trivalleystargazers.org. You can find some other new email addresses by visiting our member's web page at <http://www.trivalleystargazers.org/members.shtml>.

The new web hosting service has also helped us give you a new online membership application procedure. You no longer have to fill out a paper form and send it in the mail to us. You can now renew your membership on line by visiting our membership page at <http://www.trivalleystargazers.org/membership.shtml>. You can also use this form to change your membership information, such as your address, phone number or email; and new members can use this form to apply for membership.



While you will find that online registration is very easy to use, if you would rather use the paper form, it is still available on line at <http://www.trivalleystargazers.org/TVSapp10.pdf>, and it is also printed at the end of every monthly newsletter. While we were at it, we changed the form a little to make it clearer. In particular, student membership is spelled out as a full time high school or college student.

After you have renewed your membership, you will be directed to a web page where you can pay your dues on line. This is another new feature of our web site. You no longer have to write a check and mail it to us. You can now pay online using PayPal. Don't worry. You don't actually need a PayPal

Header Image: Artist's concept of the LSST and the night sky. Credit: Todd Mason, Mason Productions Inc. / LSST Corporation

TVS Web Site Update (continued)

account to do this, since PayPal will accept a credit card too. While you can use this form to renew your membership, you can also use it to order a key to access H2O, make a donation to the club, etc. You can see the new form at <http://www.trivalleystargazers.org/pay.shtml>.

Membership: <input type="text" value="None"/> <p>Regular membership costs \$30. Student membership costs \$5. (Must be a full time high-school or college student.) Patron membership costs \$70, which allows you access to the club's 17.5" telescope. Patron membership is available to those who have been TVS members for at least a year, and they must be a key holder. All members will receive an email notification when the PDF version of the newsletter is available for viewing on the newsletter web page.</p> <p>Currently the 17.5" telescope is not working, so there is no advantage to being a patron member.</p>
Key Deposit: <input type="checkbox"/> <p>This is a refundable \$20 deposit for the key that you will need to be able to access the club's H2O dark sky observing site. You must be a TVS member before you can get a key. You will also need to have heard an orientation lecture, and you will have to sign a key agreement form. You do not need to pay for this every year.</p>
H2O yearly site access: <input type="checkbox"/> <p>This is a \$10 fee, which must be paid every year in order to access the club's H2O dark sky observing site. Access to H2O is only available to club members. You will also need a key to the site and the combination to a lock. Patron membership does not include this fee, so be sure to order it too.</p>
Subscription to Sky and Telescope Magazine: <input type="checkbox"/> <p>A discounted subscription to Sky and Telescope for \$32.95 is available to new subscribers only. If you already have a subscription, you will have to take care of renewing it yourself through S&T. This discount is only available to TVS members.</p>
Subscription to Astronomy Magazine: <input type="checkbox"/> <p>A discounted subscription to Astronomy Magazine is available for \$34 to new subscribers only. If you already have a subscription, you will have to take care of renewing it yourself through Astronomy Magazine. This discount is only available to TVS members.</p>
Donation: \$0 <input type="text"/> <p>Donations are always welcome. We will use donations to support club activities and help maintain our club's H2O dark sky observing site. The Tri-Valley Stargazers is a 501(c)(3) nonprofit organization, so all donations are tax deductible.</p>
Total: \$0 <input type="text"/> <div style="text-align: right;"> </div>

We hope you enjoy the new changes to our web site! If you have any suggestions for improvement, be sure to send them to webmaster@trivalleystargazers.org. Hilary will enjoy hearing from you.

Calendar of Events

August 12, Noon-1:00pm

What: Investigations of strange, linear features on Mars (AKA playing with dry ice blocks in the Utah desert)

Who: Serina Diniega, Jet Propulsion Laboratory

Where: SETI Headquarters, 189 N. Bernardo Ave.,

Mountain View, CA

Cost: Free

Comparative geomorphology is a standard and highly useful approach in determining the origin of features seen on planetary surfaces. However, this approach sometimes can point interpretations into the wrong direction - the specific and sometimes highly unique conditions found on another planet cannot be neglected in the analysis! In particular, long, narrow grooves found on the slopes of martian sand dunes have been cited as evidence of liquid water via the hypothesis of melt-water initiated debris flows.

Dr. Diniega and her team proposed an alternative hypothesis: CO2 ice (AKA dry ice) blocks that form naturally on the dune surfaces each winter may fall onto and slide down the dune slope, carving out features such as those observed. To test this hypothesis, they experimented with dry ice blocks on terrestrial dunes and then compared the expected behavior of blocks on the Earth and Mars via a theoretical model. Their results demonstrated that CO2 blocks can move as natural "hovercrafts" on dune slopes on both Earth and Mars, and that such blocks on Mars can naturally create the unique features we see on Mars.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

August 16, 8:00pm-10:00pm

What: Telescopes Out of the Box

Who: Workshops

Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619

Cost: Guests \$50 per session, Members \$45 per session.
Reservations: (510) 336-7373

Remember how excited you were when you got that new telescope? You were going to make all kinds of new discoveries in the sky, but now it's just collecting dust. With the clear

continued on page 4

Officers President: Chuck Grant president@trivalleystargazers.org 925-422-7278 Vice-President: unfilled Treasurer: Roland Albers treasurer@trivalleystargazers.org Secretary: Jill Evanko secretary@trivalleystargazers.org	Volunteer Positions Newsletter Editor: Ken Sperber newsletter@trivalleystargazers.org 925-361-7435 Program Director: unfilled Loaner Scope Manager: John Swenson telescopes@trivalleystargazers.org Webmaster: Hilary Jones webmaster@trivalleystargazers.org Observatory Director/Key Master: Chuck Grant h2o@trivalleystargazers.org	Public Star Party Coordinator: Eric Dueltgen coordinator@trivalleystargazers.org AANC Representative: unfilled Astronomical League Representative: Dennis Beckley alrep@trivalleystargazers.org Historian: unfilled Refreshment Coordinator: Laurie Grefsheim	Web & E-mail www.trivalleystargazers.org info@trivalleystargazers.org TVS E-Group So how do you join the TVS e-group, you ask? Just send an e-mail message to the TVS e-mail address (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.
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Calendar of Events (continued)

summer skies, it's time to dust off those 'scopes and explore our Universe! Work with our expert astronomers on assembling and properly handling your telescope, and get tips for identifying objects in the night sky. Gain skills that will last a lifetime and impress your friends and family. Learn the basics in one class or sign up for all three and deepen your knowledge!

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

August 19, Noon-1:00pm

What: SETI Institute/NSF REU Students Final Talks
Who: SETI REU Class
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

The REU class of 2014 will give their final public presentations. In a series of 5-minute talks, the students will discuss the projects they have conducted with their SETI mentors this summer.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

August 30, 8:00pm

What: The Big Bang in Context
Who: Dr. Lloyd Knox, UC Davis
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Follow the history of the "big bang" picture of our origins of the universe, clarified by observational successes. What remaining questions drive scientists toward deeper exploration.

For more information see: <http://www.friendsofmonttam.org/astronomy/schedule>

September 2, Noon-1:00pm

What: The Higgs Boson and the Fate of the Universe
Who: Joseph D. Lykken, Deputy Director, Fermilab
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

The discovery of the Higgs boson at the CERN Large Hadron Collider poses new challenges to our understanding of basic quantum physics. Unless other new physics intervenes, we appear to live in a universe that is slightly unstable and will eventually decay catastrophically. Supersymmetry can stabilize the vacuum, but so far searches for superpartner particles at the LHC have come up empty. New ideas jettison super-

symmetry, and instead connect the Higgs boson to dark matter.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

September 8, 7:30pm

What: A Deep View on the Early Universe: Extreme Makeovers and Overweight Galaxies
Who: Mariska Kriek, Assistant Professor of Astronomy, UC Berkeley
Where: California Academy of Science, 55 Music Concourse Dr., Golden Gate Park, San Francisco, CA
Cost: Advanced ticketing required. Academy members \$8, Seniors \$10, General \$12. Reserve a space online or call 1-877-227-1831.

Galaxies are the building blocks of the Universe, massive structures that contain up to 1000s of billions of stars. Galaxies in today's Universe show a striking diversity among their properties, with large variations in their appearance, age, size, weight, and stellar birth rate. Despite this diversity, galaxies can broadly be divided into two types: low-mass spiral galaxies with high stellar production rates, and massive old elliptical galaxies in which no new stars are being formed. Whereas this broad distinction was already recognized by Edwin Hubble in the 1920s, it has remained a puzzle as to how this dichotomy originated. In particular, the elliptical galaxy population poses great challenges, as we do not understand why these galaxies form no stars in a Universe with plenty of fuel. In order to explain their enormous number of stars, we know that their stellar birth rates must have been high in the past, after which some process halted the formation of new stars. Fortunately, the finite speed of light offers us a direct view of the distant pasts of galaxies. Galaxies have been observed over most of the history of the Universe, as early as 0.5 billion years after the Big Bang. In this talk, Kriek will present recent studies of galaxies in the Early Universe, and discuss our current view of how different types of galaxies may have formed and evolved over cosmic time.

See <http://www.calacademy.org/events/lectures/> for lecture and reservation information.

September 9, Noon-1:00pm

What: Earth-Sized Planets in the Habitable Zones of Cool Stars
Who: Elisa Quintana, SETI Institute
Where: SETI Headquarters, 189 N. Bernardo Ave., Mountain View, CA
Cost: Free

A primary goal of the Kepler mission is to determine the frequency of Earth-sized planets in the habitable zones of other stars. M dwarfs, stars that are smaller and cooler than the Sun,

Calendar of Events (continued)

comprise more than 70% of the stars in our galaxy. Finding that Earth-sized planets around M dwarfs are common, therefore, has big implications for determining the frequency of other Earths.

In April 2014 we announced the discovery of Kepler-186f, the first definitive Earth-sized planet found to orbit in the habitable zone of a star other than our Sun. We will discuss our methods of combining ground-based observations with transit modeling to confirm this system, and will present

our theoretical studies on the formation and habitability of this planet. We will also present updates on several promising multi-planet systems that have Earth-sized, and possibly sub-Earth-sized, candidates in the habitable zones of cool low-mass stars in the Kepler field-of-view.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.



Caption: Roland Albers, TVS club treasurer, took this photo of IC4592 at this year's TVS Yosemite Star Party. Roland says: IC 4592 is a very large and faint reflection nebula lit by the bright star Nu Scorpii (the eye of the horse head). I took the photo with an unmodified Canon T3i DSLR and a Canon EF 200mm lens set at f/3.5. I had the camera riding piggy-back on a Celestron C8 and Celestron Advanced VX mount and was guiding using an Orion Starshoot Autoguider and 50mm guide scope. The skies were very dark and clear during our Yosemite trip (no moon or forest fires this year!), making this object an ideal target. I was able to easily take 6-minute sub-exposures at f/3.5 without sky glow becoming anywhere near a problem. The total exposure time was 60 minutes. Given how faint this object is, I would have liked much more, but I only had an hour of time to photograph it after the public dispersed. I processed this photo with darks, flats, and bias frames using Deep Sky Stacker. I also used DSS for initial color correction and stretching. I then used Photoshop CS5 for some additional stretching, color adjustments, setting the black point, and sharpening. I also used Noel Carboni's Photoshop Astronomy tools for noise reduction and DSO enhancement.

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

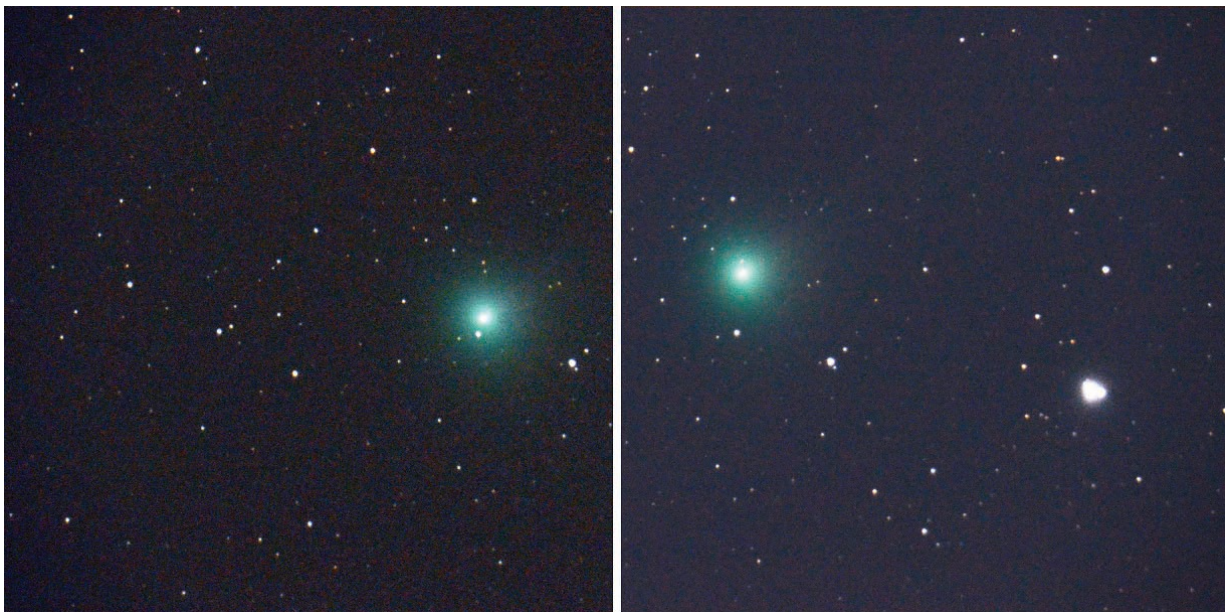
All times Pacific Daylight Time.

August

- 10 Sun Full Moon (the largest of the year) (11:09am)
- 12-13 Tue- Perseid Meteor shower peaks, but nearly Full Moon will hide all but the brightest meteors
- 17 Sun Last-Quarter Moon (5:26am)
- 18 Mon Venus and Jupiter are within 0.5 degrees of each other (Dawn)
- 23 Sat The crescent Moon forms a triangle with Venus and Jupiter (Dawn)
- 23-26 Sat- Mars passes 3.5 degrees south of Saturn (Dusk)
- 25 Mon New Moon (7:13pm)
- 31 Sun The Moon forms a tight triangle with Mars and Saturn (Dusk)

September

- 2 Tue First-Quarter Moon (4:11am)
- 5 Fri Regulus and Venus less than 1 degree apart (1/2 hour before sunrise; see p.48 Sept. S&T)
- 8 Mon Full Moon (6:38pm)
- 15 Mon Last-Quarter Moon (7:05pm)
- 17 Wed Algol at minimum brightness for 2 hours centered on 11:06pm
- 20 Sat Jupiter to the upper-left of the Moon (Dawn)
- 21-06 Sun- Zodiacal light visible in the east from dark locations (120 - 80 minutes before sunrise)
- 23 Tue New Moon (11:14pm)
- 23-30 Tue- Mars less than 4 degrees from Antares; closest on the 27th and 28th (Dusk)



Caption: Steve Goldenberg photographed Comet Jacques from H₂O on July 26, 2014 at 4:16am (left) and 4:48am (right). The fields are aligned so that one can easily see the change in the comet's location between the two 30-second images. Steve used a Celestron 11 at f/10 and a Nikon D7000 at ISO 6400. The brightest star in the right-hand image is 14 Aurigae. Real-time information about Comet Jacques can be found at: <http://www.livecometdata.com/comets/c2014-e2-jacques/>



The Invisible Shield of our Sun

By Dr. Ethan Siegel

Whether you look at the planets within our solar system, the stars within our galaxy or the galaxies spread throughout the universe, it's striking how empty outer space truly is. Even though the largest concentrations of mass are separated by huge distances, interstellar space isn't empty: it's filled with dilute amounts of gas, dust, radiation and ionized plasma. Although we've long been able to detect these components remotely, it's only since 2012 that a manmade spacecraft -- Voyager 1 -- successfully entered and gave our first direct measurements of the interstellar medium (ISM).



Image credit: Hubble Heritage Team (AURA / STScI), C. R. O'Dell (Vanderbilt), and NASA, of the star LL Orionis and its heliosphere interacting with interstellar gas and plasma near the edge of the Orion Nebula (M42). Unlike our star, LL Orionis displays a bow shock, something our Sun will regain when the ISM next collides with us at a sufficiently large relative velocity.

What we found was an amazing confirmation of the idea that our Sun creates a humongous "shield" around our solar system, the heliosphere, where the outward flux of the solar wind crashes against the ISM. Over 100 AU in radius, the heliosphere prevents the ionized plasma from the ISM from nearing the planets, asteroids and Kuiper belt objects contained within it. How? In addition to various wavelengths of light, the Sun is also a tremendous source of fast-moving, charged particles (mostly protons) that move between 300

and 800 km/s, or nearly 0.3% the speed of light. To achieve these speeds, these particles originate from the Sun's superheated corona, with temperatures in excess of 1,000,000 Kelvin!

When Voyager 1 finally left the heliosphere, it found a 40-fold increase in the density of ionized plasma particles. In addition, traveling beyond the heliopause showed a tremendous rise in the flux of intermediate-to-high energy cosmic ray protons, proving that our Sun shields our solar system quite effectively. Finally, it showed that the outer edges of the heliosheath consist of two zones, where the solar wind slows and then stagnates, and disappears altogether when you pass beyond the heliopause.

Unprotected passage through interstellar space would be life-threatening, as young stars, nebulae, and other intense energy sources pass perilously close to our solar system on ten-to-hundred-million-year timescales. Yet those objects pose no major danger to terrestrial life, as our Sun's invisible shield protects us from all but the rarer, highest energy cosmic particles. Even if we pass through a region like the Orion Nebula, our heliosphere keeps the vast majority of those dangerous ionized particles from impacting us, shielding even the solar system's outer worlds quite effectively. NASA spacecraft like the Voyagers, IBEX and SOHO continue to teach us more about our great cosmic shield and the ISM's irregularities. We're not helpless as we hurtle through it; the heliosphere gives us all the protection we need!

Want to learn more about Voyager 1's trip into interstellar space? Check this out: <http://www.jpl.nasa.gov/news/news.php?release=2013-278>.

Kids can test their knowledge about the Sun at NASA's Space place: <http://spaceplace.nasa.gov/solar-tricktionary/>.



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

Tri-Valley Stargazers Membership Application

(or apply for membership online: www.trivalleystargazers.org/membership.shtml)

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 (\$70). 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.

Magazine Subscriptions (optional): Discounted subscriptions are available only to new subscribers. All subsequent renewals are handled directly with the magazine publishers.

_____ One-year subscription to Sky & Telescope magazine (\$32.95).

_____ One-year subscription to Astronomy magazine (\$34).

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 other than other club members and the Astronomical League without your express permission.

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