

PRIMEFOCUS

Tri-Valley Stargazers



October 2016



Meeting Info

What:

Photographing the Night Sky

Who:

Kim Grandfield

When:

October 21, 2016
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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October Meeting

Photographing the Night Sky

Kim Grandfield

Kim Grandfield will be putting on a slide show about his experiences in the last few years taking photographs after dark. These photographs include images of lunar eclipses, aurora borealis, and the Milky Way. Besides showing his photos, Kim will discuss his photographic equipment and techniques for acquiring these images.



Image Caption: Kim and Charlene Grandfield near Anchorage Alaska. Image Credit Ronn Murray (used with permission)

Kim Grandfield grew up on a farm in Kansas. In 1971, fresh out of Kansas State University with a degree in Nuclear Engineering, Kim moved to California to take a job with General Electric in San Jose, Ca. In 1975 his passion for the outdoors led to him to founding Sunrise Mountain Sports in Livermore, CA. Kim's interest in documenting his outdoor adventures has always fueled his interest in photography. In the past few years Kim has been experimenting with various forms of night photography.

News & Notes

2016/2017 TVS Meeting Dates

The following lists the TVS meeting dates for 2016 and 2017. 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
Oct. 21	Oct. 24	
Nov. 18	Nov. 21	Oct. 28
Dec. 16	Dec. 19	Nov. 25
Jan. 20	Jan. 23	Dec. 30
Feb. 17	Feb. 20	Jan. 27
Mar. 17	Mar. 20	Feb. 24
Apr. 21	Apr. 24	Mar. 31
May 19	May 22	Apr. 28
Jun. 16	Jun. 19	May 26
Jul. 21	Jul. 24	Jun. 30
Aug. 18	Aug. 21	Jul. 28
Sep. 15	Sep. 18	Aug. 25
Oct. 20	Oct. 23	Sep. 29
Nov. 17	Nov. 20	Oct. 27
Dec. 15	Dec. 18	Nov. 24

Money Matters

As of the last Treasurer's Report on 9/19/16, our club's checking account balance is \$13,007.94.

For Sale: Losmandy G-11S Mount, Telescope, and Accessories

TVS recently received the donation of telescope, mount, and accessories. The full set-up includes a Losmandy G-11S mount and heavy-duty tripod, 6-inch f/8 Newtonian and tube rings, Telrad finder, eyepiece set (high quality 10mm Plossl, 25mm orthoscopic, and 30mm Plossl), and a 0.4MP CCD camera. All are in excellent condition. We are selling the complete system for \$1300. The mount and tripod alone are worth this much on the used telescope market.

TVS Brochure

Roland Albers led the development of a trifold color brochure to help educate the public about TVS. Numerous club members provided feedback to Roland on the content. The club's mission to promote education and public interest in astronomy is discussed, as is the structure of the monthly meetings, the offer to give outreach star parties, and the benefits of membership. It is envisioned to have brochures available at outreach star parties and at the general meeting. Roland's effort is sure to raise the profile of the club. The brochure is available for download from the TVS webpage.

Given the high cost of commercial color printing, if any members have access to reasonably priced printing, please contact Roland or any board member with the details.

Astronomical League Award

At the September TVS meeting, Ron Kane received an award for having completed the Astronomical League Lunar Observing Program. He stated that he did the program because Roland had done it previously.



Caption: Dennis Beckley (left), TVS Astronomical League Coordinator, presents Ron Kane with his award for having completed the Astronomical League Lunar Observing Program. Image Credit: Ken Sperber

There are nearly 50 Astronomical League Observing Programs to peak anyone's interest on astronomy. For more details, see: <https://www.astroleague.org/al/obsclubs/AlphabeticObservingClubs.html>

Outreach Star Parties: Request for Assistance

Eric Dueltgen is looking for volunteers to bring telescopes and/or binoculars to the following Outreach Star Parties:

Wednesday, November 9th, 6:30 to 8:00pm: St. Michael's School, 345 Church Street, Livermore

Wednesday, December 7th, 6:30 to 8:00pm: Sunset Elementary School, 1671 Frankfurt Way, Livermore

Both of the above outreach star parties coincide with each school's Family Science Night.

Outreach Star Party Report

By E. Dueltgen and R. Albers

On Thursday, October 6, numerous TVS members helped make a successful outreach star party at the Livermore Library. The library recently purchased several 4.5 inch reflecting telescopes that they plan to loan out to patrons, and they

Header Image: Bust of Galileo Galilei by Aristodemo Costoli, 1840-1842, Museo Galileo, Florence, Italy. Image Credit: Ken Sperber

asked for our help in getting library patrons interested in astronomy and their new telescope lending program.

Inside the library, Rich started the evening with a presentation to about 150 people. He discussed the night sky and gave an introduction to telescopes, while outside at least eight TVS members set up their telescopes. Once the presentation was over and the sky was dark, the crowd came outside to look through our telescopes. We contended with some thin clouds and with lights from the library building and parking lot, but they didn't present a serious problem.

There were a lot of families with young children in the crowd, and they were thrilled with the opportunity to see the Moon, planets, and stars through our telescopes. Curtis Macchioni showed close-up video views of the Moon to the attendees and Roland showed off the Moon and Mizar through his C8. Bob McKoon showed Saturn to the crowd. Despite the thin clouds, he said the seeing was good enough for him to see the Cassini division. Chuck showed off M13 at one point, and Eric displayed the double star Albireo.

Thank you to all the TVS members who helped make this another successful outreach event.

Calendar of Events

October 18, 12:00pm

What: The Radio Search for Extraterrestrial Intelligence at the SETI Institute
Who: Gerry Harp, SETI Institute
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

From 2009 through 2015, the SETI Institute used the Allen Telescope Array to observe stars with high probability of

hosting exoplanets. Nearby stars were chosen based on radial velocity observations that indicate planets, and a more distant set of stars were chosen from the Kepler Space Telescope's list of probable and confirmed exoplanets. By choosing stars that have planets we hoped to improve our chances for finding ET in our radio telescope observations. In this talk Dr. Harp will describe the novel technologies developed for this search by the SETI Institute and what we have learned from the last six years of SETI observations. Dr. Harp will also consider future directions the SETI Institute may take to improve on this search in the coming years.

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

October 25, 12:00pm

What: The History of the Martian South Polar Cap
Who: Carver Bierson, UC Santa Cruz
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

In the last few years we have found that Mars' south polar cap has as much carbon-dioxide as Mars' current atmosphere. This raises numerous questions about how this massive deposit formed and what Mars was like when it was in the atmosphere. Using a combination of methods including spacecraft imagery, radar, and modeling we can start to answer some of these questions. Carver Bierson will discuss evidence that these deposits may have formed over several cycles of Mars atmosphere collapsing onto the surface and then sublimating back into the atmosphere.

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

November 2, 7:00pm

What: Spacetime Symphony: Gravitational Waves from

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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.

Calendar of Events (continued)

Who: Prof. Lynn Cominsky, Sonoma State University
Where: Smithwick Theatre, 12345 El Monte Road, Los Altos Hills, CA 94022
Cost: Free, \$3 parking (\$1 dollar bills or coin required)

One hundred years ago Albert Einstein published his General Theory of Relativity, which predicts the kinds of changes in the universe that produce gravitational waves—which travel at the speed of light, but are much harder to detect than light waves. On September 14, 2015, the Laser Interferometer Gravitational-wave Observatory (LIGO) received the first confirmed gravitational wave signals. The event that produced them was the merger of two distant and massive black holes that were in mutual orbit. A second confirmed detection (two different black holes getting together) occurred on December 26, 2015. LIGO's exciting discoveries provide direct proof of predictions made by Einstein and have launched the new field of astronomy. Dr. Cominsky will present an introduction to LIGO, to gravitational waves and how they were detected, and to black holes.

For more information see: http://www.foothill.edu/news/newsfmt.php?sr=2&rec_id=3359 or phone 650-949-7888.

November 4, 6:00pm-10:00pm

What: \$5 First Fridays
Who: Chabot Staff
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: \$5, Some events have limited capacity, book in advance

Details for the November event are presently unavailable. See: <http://www.chabotspace.org/first-fridays.htm> for more details.

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

November 8, 12:00pm

What: History of Clays on Mars: How we found them + Astrobiological Importance
Who: Janice Bishop, SETI Institute
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

No details available.

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

November 15, 12:00pm

What: Latest Exoplanet Results from NASA's Kepler/K2

Mission

Who: Ian Crossfield, UC Santa Cruz
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

No details available.

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

Travelogue By Ken Sperber

Museo Galileo

Italy abounds with history. Wherever you visit, there is no shortage of museums, with more art to see than you can comprehend. If you are in Florence, seeing Da Vinci's David is a must, as is the rest of the art in the Galleria dell'Accademia, and that in the Uffizi. These popular venues are visited by sizable crowds, which at times can be overwhelming.

Fortunately, for those of us interested in Astronomy and the history of science, there is a less-crowded alternative: the Museo Galileo, located about 2 blocks east of the Ponte Vecchio. The museum is home to a comprehensive collection of items, with exhibits devoted to Galileo and his instruments, the science of navigation, warfare, precision instruments, measuring natural phenomena, chemistry, medicine, and electricity.



Two telescopes handcrafted by Galileo, and inset below is the objective lens used in the telescope that Galileo used to discover the moons of Jupiter (Museo Galileo, Florence, Italy). Image Credit: Ken Sperber

Member Astrophotos



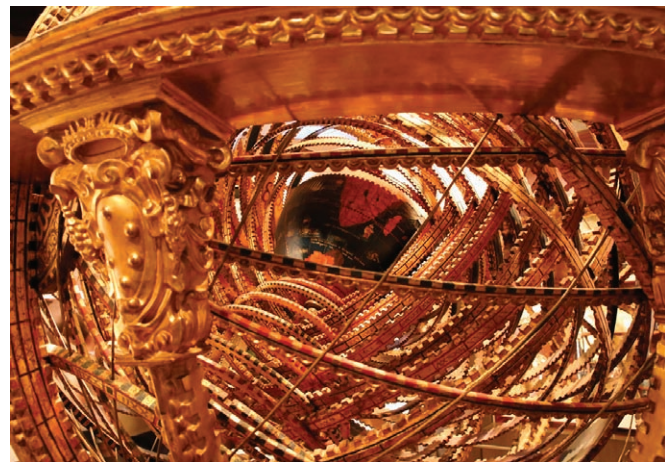
NGC 7538 is a Molecular Cloud Complex in Cepheus. Hilary Jones took photos of this target over five nights from July 29th to September 6th. He accumulated over 20 hours of exposures (800:135;130:145 minutes of LRGB time, respectively) during nights of good seeing. This object is about 9100 light years away. NGC7538 is the home of the largest protostar discovered to date, some 300 times the size of our solar system.

The highlight for me was seeing the only remaining telescopes handcrafted by Galileo. As seen on page 4, the top telescope has a magnification of 14x, while that below, given to Cosimo Medici II by Galileo in 1610, is 21x. There are a multitude of other telescopes on display, including refractor and Newtonian masterpieces built in the 18th and 19th Centuries (see below; Image Credit: Ken Sperber).



Galileo's observations and Kepler's ideas led to the concept of the Sun-centered solar system, which we take for granted today.

On display are a wide variety of astrolabes and Armillary Spheres that were developed to explain the motions of the Aristotelian/Ptolemaic Earth-centered universe. A prime example is the "Universal Machine of the World" by Antonio Santucci, built at the request of Cardinal Ferdinand I de' Medici (see below; Image Credit: Ken Sperber).



It was first unveiled in the Uffizi Gallery in 1593. Surrounding the beautifully detailed globe of the Earth are wooden and brass rings, covered in gold leaf, that depict the motions

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

Pacific Daylight Time until 2:00am November 6; Pacific Standard Time thereafter

October

- 15 Sat Full Moon (9:23pm)
20-22 Thu- The modest Orionid meteor shower peaks the morning of the 21st, but the Moon will wash out the radiant
22 Sat Last-Quarter Moon (12:14pm)
25 Tue The crescent Moon rises just after Regulus (Predawn)
26 Wed Saturn about 5 degrees to the upper-left of Venus in the southwest (Dusk)
27 Thu Saturn, Venus, and Antares form a vertical line about 7 degrees tall in the southwest (Dusk)
30 Sun New Moon (10:38am)

November

- 2 Wed Algol at minimum brightness for 2 hours centered at 11:42pm
5 Sat Crescent Moon about 7 degrees right or to the upper-right of Mars (Evening)
6 Sun Pacific Daylight Time starts at 2:00am
7 Mon First-Quarter Moon (11:51am)
14 Mon Full Moon (5:52am)
17 Thu The weak Leonid meteor shower peaks before dawn, but the Moon will wash out all but the brightest meteors
21 Mon Last-Quarter Moon with Regulus 2 degrees above (00:33am)
25 Fri The crescent Moon, Jupiter, and Spica form a triangle about 9 degrees tall in the southeast (Dawn)
25 Fri Algol at minimum brightness for 2 hours centered at 9:13pm
29 Tue New Moon (4:18am)

of the heavens. Included are such references as the Topics of Cancer and Capricorn and the plane of the ecliptic. Perched on its pedestal of four sirens, the sphere stands about 8 feet tall, and it is the largest Armillary Sphere ever produced. A video of the workings can be found at: <http://catalogue.museo.galileo.it/multimedia/SantuccisSphere.html>

For anyone interested in Astronomy, or more broadly the history of science, the Museo Galileo is a must see.

One Incredible Galaxy Cluster Yields Two Types of Gravitational Lenses

By Dr. Ethan Siegel

There is this great idea that if you look hard enough and long enough at any region of space, your line of sight will eventually run into a luminous object: a star, a galaxy or a cluster of galaxies. In reality, the universe is finite in age, so this isn't quite the case. There are objects that emit light from the past 13.7 billion years—99 percent of the age of the universe—but none before that. Even in theory, there are no stars or galaxies to see beyond that time, as light is limited by the amount of time it has to travel.

But with the advent of large, powerful space telescopes that can collect data for the equivalent of millions of seconds of observing time, in both visible light and infrared wavelengths, we can see nearly to the edge of all that's accessible to us.

The most massive compact, bound structures in the universe are galaxy clusters that are hundreds or even thousands of times the mass of the Milky Way. One of them, Abell S1063, was the target of a recent set of Hubble Space Telescope observations as part of the Frontier Fields program. While the Advanced Camera for Surveys instrument imaged the cluster, another instrument, the Wide Field Camera 3, used an optical trick to image a parallel field, offset by just a few arc minutes.



Then the technique was reversed, giving us an unprecedentedly deep view of two closely aligned fields simultaneously, with wavelengths ranging from 435 to 1600 nanometers.

With a huge, towering galaxy cluster in one field and no comparably massive objects in the other, the effects of both weak and strong gravitational lensing are readily apparent. The galaxy cluster—over 100 trillion times the mass of our sun—warps the fabric of space. This causes background light to bend around it, converging on our eyes another four billion light years away. From behind the cluster, the light from distant galaxies is stretched, magnified, distorted, and bent into arcs and multiple images: a classic example of strong gravitational lensing. But in a subtler fashion, the less optimally aligned galaxies are distorted as well; they are stretched into elliptical shapes along concentric circles surrounding the cluster.

A visual inspection yields more of these tangential alignments than radial ones in the cluster field, while the parallel field exhibits no such shape distortion. This effect, known as weak gravitational lensing, is a very powerful technique for obtaining galaxy cluster masses independent of any other conditions. In this serendipitous image, both types of lensing can be discerned by the naked eye. When the James Webb Space Telescope launches in 2018, gravitational lensing may well empower us to see all the way back to the very first stars and galaxies.

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

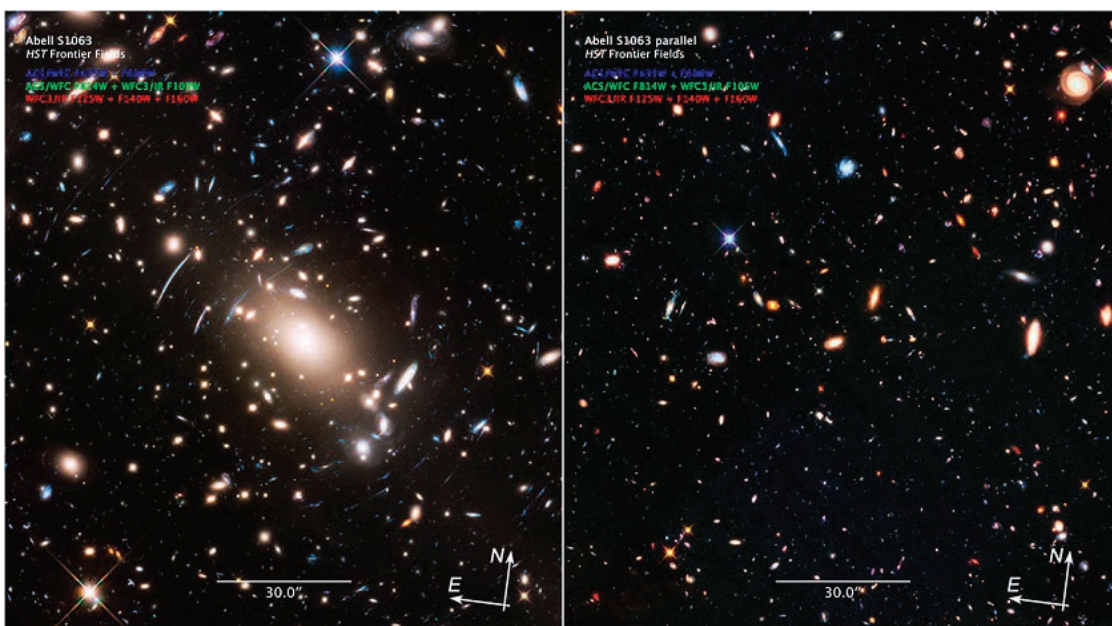


Image caption: Galaxy cluster Abell S1063 (left) as imaged with the Hubble Space Telescope as part of the Frontier Fields program. The distorted images of the background galaxies are a consequence of the warped space due to Einstein's general relativity; the parallel field (right) shows no such effects. Image credit: NASA, ESA and Jennifer Lotz (STScI)



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 (\$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.

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.