PRIMEFOCUS

Tri-Valley Stargazers

December 2018

Meeting Info
What:
Holiday Potluck Dinner

Who:
Family and Friends

When:
December 21, 2018
Doors open at 6:30 p.m.
Dinner at 7:00 p.m.

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

Inside

December Meeting

Holiday Potluck Dinner and Door Prize Raffle

This month is our Holiday dinner. The doors will open at 6:30pm to set up the tables and chairs, and then the feast will begin at 7pm. TVS will provide the drinks and paper/plasticware. Jill Evanko will prepare the main course, possibly turkey and/or tri-tip. Please bring family and friends to share in the festivities. Based on the first letter of your last name, members are asked to bring a dish to share: A-D Appetizer; E-J Dessert; K-O Macaroni or Potato Salad; P-Z Green or Fruit Salad. If possible, please contact Jill to let her know what you are bringing to ensure a balanced menu (potluck"at"trivalleystargazers.org).

At the potluck we will also hold a raffle. On a strictly voluntary basis we're looking for a few members to donate small door prizes for the raffle, especially if you have something cool and astronomically themed that you'd like to share.

Time to Renew Club Membership for 2019

TVS membership is open to anyone with an interest in astronomy. Amateurs and professionals are equally welcome; skilled amateurs comprise the majority of the membership. You do not have to own a telescope in order to become 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: 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.

News & Notes

2018 and 2019 TVS Meeting Dates

Below are the TVS meeting dates for 2018 and 2019. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting (except December*).

Lecture Meeting	**Board Meeting**	Prime Focus **Deadline**
Dec. 21	Dec. 17*	
Jan. 18	Jan. 21	Dec. 28
Feb. 15	Feb. 18	Jan. 25
Mar. 15	Mar. 18	Feb. 22
Apr. 19	Apr. 22	Mar. 29
May 17	May 20	Apr. 26
Jun. 21	Jun. 24	May 31
Jul. 19	Jul. 22	Jun. 28
Aug. 16	Aug. 19	Jul. 26
Sep. 20	Sep. 23	Aug. 30
Oct. 18	Oct. 21	Sep. 27
Nov. 15	Nov. 18	Oct. 25
Dec. 20	Dec. 23	Nov. 29

TVS Election Results

By acclamation at the November meeting, the outcome of the club election is as follows:

• President: Roland Albers

• Vice President: Eric Dueltgen

• Treasurer: David Feindel

• Secretary: Ron Kane

Money Matters

As of the last Treasurer's Report on 11/19/18, our club's checking account balance is $14,076.60.

TVS Welcome to New Members

TVS would like to welcome new members Thomas Treadway and Joseph Lin, and returning member Gary Steinhour. Please say hello and chat with them at upcoming club meetings.

2019 RASC Handbooks and Calendars

In the past, the club has taken pre-orders for the Royal Astronomical Society of Canada's (RASC) annual Observer's Handbook and Observer's Calendar. We've purchased them in volume at a discount and passed the savings on to club members. Unfortunately, this club benefit has become increasingly difficult to administer, particularly distributing the materials after they arrive. So, we will no longer be offering this service. But have no fear! The Astronomical League is now offering the same benefit. If you'd like to purchase any 2019 RASC materials, please go to https://store.astroleague.org where you can still purchase them at a significant discount. Plus your RASC publications will be shipped directly to your home! For more information, go to the above website or refer to page 11 in the September issue of Reflector magazine.

Holiday Gifts: TVS Crystal Wine Glasses and Baseball Caps For Sale

TVS is offering elegant crystal wine glasses for sale to club members. You don't have to drink wine to enjoy the beautiful TVS logo-etched stemware. Use them for your favorite beverage, or they can be used as a beautiful container for small plants. They are the perfect gifts for loved ones or friends. Look for them at club meetings, where they will be sold for $10/each. Don't drink alone, buy two! Support TVS!

TVS Baseball Caps are available for purchase at a cost of $15 each. The caps are Navy Blue with an embroidered club logo. The size is adjustable with a high quality strap and buckle-no plastic here! Purchase a cap to support the club and amateur astronomy. The cap will easily identify you as a TVS member at club outreach star parties, and they will even keep your head warm.

Contact Club Treasurer David Feindel if you are interested in purchasing a wine glass or cap.

Calendar of Events

December 18, 7:00pm-8:00pm

What: Finding and Messaging ET: So What?
Who: Julia DeMarines, Doug Vakoch, Eliot Gillum, and Seth Shostak
Where: SRI Conference Center, 333 Ravenswood Ave., Menlo Park, CA 94205 (Enter from Middlefield Rd.)
Cost: Free, see the website to register

For more than four decades, astronomers have been searching for technosignatures: signals coming from distant technological civilizations. The first SETI searches began in the 1960s by searching for extraterrestrial radio waves and have more recently expanded to include optical (visible) signals, such as powerful laser pulses. We know that, like technological progress, the search is also accelerating, evolving with the development of new antenna arrays and new networks of telescopes which will soon be capable listening to the entire sky, everywhere, and all the time. It is impossible to know when we will get our first contact and what this message will say, but we know that this discovery will have an ethical and political impact on our world. And then what will happen next? Will the detection of ET be dangerous or beneficial for humankind? Will it change everything, including our place in

Header Image: This year the Geminid meteor shower peaks on the morning of December 14. Inverted image of a 2017 Geminid located near the Double Cluster, the California Nebula, and the Pleiades. Credit: Ken Sperber

Calendar of Events (continued)

the universe or will we simply continue our life knowing that 'We are not alone'?

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

December 18, 7:30pm-10:00pm

What: San Jose Astronomical Association Imaging Meeting
Who: TBD
Where: Houge Park, 3872 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/256668002/

December 29, 6:00pm - December 30 10:00am

What: Slumber with the Stars, A Family Night at the Museum
Who: Family Night
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: $85/person, includes dinner and breakfast

Slumber with the Stars, A Family Night at the Museum Science (+4) Transform the Sleepover from Pajama Party to Night of Discovery with Famous Scientists of History. Includes: flashlight tours to meet historical characters who influenced modern astronomy, dinner and breakfast buffet, Night at the Museum movie screening, planetarium show, exhibits, telescope viewing (weather permitting). Sleeping areas: exhibit halls, meeting rooms, Pleiades courtyard (weather permitting) for those who wish to bring tents.

For more information see: https://chabotspace.org/events/events-listing/ or for more information, call (510) 336-7373.

January 14, 7:30pm

What: Another Pale Blue Dot: The SETI Institute's Search for Exoplanets
Who: Dr. Franck Marchis, SETI Institute
Where: California Academy of Sciences, 55 Music Concourse 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.

In only two decades, we've gone from the mere speculation about planets beyond our solar system ("exoplanets") to being able to observe them through a variety of methods. Dr. Franck Marchis, Planetary Astronomer and chair of the exoplanet group at the SETI Institute, will discuss new and sophisticated projects which aim to image directly those exoplanets. Future instruments could soon deliver an image of a cousin of Earth, or another Pale Blue Dot, a planet similar to our own.

See www.calacademy.org/events/benjamin-dean-astronomy-lectures for lecture and reservation information.

H2O Herb Quick Dome Renovation: By Ross Gaunt

Reverse engineering someone else's work is typically difficult; you have to get 'inside their head' to understand the reasoning and purpose for what someone has engineered or designed. Such has been the case with me in the renovation of Herb Quick's dome at H2O.

With the arrival of the Celestron 14" SCT telescope over the summer, the TVS board decided to install it in the dome. The dome has been unused for many years, and I volunteered to renovate it for the C14. A couple months ago, when I first opened the shutter of the dome, I saw an old Newtonian telescope mounted on a pedestal in the center of a wooden plank floor. There were leftover signs of a large amount of infestation by local critters over the years, and crisscrossing throughout the dome was a web of wires and cables. This web was an electrical system for rotating the dome roof, raising the shutter door, and controlling the movement of the telescope. My task was to clean up the dome, mouse-proof the inside, and install a new control system for the dome and C14 telescope.

Caption: The Herb Quick Dome and telescope at H2O. Image Credit: Ross Gaunt

One of the difficulties in motorizing the dome, and especially the shutter, is that the upper half turns. Any wiring on the roof needs to move as the dome turns, and this makes for long wires strewn around the inside. Also, since the dome is used in the dark, most of the wires and cables need to be placed so that a user does not trip on them. Herb solved one trip hazard by placing cables going to the telescope under the floor, but some of the cables for the shutter motor were strung overhead. That was pretty much the only solution open to him. The overhead wires were the only wires that the mice didn't chew into.

With several trips to H2O over a few weeks I cleaned and sanitized the dome, re-caulked the seams, and installed a fine mesh screen around the outside of the dome to mitigate the mouse problem. I finally got to the point where I could tackle the maze of wires. Rather than simply cut out all the wires and cables, I decided to investigate how the system was wired as an attempt to understand why things were done in the way they were done. This was the first time that I've worked on such a project, so I wanted to learn as much as I could about Herb's control systems as a means of minimizing unforeseen problems when I installed the new control system.

As luck would have it, on one wall I found a water stained, hand drawn diagram of the wiring. It showed the location of each of the system components and the wires, but this was not a typical electrical schematic. Still, this was an enormous help. Basically there were three independent systems. One system, using two batteries, powered the telescope AZ motor and clock drive. Another system raised and lowered the shutter, and the third powered and controlled the dome rotation motors. These last two systems were powered from either of two batteries, named Alpha and Beta. The batteries were charged using a solar panel on the south side of the dome. An external switch near the dome entrance selected the battery to use and another switch activated the motor to pull the cables to open the shutter. There were magnetic limit switches, but oddly there were two limit-override switches outside on the top of the dome. It takes a ladder to access these switches. In all, there were nine switches to open and close the shutter.

Herb used a Lumicon Dual Star Drive device and a small 4-button East/West/North/South box to perform fine axis control of the telescope during astrophotography exposures. Lumicon, previously headquartered in Livermore, builds astronomy accessories; including their past system for hyper-sensitizing photographic film for astrophotography. Jack Marling, the former owner of Lumicon, is one of the founders of a brilliant astronomy club, the Tri-Valley Stargazers.

The dome roof rotation system had the simplest wiring, and yet it had a rather unexpected control device. The roof was rotated by two 12 volt, 2.5 amp motors that drove small fan-belts that were spring loaded against the underside of the roof rim. There was a three position toggle switch (left, neutral, right) on one side of the dome that would cause the motors to rotate the dome clockwise or anti-clockwise. There was no speed control.

While cleaning up the floor of the dome I found a wooden box that was not connected to any system and was not shown on the wiring diagram. With a bit of noodling, I think I figured out what clever Herb was up to. Inside the box was an upper and lower compartment. The upper section had external connection points, relays, and a flat piece of brass with a tab that rotated left or right to make contact with screws on either side. After tracing out the wiring, I found that when the tab touched the left screw, the relays closed

continued on p.5

Club Member Astrophoto: Mohamad and Abe Yassine

Image Caption: Mohamad and Abe Yassine took this image of the Horsehead Nebula (B33) and the Flame Nebula (NGC2024) on December 7, 2018. Abe suggested the target and helped with the set-up! They used a Celestron Edge HD1100 with the HyperStar 3 system and a modified Canon T3i. The total integration time was 3 hours.

Dome Renovation (continued)

to activate the motors to turn one direction, and accordingly, contact with the right screw reversed the relay contacts and drove the motors in the opposite direction. So was this just a complicated, redundant system to rotate the roof?

Herb, what's going on?

It was the lower compartment of the box that revealed the answer. On the upper compartment there was a cut-out window where I could see a black object underneath with a label: 27 MHz. Oh, could this be a pulse modulation clock system for rotating the dome at a sidereal rate? With anticipation I unscrewed the upper section's lid and opened up the lower compartment. Inside was the mysterious black object that nearly filled the compartment. Uh, it had 4 wheels, more like tires!? I picked it up and turned it over to find it was a toy remote controlled Acura NSX. Well, at least Herb had good taste in cars. Still, what on earth was the purpose of the toy car? In the box the car sat bottom up. I found that the brass tab on the upper compartment had a piece that went down to the lower section of the box and then was formed into a two prong fork that perfectly fit around the sides of the upturned front left wheel of the car. When the wheel turned one way it rotated the brass tab to contact the left screw, thus activating the dome rotation motors. And of course, when the wheel was turned to the right, the tab made contact with the other screw and causing the dome to rotate in the opposite direction. So now it became clear. Rather than a sidereal clock, this was a means of remotely turning the dome at the telescope and being free of any wires that a user could trip over in the dark. While guiding the telescope during a photographic exposure, Herb could also keep the shutter opening clear for the telescope's view using a cheap wireless remote controlled toy car. Genius!

Caption: A radio-controlled car was an integral component of Herb's mechanism for dome rotation. Image Credit: Ross Gaunt

continued on p.6

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

All times are Pacific Standard Time

December

13-14	Thu	Geminid Meteor shower peaks on the morning of the 14th
14	Fri	The Moon and Mars are separated by 4° in the southeast (Evening)
15	Sat	First-Quarter Moon (4:49am)
19	Wed	Algol at minimum brightness for 2 hours centered on 11:47pm PST
20-21	Thu	The almost full Moon is near the Hyades (All Night)
21	Fri	Jupiter and Mercury are less than 1° in the southeast (Predawn)
22	Sat	Full Moon (10:49am)
22	Sat	Algol at minimum brightness for 2 hours centered on 8:36pm PST
24-25	Mon	The Moon passes 0.5° - 4° from M44, the Beehive Cluster (All Night)
29	Sat	Last-Quarter Moon (1:34am)

January

1-	Tue-	The crescent Moon and Venus are in Libra. The Moon passes Jupiter over the next few days (Early Morning)
3	Thu	This evening the Quadrantid meteor shower peaks over North America
5	Sat	New Moon (5:28pm)
11	Fri	Algol at minimum brightness for 2 hours centered on 10:21pm PST
13	Sun	First-Quarter Moon (10:46pm)
20	Sun	Full Moon: Total Lunar Eclipse Visible; see January S&T, p.18 (9:16pm)
22	Tue	Venus within about 2.5° of Jupiter and Antares 8° away (Dawn)
23	Wed	Saturn appears low in the southeast; binoculars suggested (Dawn)
27	Sun	Last-Quarter Moon (1:10pm)
30	Wed	Venus and Jupiter are flanked by the Moon and Saturn (Dawn)

Dome Renovation (continued)

The dome's new modern control systems, hopefully, will be installed with the C14 by next spring. We plan to have an ASCOM system that will communicate with the telescope to get its RA and DEC positions, and that information will be used to move the dome's shutter opening as needed to keep pace with the movement of the telescope. There will be 12 volt outlets to power a laptop, as well as USB connections for cameras and filters. This should make the C14 a great telescope for visual and planetary observations and imaging. For reasons of simplicity, the shutter door will be opened manually. It's an easy task to raise the door. Perhaps, if the need arises, a motorized shutter system could be installed at some later time.

It's been a rather eye-opening experience renovating the dome. There is a great deal of work still to be done, including the procurement of a mount for the telescope, controller boards, batteries, and a solar panel battery charging system. Donations to the club to help defray the cost of these systems will be greatly appreciated. I for one, am looking forward to spending a long night of observing with the C14 in the near future. I think I'll place the car in a nice clear box and put it in a place of honor inside the dome.

NASA Night Sky Notes

Observe Apollo 8's Lunar Milestones

By David Prosper

December marks the 50th anniversary of NASA's Apollo 8 mission, when humans first orbited the Moon in a triumph of human engineering. The mission may be most famous for "Earthrise," the iconic photograph of Earth suspended over the rugged lunar surface. "Earthrise" inspired the imaginations of people around the world and remains one of the most famous photos ever taken. This month also brings a great potential display of the Geminids and a close approach by Comet 46P/Wirtanen

Image Caption: Earthrise, 1968. Note the phase of Earth as seen from the Moon. Nearside lunar observers see Earth go through a complete set of phases. However, only orbiting astronauts witness Earthrises; for stationary lunar observers, Earth barely moves at all. Why is that? Credit: Bill Anders/NASA

You can take note of Apollo 8's mission milestones while observing the Moon this month. Watch the nearly full Moon rise just before sunset on December 21, exactly 50 years after Apollo 8 launched; it will be near the bright orange star Aldebaran in Taurus. The following evenings watch it pass over the top of Orion and on through Gemini; on those days five decades earlier, astronauts Frank Borman, Jim Lovell, and Bill Anders sped towards the Moon in their fully crewed command module. Notice how the Moon rises later each evening, and how its phase wanes from full on Dec 22 to gibbous through the rest of the week. Can you imagine what phase Earth would appear as if you were standing on the Moon, looking back? The three brave astronauts spent 20 sleepless hours in orbit around the Moon, starting on Dec 24, 1968. During those ten orbits they became the first humans to see with their own eyes both the far side of the Moon and an Earthrise! The crew telecast a holiday message on December 25 to a record number of Earthbound viewers as they orbited over the lifeless lunar terrain; "Good night, good luck, a merry Christmas and God bless all of you - all of you on the good Earth." 50 years later, spot the Moon on these holiday evenings as it travels through Cancer and Leo. Just two days later the astronauts splashed down into the Pacific Ocean after achieving all the mission's test objectives, paving the way for another giant leap in space exploration the following year.

The Geminids, an excellent annual meteor shower, peaks the evening of December 13 through the morning of the 14th. They get their chance to truly shine after a waxing crescent Moon sets around 10:30 pm on the 13th. Expert Geminid observers can spot around 100 meteors per hour under ideal conditions. You'll spot quite a few meteors by avoiding bad weather and light pollution if you can, and of course make sure to bundle up and take frequent warming breaks. The Geminids have an unusual origin compared to most meteor showers, which generally spring from icy comets. The tiny particles Earth passes through these evenings come from a strange "rock comet" named asteroid 3200 Phaethon. This dusty asteroid experiences faint outbursts of fine particles of rock instead of ice.

You can also look for comet 46P/Wirtanen while you're out meteor watching. Its closest approach to Earth brings it within 7.1 million miles of us on December 16. That's 30 times the average Earth-Moon distance! While passing near enough to rank as the 10th closest cometary approach in modern times, there is no danger of this object striking our planet. Cometary brightness is hard to predict, and while there is a chance comet 46P/Wirtanen may flare up to naked eye visibility, it will likely remain visible only via binoculars or telescopes. You'll be able to see for yourself how much 46P/Wirtanen actually brightens. Some of the best nights to hunt for it will be December 15 and 16 as it passes between two prominent star clusters in Taurus: the Pleiades and the V-shaped Hyades. Happy hunting!

Catch up on all of NASA's past, current, and future missions at nasa.gov

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info 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 ($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).

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