

PRIMEFOCUS

Tri-Valley Stargazers



August 2016



Meeting Info

What:

The Evolution of the Reflector Telescope, Pt. 1

Who:

Dr. Kenneth Lum

When:

August 19, 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

Inside

News & Notes	2
Star Party Report	2
Calendar of Events	2
Journal Club	4
RTMC 2016	5
What's Up	6
NASA's Space Place	7
Membership/Renewal Application	8

August Meeting

The Evolution of the Reflector Telescope, Pt. 1

Dr. Kenneth Lum

The reflecting astronomical telescope, making use of mirrors, was invented by Sir Isaac Newton in 1668 as a solution to the problem of chromatic aberration in refracting telescopes that use lenses. Initial versions of reflectors suffered from unreliable mirror making technologies based on metal mirrors and lagged behind the technology of refractors after the invention of the achromatic lens in the mid-18th Century. This changed dramatically in the late 19th Century with the coming of the ability to apply high efficiency reflective coatings to glass mirrors, better ways to test the accuracy of their surfaces, and improved mechanical telescope mountings. I will discuss the early history of the people who were most responsible for this change to the dominant telescope technologies used today.

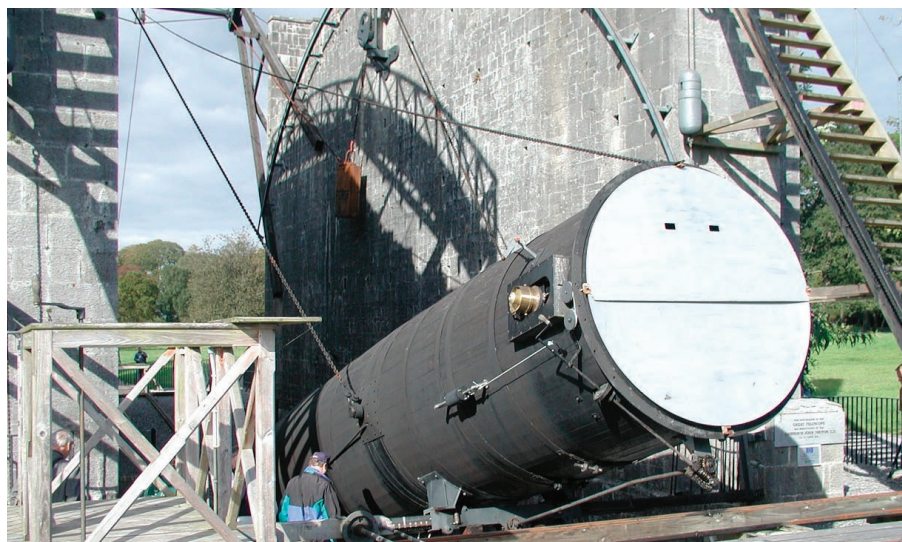


Image Caption: The 72" "Leviathan of Parsonstown" reflector telescope of William Parsons, 3rd Earl of Rosse, in Parsonstown, Ireland (1845). Credit: Dr. Kenneth Lum

Dr. Kenneth Lum is retired from the practice of Emergency Medicine. Since high school, he has also been an enthusiastic amateur astronomer, having built two telescopes at the Adler Planetarium in Chicago and a large Newtonian reflector when he reentered amateur astronomy in 1986. He pursued an interest in astronomical photography during the 1990s and continues to study the history of astronomy and astronomical instrumentation. Dr. Lum is currently interested in ways to enhance the performance of small telescopes with the use of a photomultiplier eyepiece and astronomical video cameras. Since 1994, he has been traveling with the Antique Telescope Society almost annually visiting different historical astronomical observatories.

News & Notes

2016 TVS Meeting Dates

The following lists the TVS meeting dates for 2016. 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. 19	Aug. 22	
Sep. 16	Sep. 19	Aug. 26
Oct. 21	Oct. 24	Sep. 30
Nov. 18	Nov. 21	Oct. 28
Dec. 16	Dec. 19	Nov. 25

Money Matters

As of the last Treasurer's Report on 7/18/16, our club's checking account balance is \$13,152.67.

Club Star Parties

This year's club star parties will be held on:

Saturday 8/27/16: H2O Open House

Friday 9/02/16: The Muslim Community Center, Pleasanton

Saturday 9/24/16: Tesla Winery Star Party

The August 27 H2O Open House will be open to all club members and the public. We will meet at the corner of Mines and Tesla and leave for H2O at 6:00 PM. 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.

For the September 2 star party at the at the Muslim Community Center in Pleasanton, Eric Dueltgen is looking for volunteers to bring telescopes and/or binoculars. Information about the meeting time, etc., will be posted on the TVS Yahoo group.

The September 24 Tesla Winery Star Party will be open to club members and their guests. Start and end times for the parties will be announced later, but we usually plan to arrive at the observing site about 30 minutes before sunset and wrap up around midnight. For those wishing to participate, each party will have a different observing theme. Suggestions include lunar features observing, planetary night, star cluster observing, beginner's night, and constellation identification. If you have an idea for another theme, please mention it to a board member during any meeting.

Tesla Star Party Report By R. Albers

The July Club Star Party, held at Tesla Vintners, was a success. Over a dozen club members and guests attended. The focus

of the evening was locating and observing all eight planets, and everyone present participated in the challenge. We found both Venus and Mercury low in the western sky shortly after sunset, with everyone observing both planets with unaided eyes, binoculars, and telescopes. Jupiter, Mars, and Saturn were well-placed to observe throughout the night and seeing was good enough to make out Saturn's Cassini division. Neptune rose later in the evening, and as it climbed higher in the sky its distinctive deep blue hue became more and more apparent. Most attendees were content with ending their planetary tour there, but a few of us stayed until midnight to complete the challenge by observing Uranus rise in the east, just over the competing lights from Wente. This was a first for me, seeing all the planets in one evening!

The only minor disappointment of the night was failing to locate asteroid Pallas. It turns out that Stellarium does not chart it accurately. I'm looking forward to finding it during the August 27th Open House using some different charting software.

Calendar of Events

August 16, 12:00pm

What: SETI Institute REU Students Lightning Talks
Who: REU Students
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

The SETI Institute REU students Class of 2016 will summarize their summer projects in exciting 3 minute lightning talks!

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

August 23, 12:00pm

What: Characterizing the Coldest Exoplanets
Who: Andrew Skemer, UC Santa Cruz
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

The coldest known exoplanets are still much hotter than the gas giant planets in our own Solar System. Pushing to colder temperatures requires observing in the thermal infrared (3-5 microns) where self-luminous gas-giants peak in brightness.

Header Image: The 200-inch Hale telescope at Mt. Palomar. Image Credit: Ken Sperber

Calendar of Events (continued)

Dr. Skemer will present observational studies characterizing the atmospheres of the coldest exoplanets and the coldest brown dwarf. These observations include a planet whose metallicity is higher than its host star, and a 250 K brown dwarf which shows signs of water clouds. Additionally, he will describe a new instrument that can obtain spectroscopy of directly imaged planets from 3-5 microns.

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

August 30, 12:00pm

What: GeneLab: A Systems Biology Platform for Omics Data from the ISS
Who: Oana Marcu, SETI Institute and NASA Ames
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.

September 6, 12:00pm

What: Triggering Big Bursts of Star Formation in Blue Compact Dwarf Galaxies
Who: Trisha Ashley, Bay Area Env Res Institute
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

Dwarf galaxies tend to form stars inefficiently. Yet, blue compact dwarf (BCD) galaxies are a subset of dwarf galaxies that have intense and concentrated star formation (compared to typical dwarf galaxies). BCDs are thought to require a large disturbance to trigger their burst of star formation. A common theory is that the enhanced star formation in a BCD is

the result of an interaction with another galaxy or a dwarf-dwarf galaxy merger. However, many BCDs are relatively isolated from other galaxies, making an interaction or a merger a less likely starburst trigger.

As part of the atomic hydrogen dwarf galaxy survey, LITTLE THINGS*, Dr. Ashley has studied the gaseous properties of six BCDs. Atomic hydrogen data allow us to explore the velocity fields and morphologies of the gas in BCDs, which may contain signatures of star formation triggers, such as gas consumption, a past merger, and interaction with previously undetected companions. If BCDs have formed through gas consumption or dwarf-dwarf mergers, then they would be useful analogs for galaxy formation in the early universe. Also, learning which large disturbance has triggered the burst of star formation in BCDs could be useful for understanding and modeling how/whether BCDs evolve into/from other types of dwarf galaxies

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

September 10, 8:00pm

What: Shining Light on the Dark Side with Lasers and Atoms
Who: Dr. Holger Müller, UC Berkeley
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free

Multiple lines of astronomical evidence demonstrate the existence of dark matter and dark energy — mysterious stuff whose gravity holds galaxies together and drives the accelerated expansion of the universe. Precision measurements in physics are suitable for searching for ultralight dark-sector candidates.

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

continued on page 4

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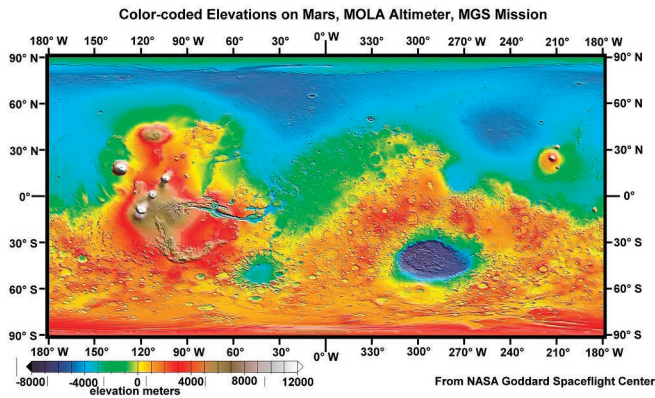
TVS E-Group

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.

Journal Club By Ken Sperber

Surfing with the Alien

If you have ever seen a topographic map of Mars you've noticed that the Northern Hemisphere (NH) tends to be at lower elevation than the Southern Hemisphere (SH) (see below). This was determined by the Mars Global Surveyor Mars Orbiter Laser Altimeter (MOLA), which provided "maps precise to within about 30 centimeters in the vertical dimension.



Caption: Topographic Mercator projection map of Mars based on Mars Orbital Laser Altimeter data created by the MOLA team at Goddard Space Flight Center, NASA. Blue indicates locations where the surface is substantially lower than the average planet elevation.

Another feature of the NH is that it is relatively devoid of craters compared to the SH. Combining the altimetry data, the relative lack of craters, the presence of hydrated minerals, and the apparent presence of river channels suggests that an ocean was present in the northern lowlands about 3.4 billion years ago. The altimetry data indicates the locations of outflow channels, and with sufficient vertical resolution that one can distinguish catastrophic outflows that lie on top of one another, such as that observed at Chryse Planitia. There, two overlapping layers are confirmed by nighttime infrared observations that show temperature differences due to their different surface types, as discussed in Rodriguez et al. 2016, *Scientific Reports*, doi: 10.1038/srep25106). By evaluating how the flows interacted with obstructions, such as mesas, and the distribution of boulder debris, the authors contend that the overlapping layers were formed by separate tsunamis that were caused by meteor impacts in the northern ocean. The lowest layer, caused by the first tsunami, features many boulders up to 10m in size, typical of the boulder sizes that are transported by terrestrial tsunamis. After riding up the surrounding higher elevation ground, the tsunami then rushed back to the ocean creating visible backwash channels.

The second tsunami is estimated to have occurred tens of millions of years later, when Mars was colder. During the intervening time since the first tsunami, some of the ocean had

evaporated with sea-level having dropped by about 300 meters, and the ocean partially froze. When the second tsunami occurred, the icy water quickly froze as it flowed over the cold terrain, creating icy lobate fronts, and therefore leaving no evidence of a backwash phase.

Both tsunamis were more powerful than those that typically occur on Earth, with flooding pushing nearly 650 kilometers inland from the seashore. The authors estimate that the meteorites that caused these Martian tsunamis would have created craters about 30km in diameter, and their occurrence separated of tens of millions of years is consistent with estimates of the how often such big impacts would occur.

The authors speculate that if life evolved in the early Martian Ocean it is possible that fossils might be contained in the icy lobate fronts of the second tsunami. This will surely promote discussion about targeting future Martian surface landers to the icy lobate fronts.

Editor's Comment: Speaking for myself, making it clear that I am not a planetary geologist/astrobiologist, why not put a lander down in the Northern Hemisphere near the deepest portion of the early sea? This could be where a concentration of fossils might be located from the last vestiges of a sea. Also, there would be more atmosphere above that would make it easier to deliver a larger instrument package to the surface.

For more information see: <http://www.nature.com/articles/srep25106> (this article is open source and available for download by anyone), and http://mars.nasa.gov/mgs/mission/sc_instruments.html

RTMC 2016, Then and Now By Alan B. Gorski

This year's Riverside Telescope Makers Conference (RTMC) did not disappoint when it came to nice weather, clear skies, and good seeing every night. While I enjoyed the relaxed pace, I do miss the wonderment of my first RTMC in 1979.

Back then, I was President of the Tacoma (WA) Astronomical Society, and four of us flew to Ontario, CA where we rented a big green station wagon. We made our way to Big Bear Lake via the "Rim of the World Drive" (aka Route 18) which was quite an experience. There wasn't much traffic that year because the US was in the midst of an Energy Crisis and some service stations were out-of-gas. Most everyone that drove to RTMC brought a telescope and there were plenty to look through. On Friday night, "Show and Tell" went on for four hours for a standing room only crowd.

That year, for some reason, I was the Saturday night keynote speaker and I spoke on color slide enhancement using a Spiratone slide duplicator. Most of the slides were taken through a Celestron 5.5" f/1.65 Schmidt Camera which produced really great photos in about 20 minutes using Ektachrome 100.

Today, RTMC is under "New Leadership" and has regained some momentum. My guess is that the 2016 attendance was

about 500, one third of what it used to be. I plan on giving a talk next year on digital astrophotography. It's the least I can do to help make RTMC great again.



Image Credit: At the RTMC meeting, Alan Gorski took this image of a beautiful 8.5" refractor.



Image credit: Alan Gorski took this image of M27, the Dumbbell Nebula, at the 2016 RTMC. He used a Canon 6D full frame - enhanced DSLR on a TeleVue NP127 f/5.2 APO. The image duration was 160 seconds at ISO 3200. Inset is a magnified view of M27. A tumbling satellite passed through the field of view, exhibiting pronounced brightness variations.

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

All times are Pacific Daylight Time.

August

- 11- Thu- Watch for Sirius to rise in the east-southeast about 20 minutes before sunrise
- 11 Thu The Perseid meteor shower peaks on the morning of August 12
- 18 Thu Full Moon (2:26pm)
- 23-24 Tue- Saturn, Mars, and Antares form a vertical line about 6 degrees long (Evening)
- 24 Wed Last-Quarter Moon (8:41pm)
- 27 Sat Venus and Jupiter close together very low in the west (Dusk)

September

- 1 Thu New Moon (2:03am)
- 4 Sun Spica is ~5 degrees to the lower-left of the thin crescent Moon (Dusk)
- 8 Thu Saturn (Mars) within 4 degrees (9 degrees) of the Moon (Evening)
- 9 Fri First-Quarter Moon (4:49am)
- 16 Fri Full Moon (12:05pm)
- 22 Thu Autumn begins in the Northern Hemisphere (7:21 am)
- 23 Fri Last-Quarter Moon (2:56am)



Image Caption: TVS members eagerly awaiting the food from the grill at the July meeting. Prior to the food being served we had nice views of the Sun through the club's Lunt telescope. After dinner, many gathered to watch Mars, Saturn, and Antares emerge from the dusk. Image credit: Ken Sperber

Venus and Jupiter prepare for their close-up this August

By Dr. Ethan Siegel

As Earth speeds along in its annual journey around the Sun, it consistently overtakes the slower-orbiting outer planets, while the inner worlds catch up to and pass Earth periodically. Sometime after an outer world—particularly a slow-moving gas giant—gets passed by Earth, it appears

to migrate closer and closer to the Sun, eventually appearing to slip behind it from our perspective. If you've been watching Jupiter this year, it's been doing exactly that, moving consistently from east to west and closer to the Sun ever since May 9th.

On the other hand, the inner worlds pass by Earth. They speed away from us, then slip behind the Sun from west to east, re-emerging in Earth's evening skies to the east of the Sun. Of all the planets visible from Earth, the two brightest are Venus and Jupiter, which experience a conjunction from our perspective only about once per year. Normally, Venus and Jupiter will appear separated by approximately 0.5° to 3° at closest approach. This is due to the fact that the Solar System's planets don't all orbit in the same perfect, two-dimensional plane.

But this summer, as Venus emerges from behind the Sun and begins catching up to Earth, Jupiter falls back toward the Sun, from Earth's perspective, at the same time. On August



27th, all three planets—Earth, Venus and Jupiter—will make nearly a perfectly straight line.

As a result, Venus and Jupiter, at 9:48 PM Universal time, will appear separated by only 4 arc-minutes, the closest conjunction of naked eye planets since the Venus/Saturn conjunction in 2006. Seen right next to one another, it's startling how much brighter Venus appears than Jupiter; at magnitude -3.80 , Venus appears some eight times brighter than Jupiter, which is at magnitude -1.53 .

Look to the western skies immediately after sunset on August 27th, and the two brightest planets of all—brighter than all the stars—will make a dazzling duo in the twilight sky. As soon as the sun is below the horizon, the pair will be about two fists (at arm's length) to the left of the sun's disappearance and about one fist above a flat horizon. You may need binoculars to find them initially and to separate them. Through a telescope, a large, gibbous Venus will appear no more distant from Jupiter than Callisto, its farthest Galilean satellite.

As a bonus, Mercury is nearby as well. At just 5° below and left of the Venus/Jupiter pair, Mercury achieved a distant conjunction with Venus less than 24 hours prior. In 2065, Venus will actually occult Jupiter, passing in front of the planet's disk. Until then, the only comparably close conjunctions between these two worlds occur in 2039 and 2056, meaning this one is worth some special effort—including traveling to get clear skies and a good horizon—to see!

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!

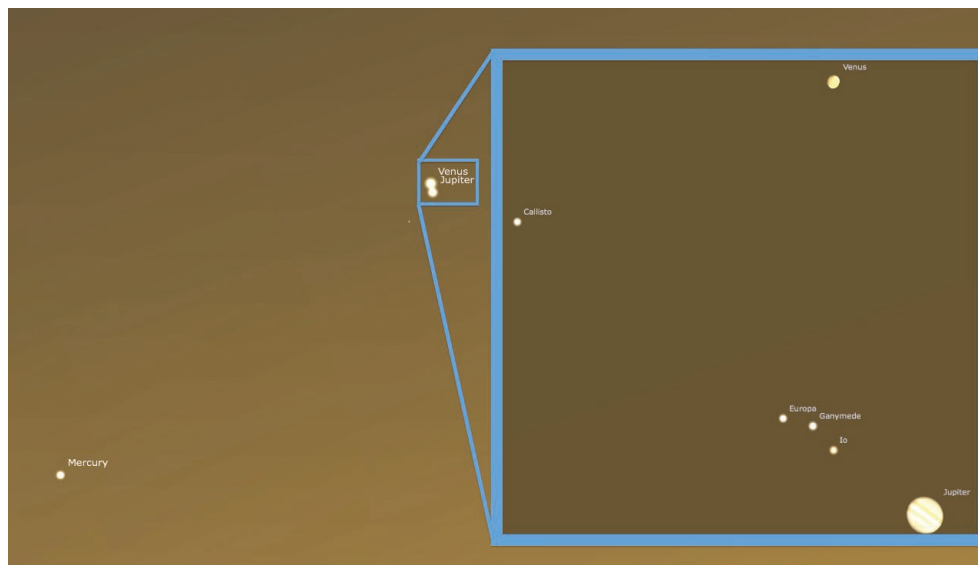


Image credit: The western sky as it will appear on August 27, just after sunset from the United States. Venus and Jupiter are separated by less than 6 arc-minutes. The inset shows Venus and Jupiter as they'll appear through a very good amateur telescope. Created by E. Siegel with Stellarium.



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.