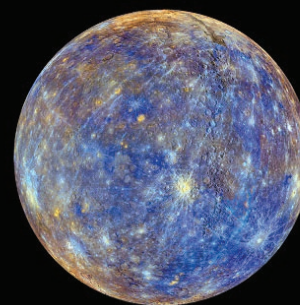


PRIMEFOCUS

Tri-Valley Stargazers



September 2019



Meeting Info Spacecraft Thermal Control

Who:
Kenji Ozawa

When:
September 20, 2019
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

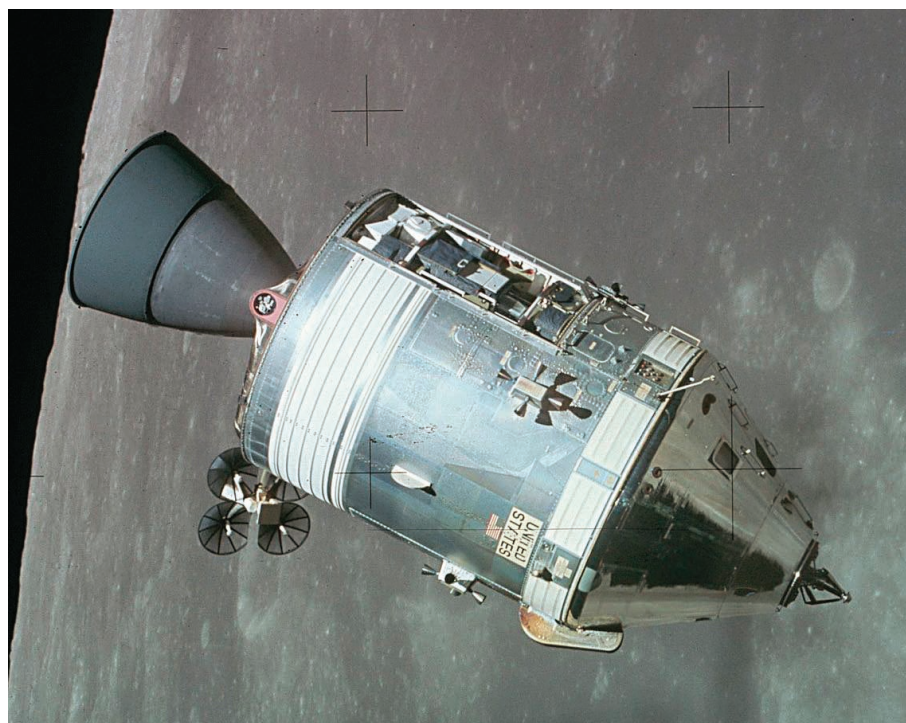
News & Notes	2
Calendar of Events	2
Upcoming Mercury Transit	4
Member Astrophotos	4-5
What's Up	6
NASA Night Sky Notes	7
Membership/Renewal Application	8

September Meeting

Spacecraft Thermal Control

By Kenji Ozawa

In this presentation I will discuss the role of Thermal Engineers on the spacecraft design team and explore the use of conduction and thermal radiation (the two dominant modes of heat transfer in a vacuum) to control the temperature of the spacecraft.



Caption: The Apollo 15 Command Service Module (CSM) in lunar orbit as photographed from the Lunar Module (LM). On the Service Module, scientific instruments are visible. While the CSM and LM were insulated, prolonged exposure to sunlight or deep space would result in extreme temperatures that would overheat and freeze opposite sides of the vehicle. Thus, while enroute to the Moon and back to Earth the spacecraft was put into a "barbecue roll" to prevent it from becoming too hot or too cold. Image Credit: NASA

Kenji Ozawa has been a Thermal Engineer for the last 9 years in commercial aerospace. He spent the first half of his career working on geosynchronous communication satellites for SSL (now Maxar) followed by his current role at Planet where he leads the Thermal Engineering team. At Planet he is accountable for the thermal performance of the largest constellation of earth observing spacecraft in history in addition to the analysis, testing, and design of thermal subsystems for all new projects.

News & Notes

2019 TVS Meeting Dates

Below are the TVS meeting dates for 2019. 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
Sep. 20	Sep. 23	
Oct. 18	Oct. 21	Sep. 27
Nov. 15	Nov. 18	Oct. 25
Dec. 20	Dec. 23	Nov. 29

Money Matters

As of the last Treasurer's Report on 7/15/19, our club's checking account balance is \$14,161.15.

TVS Welcome to New Members

TVS would like to welcome new members Patel Aronov, Paul Caffrey, John Forrest, Diana Jine, Jeffrey Justeson, JinHyoung Oh, Sanjay Virkar, and Kai Yung. Please say hello and chat with them at upcoming club meetings.

Outreach Star Parties

October 1: John Green Elementary School, 3300 Antone Way, Dublin, set-up at 6:30pm

October 3: Livermore Library, 1188 S. Livermore Ave., Livermore, set-up at 6:30pm

October 5: Del Valle (Arroyo Staging Area), set-up at 6:00pm

Club Star Parties

September 21: Tesla Vintners, set-up at 6:30pm. The observing theme is Planetary Nebulae!

Del Valle star parties are joint public outreach and club star parties. They are jointly hosted with the EBRPD and held at the Arroyo Staging Area. The public is invited for the first 1.5-2 hours, while club members can stay the remainder of the night.

Tesla Vintners star parties are open to only club members and their guests. These star parties end at midnight, but participants can leave earlier, should they wish.

H2O star parties are open to the public. The open house ends at midnight, and all participants are encouraged to stay the duration. The drive to H2O takes about 1 hour, and the caravan leaves promptly from the corner of Mines and Tesla Rds.

CalStar Star Party

The CalStar Star Party will be held on September 25-28. The location is only 3 hours away at Lake San Antonio in southern Monterey County. CalStar, a loosely organized party with no registration and no structure, is held at the County park. Just show up and pay the camping fee and join the group of about 100 star gazers in a section of the park reserved for us.

For more information see: <https://calstar.observers.org/>

Calendar of Events

September 21, 11:00am

What: Our Changing Atmosphere: Evidence that Demands a Verdict?

Who: Prof. Jeffrey Raimer, UC Berkeley

Where: UC Berkeley, Genetics and Plant Biology Building, Room 100 (northwest corner of campus)

Cost: Free, limited hourly pay parking on/nearby campus. The venue is 15-20 minute walking distance from BART and bus lines.

Many people are aware of climate change only by way of public discourse and social media. Drawing on recent scientific papers organized for a course he teaches at Berkeley, Jeff Reimer will show how the atmosphere is changing, that humans are the cause, and that there are consequences. These consequences may be viewed in the context of Earth's historical carbon cycles, which demonstrate well what the Earth will look like unless we consider every possible means to decarbonize the atmosphere. Reimer's research is focused on carbon capture and sequestration and will therefore end his talk by showing how such capture is becoming increasingly feasible.

For more information see: <http://scienceatcal.berkeley.edu/the-sciencecal-lecture-series/>

September 24, 7:15pm

What: Gravitational Lensing

Who: Dr. Emmanuel Schaan, LBL

Where: Mt. Diablo Astronomical Society, Lindsay Wildlife Experience, Community Room, 1931 First St., Walnut Creek, CA 94597

Cost: Free.

No details available.

For more information see: https://nightsky.jpl.nasa.gov/event-view.cfm?Event_ID=95251

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

What: First Friday: Spooky Science

Who: Staff

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

Cost: \$5

If there's something strange in your neighborhood, who you gonna call? Scientists! October's First Friday is all about spooky science. Learn about the science of fear, say hello to some creepy crawlers, and hear scientific explanations for

Header Image: Enhanced image of Mercury, taken by the MESSENGER Orbiter, to show chemical, mineralogical, and physical differences across the surface. Credit: NASA

Calendar of Events (continued)

things that go bump in the night. Science is so fun, it's scary!

For more information see: <https://chabot.space.org/calendar/first-friday-the-great-outdoors/> or call (510) 336-7373.

October 4, 7:00pm-8:00pm

What: Intro to the Night Sky
Who: David G.
Where: Houge Park, 3972 Twilight Drive, San Jose, CA
Cost: Free

At our "Intro to the Night Sky" talk, learn about what's happening in the night sky in the coming month and what you can see from your own backyard in San Jose. Afterward take a walk down telescope row at our In-Town Star Party. The class and the star party are free, no reservations, just show up!

For more information, see: <https://www.meetup.com/SJ-Astronomy/events/257516271/>

October 5, 7:00pm

What: Mission: Mars
Who: Robert McGehee, Doctoral Candidate, Physics Department, UC Berkeley
Where: Mt. Tamalpais State Park, Cushing Memorial Amphitheater, more commonly known as the Mountain Theater, Rock Spring parking area
Cost: Free.

Dark matter is the cosmic parent of all vast structures in the night sky, including our own Milky Way galaxy. Yet, we know so little about this mysterious stuff that constitutes over 80% of the material universe. This talk will illuminate our universe's elusive dark matter, highlighting the ingenious methods that scientists use to search for it.

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

October 7, 7:30pm

What: Near Earth Asteroids, Space Missions, and the Impact Hazard
Who: Michael Busch, 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.

The near-Earth asteroids (NEAs) are a population of objects on orbit around the Sun that cross or come near the orbit of Earth; remnants of material from the early solar system that never accreted into planets. NEAs are accessible targets for space missions, but also pose a hazard due to potential future impacts onto Earth. Dr. Busch will review the near-Earth population and efforts to address the asteroid impact hazard. He will also discuss past, current, and future missions to near-Earth asteroids, including missions by NASA, ESA, JAXA, the Chinese National Space Agency, and potentially other groups

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

Officers

President:
 Roland Albers
president@trivalleystargazers.org

Vice-President:
 Eric Dueltgen
vice_president@trivalleystargazers.org

Treasurer:
 David Feindel
treasurer@trivalleystargazers.org

Secretary:
 Ron Kane
secretary@trivalleystargazers.org

Past President:
 Rich Combs
past_president@trivalleystargazers.org

Volunteer Positions

Astronomical League Rep.:
 Dennis Beckley
alrep@trivalleystargazers.org

Club Star Party Coordinator:
 Eric Dueltgen
coordinator@trivalleystargazers.org

Del Valle Coordinator:
 David Feindel
delvalle@trivalleystargazers.org

Historian:
 Hilary Jones
historian@trivalleystargazers.org

Internat. Dark-Sky Assoc. Rep.:
 Aadi Duggal
darksky@trivalleystargazers.org

Librarian:
 Ron Kane
librarian@trivalleystargazers.org

Loaner Scope Manager:
 Ron Kane
telescopes@trivalleystargazers.org

Night Sky Network Rep.:

Ross Gaunt
nnsn@trivalleystargazers.org

Newsletter Editor:
 Ken Sperber
newsletter@trivalleystargazers.org
 925-361-7435

Observatory Director/Key Master:
 Chuck Grant
observatory@trivalleystargazers.org

Outreach Coordinator:
 Eric Dueltgen
outreach@trivalleystargazers.org

Potluck Coordinator:
 Jill Evanko
potluck@trivalleystargazers.org

Program Coordinator:
 Dan Helmer
programs@trivalleystargazers.org

Publicity Coordinator:
 Jim Theberge
publicity@trivalleystargazers.org

Refreshment Coordinator:

Laurie Grefsheim

Webmaster:
 Hilary Jones
webmaster@trivalleystargazers.org

Web & E-mail
www.trivalleystargazers.org
info@trivalleystargazers.org

TVS E-Group

To join the TVS e-group just send an e-mail message to the TVS e-mail address (info@trivalleystargazers.org) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.

TVS Patron Member Orientation



Image Caption: Jack Marling (3rd from left), one of the founding members of TVS, one of the builders of the observatory, and builder of the observatory's Coulter 17.5" telescope and original mount, was on hand for the Patron Member Orientation Night on August 31. The goal was to instruct Patron members on how to operate the new computer controlled mount and electrical system, as well as general observatory procedures. Seen from l. to r. are Roland Albers, Chuck Grant, Jack Marling, David Feindel, Eric Dueltgen, Ross Gaunt, and Gert Gottschalk. Image Credit: Gert Gottschalk.

Mercury Transit By Ken Sperber

Mercury will transit the Sun on Monday, November 11. The transit will be in progress when the Sun rises at about 6:44am. At 7:20am Mercury will be at greatest transit, when it is closest to the center of the Sun, and the eclipse will end at 10:05am. For observing or imaging, be sure to select a location with a clear eastern horizon. In this case, the club observing site (H2O) will not be optimal, since the Sun will not clear the eastern hills until about 7:30am. That being said, the best views will occur toward the end of the transit when the Sun is higher in the sky, and one is not looking through as much atmosphere.

The disk of Mercury only spans about 1/194 of the solar disk, and it will appear as an ink-black spot. Dr. Fred Espenak (Mr. Eclipse) recommends that a magnification of at least 50x will be needed to see Mercury. To observe and/or image the transit you will need to use either a white light solar filter or a solar Hydrogen-alpha (H-alpha) filter/telescope. NOTE: DO NOT

USE A NIGHTSKY H-ALPHA FILTER FOR OBSERVING THE SUN. While sunspots are visible in both types of filters, much more surface detail and solar prominences are visible in solar H-alpha filters. White light filters are relatively inexpensive, while solar H-alpha filters/telescopes are typically \$1000+. Thousand Oaks Optical (<http://thousandoaksoptical.com/>) makes white light filters for a wide variety of telescopes and camera zoom lenses. Orion Telescopes (<https://www.telescope.com/>) also sells white light filters for a variety of instruments, and they also sell solar H-alpha telescopes manufactured by Coronado. Lunt Solar Systems (<https://luntsolarsystems.com/>) also sells solar H-alpha telescopes (TVS owns a Lunt H-alpha telescope). See Gert Gottschalk's webpage for solar H-alpha images taken through his Lunt telescopes (http://www.trivalleystargazers.org/gert/Astro_en.htm)

Only about 13 Mercury transits occur per century, and the next Mercury transit will not occur until November 13, 2032, so you'd better be prepared for the upcoming event.

For more information, see: <http://www.eclipsewise.com/oh/tm2019.html>.

TVS Member Astrophotos

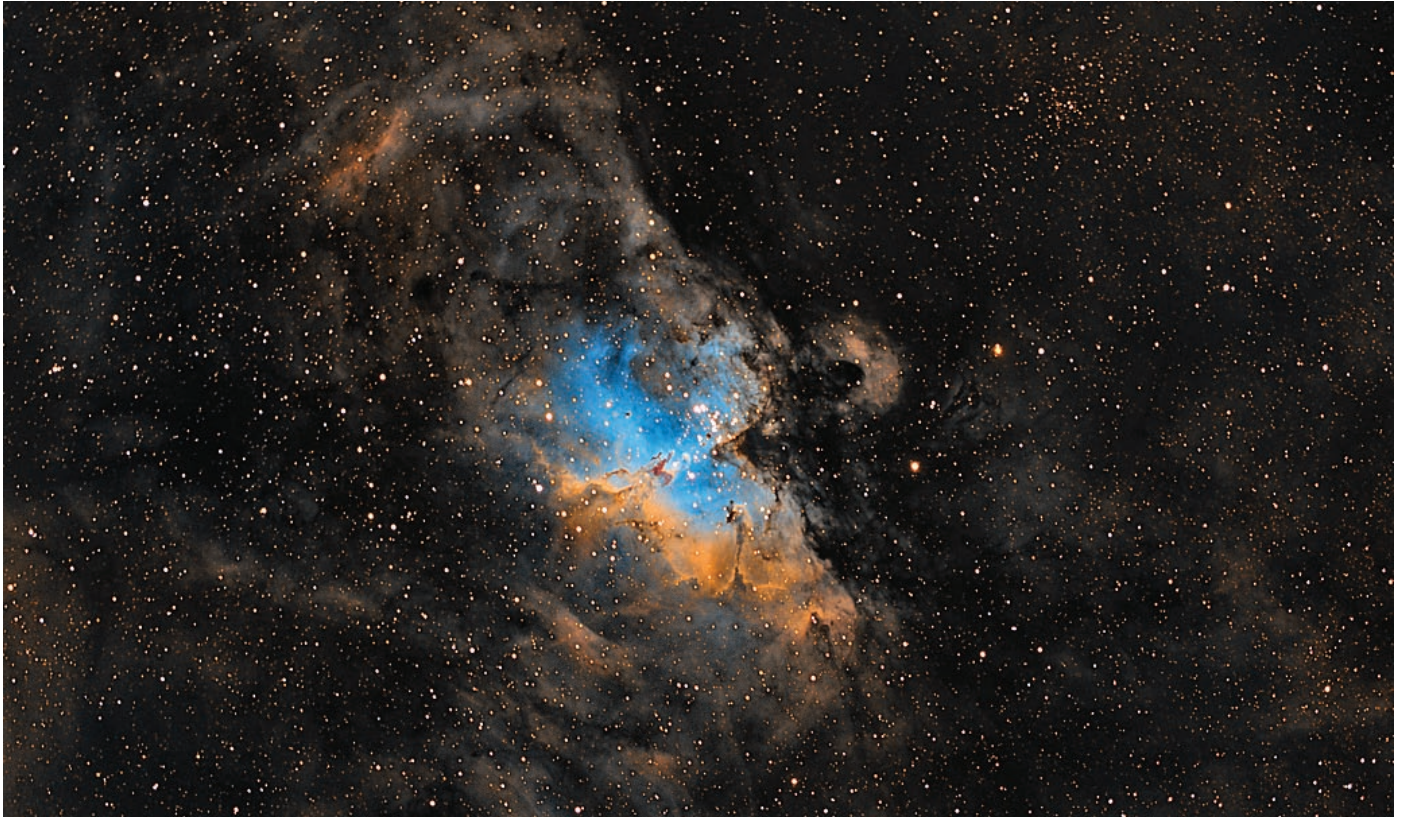


Image Caption: Moe Yassine imaged M16 using a Celestron Edge HD 1100 and a ZWO ASI1600mm-Pro camera. Presented in the Hubble Space Telescope Palette, narrow band filters were used with Sulfur II, H-alpha, and OIII mapped to RGB. The total integration time was 3 hours.

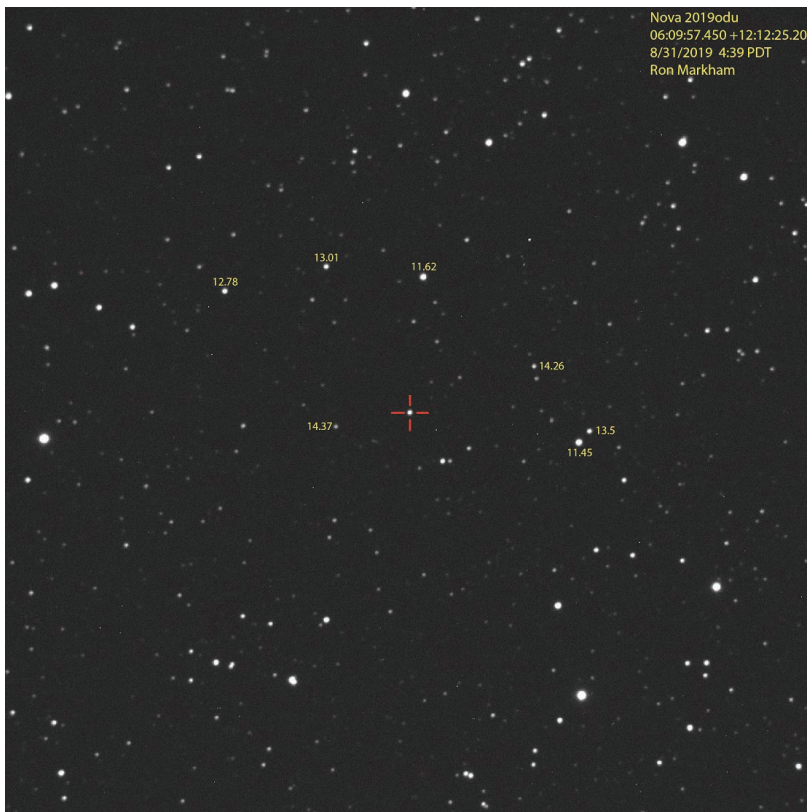


Image Caption: Ron Markham imaged Nova AT2019odu on August 31, 2019. On the image, magnitudes of nearby stars are given for reference. The Nova was discovered on August 19 by the Gaia Spacecraft, at which time it was visible at 11.63mag. Nova occur in binary systems when a White Dwarf star accretes matter from an orbiting main sequence or giant star. When the accreted matter reaches a temperature of ~ 20 million K, hydrogen fusion occurs and a rapidly brightening Nova is seen. Nova can recur, and it is possible that the White Dwarf might become a Type 1a supernova if it eventually accretes enough matter to exceed the Chandrasekar limit, ~ 1.4 solar masses.

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

All times are Pacific Daylight Time

September

- 13 Fri Full Moon (9:33pm)
- 20 Fri The Moon is near the Hyades, not far from Aldebaran (Dawn)
- 21 Sat Last-Quarter Moon (7:41pm)
- 23 Mon The Moon, in Gemini, forms a triangle with Castor and Pollux (Morning)
- 24-25 Tue- The Moon is near M44, the Beehive Cluster (Morning)
- 26 Thu The crescent Moon is in Leo, $\sim 3^\circ$ from Regulus (Dawn)
- 26- Thu- Over the next 2 weeks the Zodiacal Light is visible in the east beginning ~ 2 hours before morning twilight
- 28 Sat New Moon (11:26am)
- 29 Sun Algol at minimum brightness for ~ 2 hours centered on 9:34pm (Evening)

October

- 2 Wed Algol at minimum brightness for ~ 2 hours centered on 6:23pm
- 3 Thu The Moon and Jupiter are $\sim 1.5^\circ$ apart in the southwest, with Antares 10° to the lower-right (Evening)
- 4 Fri Saturn, the Moon, Jupiter, and Saturn form a 34° long arc (Evening)
- 5 Sat First-Quarter Moon (9:47am) and Saturn $\sim 2^\circ$ apart (Evening)
- 13 Sun Full Moon (2:08pm)
- 17 Thu The Moon is near the Hyades, $\sim 4^\circ$ from Aldebaran (Evening)
- 19 Sat Algol at minimum brightness for ~ 2 hours centered on 11:15pm
- 21 Mon Last-Quarter Moon (5:39am)
- 21-22 Mon The Orionid Meteors peak this night; see S&T, October 2019, p.48
- 22 Tue Algol at minimum brightness for ~ 2 hours centered on 8:04pm
- 26 Sun The thin sliver of a Moon, Mars, and Porrima form a triangle in Virgo, low on the eastern horizon (Dawn)
- 27 Sun New Moon (8:38pm)
- 29 Tue The Moon and Venus are $\sim 2^\circ$ apart in the southwest (Dusk)
- 31 Thu Saturn, the Moon, and Jupiter are seen in the southwest (Dusk)

NASA Night Sky Notes

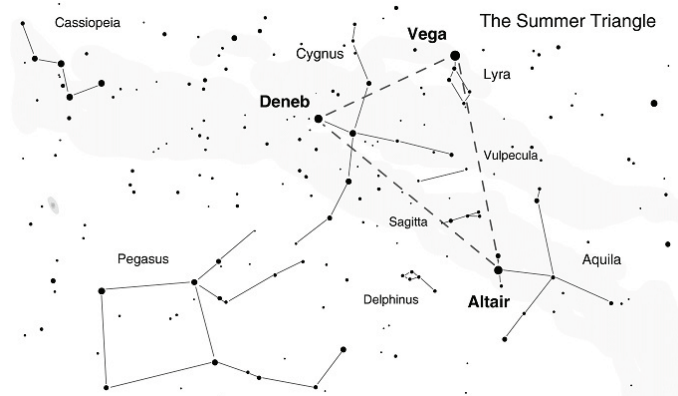
Spot the Stars of the Summer Triangle

By David Prosper

September skies are a showcase for the Summer Triangle, its three stars gleaming directly overhead after sunset. The equinox ushers in the official change of seasons on September 23. Jupiter and Saturn maintain their vigil over the southern horizon, but set earlier each evening, while the terrestrial planets remain hidden.



The bright three points of the Summer Triangle are among the first stars you can see after sunset: Deneb, Vega, and Altair. The Summer Triangle is called an asterism, as it's not an official constellation, but still a striking group of stars. However, the Triangle is the key to spotting multiple constellations! Its three stars are themselves the brightest in their respective constellations: Deneb, in Cygnus the Swan; Vega, in Lyra the Harp; and Altair, in Aquila the Eagle. That alone would be impressive, but the Summer Triangle also contains two small constellations inside its lines, Vulpecula the Fox and Sagitta the Arrow. There is even another small constellation just outside its borders: diminutive Delphinus the Dolphin. The Summer Triangle is huge!



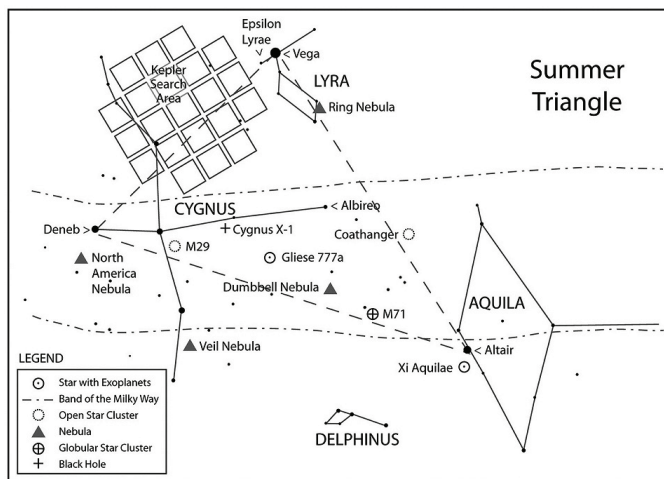
Caption: This view of the area around the Summer Triangle includes another nearby asterism: the Great Square of Pegasus.

The equinox occurs on September 23, officially ushering in autumn for folks in the Northern Hemisphere and bringing with it longer nights and shorter days, a change many stargazers appreciate. Right before sunrise on the 23rd, look for Deneb - the Summer Triangle's last visible point - flickering right above the western horizon, almost as if saying goodbye to summer.

The Summer Triangle region is home to many important astronomical discoveries. Cygnus X-1, the first confirmed black hole, was initially detected here by x-ray equipment on board a sounding rocket launched in 1964. NASA's Kepler Mission, which revolutionized our understanding of exoplanets, discovered thousands of planet candidates within its initial field of view in Cygnus. The Dumbbell Nebula (M27), the first planetary nebula discovered, was spotted by Charles Messier in the diminutive constellation Vulpecula way back in 1764!

Planet watchers can easily find Jupiter and Saturn shining in the south after sunset, with Jupiter to the right and brighter than Saturn. At the beginning of September, Jupiter sets shortly after midnight, with Saturn following a couple of hours later, around 2:00am. By month's end the gas giant duo are setting noticeably earlier: Jupiter sets right before 10:30pm, with Saturn following just after midnight. Thankfully for planet watchers, earlier fall sunsets help these giant worlds remain in view for a bit longer. The terrestrial planets, Mars, Venus, and Mercury, remain hidden in the Sun's glare for the entire month.

Discover the latest in space science from the NASA missions studying our universe at nasa.gov



Caption: Once you spot the Summer Triangle, you can explore the cosmic treasures found in this busy region of the Milky Way. Make sure to "Take a Trip Around the Triangle" before it sets this fall! Find the full handout at bit.ly/TriangleTrip



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.