

PRIMEFOCUS

Tri-Valley Stargazers

August 2020

1.5 arcmin



Meeting Info: Mapping the Cloudy Skies of a Galactic Black Hole

Who:
Dr. Natalie Hell

When:
August 21, 2020
Meeting at 7:30 p.m.
Lecture at 8:00 p.m.

Where:
Virtual Meeting using: Zoom*
See the April or May issue of PrimeFocus for info on getting connected using Zoom.

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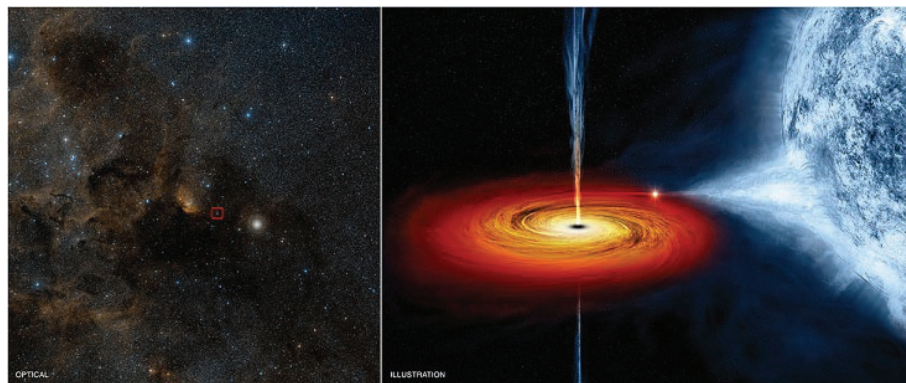
August Virtual Meeting Using "Zoom"*

Mapping the Cloudy Skies of a Galactic Black Hole with the Help of Laboratory Measurements

Dr. Natalie Hell, Lawrence Livermore National Laboratory

High-mass X-ray binaries are binary star systems consisting of a supermassive star in orbit around an evolved compact object like a black hole or neutron star. Supermassive stars exhibit strong stellar winds consisting of material from the stellar atmosphere being ejected into space. These winds are unstable with a tendency to fragment into pockets of denser and colder material, referred to as clumps, embedded in tenuous hot gas. In high mass X-ray binaries, these winds are partially focused towards the black hole. As the material falls onto the black hole, energy is released in the form of radiation that allows us to 'X-ray' the stellar wind and its structure. Understanding the wind morphology and how it is impacted by the presence of the compact object is crucial for the evolution both of isolated supermassive stars and of these binary systems.

In this talk, I will focus on the black-hole binary Cygnus X-1 and how we used laboratory measurements with an electron-beam ion trap to further our understanding of the clumpy wind in this system.



Caption: Location and illustration of Cygnus X-1. See: <https://chandra.harvard.edu/photo/2011/cygx1/>

Bio: Inspired by documentaries and public outreach talks on astronomy, Natalie enrolled for physics studies with a minor in astronomy at Friedrich-Alexander-Universität (FAU) Erlangen-Nürnberg, Germany. For her Bachelor's thesis project she studied satellite observations of the South-Atlantic Anomaly. Afterwards, a summer internship at Lawrence Livermore National Lab sponsored through a program of the German Academic Exchange Service, DAAD, set her on the path for a career in atomic physics with a focus on laboratory X-ray astrophysics. Subsequently, for both her Master's and PhD projects Natalie worked on labastro measurements at LLNL and high-mass X-ray binary studies at Dr. Remeis Observatory & Erlangen Centre for Astroparticle Physics (ECAP), FAU, where she graduated in 2017. She returned to LLNL as a postdoc and now continues her work there as a staff researcher. Natalie is also part of the teams preparing the future X-ray observatory missions XRISM and Athena.

News & Notes

2020 TVS Meeting Dates

Below are the TVS meeting dates for 2020. 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. 21	Aug. 24	
Sep. 18	Sep. 21	Sep. 04
Oct. 16	Oct. 19	Oct. 02
Nov. 20	Nov. 23	Nov. 06
Dec. 18	Dec. 21	Dec. 04

Money Matters

As of the last Treasurer's Report on 07/20/20, our club's account balance is \$13,225.33.

TVS Welcome to New Members

TVS would like to welcome new members Laura Rensink, Mark Stevenson, David Wright, Timm Wulff. Please say hello and chat with them during our Zoom club meetings.

TVS Summer Observing Program Awardees

Jenny Siders, Ron Kane, Roland Albers, Ross Gaunt, and Ken Sperber have completed the TVS summer observing program. The observing list highlights some of the best objects in the summer sky with the goal of familiarizing observers with a range of objects, including Globular Clusters, Open Clusters, Emission Nebulae, Planetary Nebulae, and Carbon and Double Stars.

For those interested in participating, the list can be found at: http://www.trivalleystargazers.org/observing_2020_summer.shtml. Once you've completed all observations, submit your electronic log to: awards@trivalleystargazers.org. We'll have an attractive certificate and mention in this newsletter for all who complete the program.

H2O and Del Valle Observing Sites Reopened

The club is happy to announce that the Del Valle and Hidden Hill Observatory sites reopened for observing on June 1st. However, due to the ongoing COVID-19 emergency, the following additional restrictions must be followed:

- *The sites are open for individual use only by club members and immediate family; no guests or group events allowed
- *You use each observing site at your own risk and agree to hold the club and the landowners free of all liability
- *Do not use either observing site if you are not feeling well or suspect you were recently exposed to the virus
- *Announce your intention to use either site on our groups.io group

*While at either site maintain social distancing of at least 15 feet (about a car's length)

*Bring hand sanitizer and use it before and after touching any locks or facilities

*Club members should not touch or look through each other's equipment. Focuser knobs and eyepieces can potentially spread the virus.

*H2O keyholders who wish to use the Quick Dome should first contact Ross Gaunt (secretary@trivalleystargazers.org) to reserve it for individual use for the day

*H2O patrons who wish to use the Marling Scope should first contact Chuck Grant (observatory@trivalleystargazers.org) to reserve it for individual use for the day

*Note that these restrictions do not replace or negate any Alameda or Santa Clara County health orders in place at this time.

Ross Gaunt, our club secretary, emailed the updated lock combinations and usage instructions for each site to all H2O keyholders and all Del Valle registered users. If you are an H2O keyholder or Del Valle registered user and didn't get Ross's email, please let Roland (president@trivalleystargazers.org) or Ross know and we'll straighten it out. Stay safe and happy observing!

TVS Star Party Descriptions

NOTE: ALL STAR PARTIES ARE SUBJECT TO POSSIBLE CANCELLATION PENDING THE STATUS OF STATE AND COUNTY COVID-19 RESTRICTIONS.

Del Valle star parties are also public outreach events. 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.

Outreach Star Party Schedule

Cancelled through August.

Contact Eric Dueltgen if you are interested in participating (outreach@trivalleystargazers.org).

2020 Club Star Party Schedule

September 19: Del Valle Arroyo

October 17: Tesla Vintners

Header Image: Image of Cygnus X-1 taken by the Chandra X-Ray Observatory. Cygnus X-1 weighs about 14.8 times the mass of the Sun and spins ~800 times per second. See: <https://chandra.harvard.edu/photo/2011/cygx1/>

Calendar of Events

August 19, 7:00pm

What: Perseverance: A Martian Rover to Find Life?
 Who: Dr. Janice Bishop and Dr. Pablo Sobron
 Sponsor: SETI Institute
 Online: <https://www.seti.org/event/perseverance-martian-rover-find-life>; REGISTRATION REQUIRED

The Mars 2020 Perseverance Rover successfully launched on July 30, 2020, is now en route toward Mars. The mission will pave the way for future human expeditions to Mars and demonstrates technologies that could be used by future Mars explorers. Designed to search for signs of ancient microbial life, the robotic rover is equipped with an instrument that will drill to collect core samples of Martian rock and soil and then store them in sealed tubes for pick-up by a future mission. The Mars 2020 rover will include innovative technologies to explore the Jezero crater region, such as a Mars Helicopter that will become the first powered flight craft on the Red Planet and a sample caching system

August 19, 8:00pm

What: 137 Years of Chabot Space & Science Center in 60 Minutes
 Who: Benjamin Burrell (Chabot)
 Sponsor: Chabot Space and Science Center
 Online: <https://chabot.space.org/events/events-listing/>

Chabot Space & Science Center has very old roots in Oakland and the East Bay, and no fewer than three incarnations as a student and public observatory and science education center. Now celebrating the 20th anniversary at its present location on the skyline of the Oakland Hills, the institution as a whole turns 137 this year. This presentation will trace and illustrate the rich and interesting history of an observatory that was,

from its inception, dedicated to educating the public about science and the universe.

To receive a notification when the talk begins, make sure to "Like" the Chabot Space and Science Center Facebook page.

If you miss the live event, the full presentation will be released on the YouTube channel within one week of the event: https://www.youtube.com/channel/UCarFXs-04xmdHW_PVc7LWRg

August 22, 7:30pm

What: Galactic Weather
 Who: Yong Zheng, UC Berkeley
 Sponsor: Mt. Tamalpais Astronomy
 Online: https://youtu.be/8E4YWu_ulik

Just as Earth has an atmosphere, and stars (like the Sun) have coronas, galaxies are embedded in invisible halos of atomic gases. As galaxies evolve, these gaseous halos exhibit many interesting phenomena similar to rains and droughts on Earth. What do these enormous galactic climate systems look like, how are they studied, and how do they behave.

For more information see: <http://www.mttamastronomy.org/calendar> and <https://youtube.com/MtTamAstronomy>

August 27, 7:15pm

What: Charon, Pluto's Moon
 Who: Dr. Ross Beyer
 Where: Mt. Diablo Astronomical Society, Lindsay Wildlife Experience, Community Room, 1931 First St., Walnut Creek, CA 94597
 Cost: Free

Details not available.

continued on p.6

Officers	Volunteer Positions	Night Sky Network Rep.:	Refreshment Coordinator:
President: Roland Albers president@trivalleystargazers.org	Astronomical League Rep.: Dennis Beckley alrep@trivalleystargazers.org	Ross Gaunt nnsn@trivalleystargazers.org	Laurie Grefsheim
Vice-President: Eric Dueltgen vice_president@trivalleystargazers.org	Club Star Party Coordinator: Eric Dueltgen coordinator@trivalleystargazers.org	Observatory Director/Key Master: Chuck Grant observatory@trivalleystargazers.org	Webmaster: Hilary Jones webmaster@trivalleystargazers.org
Treasurer: Jenny Siders treasurer@trivalleystargazers.org	Del Valle Coordinator: David Feindel delvalle@trivalleystargazers.org	Observing Program Coordinator: Ron Kane awards@trivalleystargazers.org	Web & E-mail www.trivalleystargazers.org info@trivalleystargazers.org
Secretary: Ross Gaunt secretary@trivalleystargazers.org	Historian: Hilary Jones historian@trivalleystargazers.org	Outreach Coordinator: Eric Dueltgen outreach@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.
Past President: Rich Combs past_president@trivalleystargazers.org	Librarian: Ron Kane librarian@trivalleystargazers.org	Potluck Coordinator: OPEN potluck@trivalleystargazers.org	
	Loaner Scope Manager: Ron Kane telescopes@trivalleystargazers.org	Program Coordinator: Dan Helmer programs@trivalleystargazers.org	
	Newsletter Editor: Ken Sperber newsletter@trivalleystargazers.org	Publicity Coordinator: OPEN publicity@trivalleystargazers.org	

TVS Astrophotos: Comet NEOWISE (C/2020 F3)



Image Captions: Comet NEOWISE (C/2020 F3): Top-left: Paul Caffrey also captured a meteor in this 5 second exposure on July 10 using a Canon 450 DSLR and a Samyang 85mm lens set at f/2. Top-right: Dave Childree took this image on July 11 using an Olympus EM-1 with a 200mm lens. This is a stack of 20 images. Lower-left: Kai Yung took this image on July 14. It also shows the passage of the International Space Station. Lower-right: Craig Siders took this image on July 19th using a Fuji X-T1 with a Rokinin 85mm f/1.4 lens at f/2. This stack of 60 ten second images shows the blue ion tail in addition to the dust tail.

TVS Astrophotos: Comet NEOWISE (C/2020 F3) and M8



Image Captions: Upper-left: Roland Albers took this image of Comet NEOWISE on July 21 using a Canon T3i and a 50mm lens. This is a composite of 20 ten second exposures at f/2.8 and ISO-1600 that shows the blue ion tail in addition to the dust tail. Upper-right: Swaroop Shere took this image of Comet NEOWISE on July 25 at 1000mm focal length. It is a composite of 15 thirty second images. Lower-left: Ashish Joshi took this image of M8, the Lagoon Nebula, using an Explore Scientific CF 115mm f/5.5 triplet refractor. He used a ZWO ASI294MC-Pro camera with an Explore Scientific light pollution filter. This is a composite of fifty 120 second exposures. Lower-right: Jannette (Moochie) spruced up the H2O pay station with a lovely astronomical theme to get you into the mood for your night of observing. Image Credit: Roland Albers.

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

All times are Pacific Daylight Time

August

- 18 Tue New Moon (7:42pm)
22 Sat The crescent Moon is $\sim 5^\circ$ from Spica (Dusk)
25 Tue First-Quarter Moon (10:58am)
25 Tue The Moon is $\sim 5^\circ$ from Antares (Dusk)
27 Thu Saturn, Jupiter and the Moon form a line (Dusk)
28 Fri The Moon is $\sim 2^\circ$ from Jupiter with Saturn to the left (Dusk)
29 Sat The Moon, Saturn, and Jupiter form a line (Dusk)

September

- 1 Tue Full Moon (10:22pm)
5 Sat Mars and the Moon rise as a close pair (Evening)
7 Mon Algol shines at minimum brightness for 2 hours centered on 11:30pm
9 Wed The Moon is near the Hyades Cluster with the Pleiades to the upper right (Dawn)
10 Thu Last-Quarter Moon (2:26am)
10 Thu The Moon is framed by Aldebaran and Beta and Zeta Tauri (Dawn)
10 Thu Algol shines at minimum brightness for 2 hours centered on 11:19pm.
14 Mon The Moon and Venus are $\sim 5^\circ$ apart with M44 to the upper left (Dawn)
15- Tue- For the rest of the month the Zodiacal light is visible in the east from a dark site, beginning about 2 hours before morning twilight
15 Tue The thin crescent Moon is visible with Regulus trailing by $\sim 5^\circ$ (Dawn)
17 Thu New Moon (4:00am)
21 Mon The crescent Moon occults Beta Scorpii in the southwest during daylight, with the pair emerging in twilight (see September S&T, p. 50)
23 Wed First-Quarter Moon (6:55pm)
24 Thu The Moon, Jupiter, and Saturn form an arc $\sim 11^\circ$ long (Dusk)
25 Fri Saturn, Jupiter, and the Moon form a triangle (Dusk)

Calendar of Events (continued)

For more information see: https://nightsky.jpl.nasa.gov/event-view.cfm?Event_ID=95250

August 28, 8:15pm

What: Intro to the Night Sky
Who: SJ Astronomy
Sponsor: San Jose Astronomical Association
Online: <https://www.meetup.com/SJ-Astronomy/events/267474910/>

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.

For more information see: <https://www.sjaa.net/calendar/>

August 29, 8:00pm

What: A Look at the Universe's Binary Systems
Who: SJ Astronomy
Sponsor: San Jose Astronomical Association
Online: <https://www.meetup.com/SJ-Astronomy/events/272330136/>

Details not available.

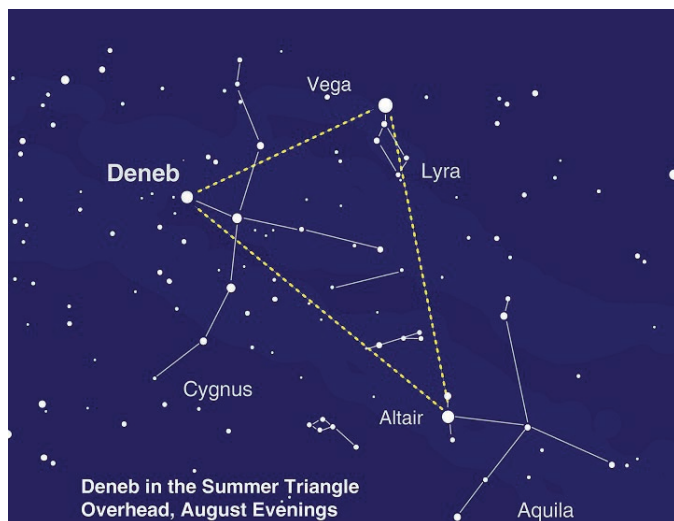
For more information see: <https://www.sjaa.net/calendar/>

NASA Night Sky Notes

Summer Triangle Corner: Deneb

By David Prosper

The Summer Triangle is high in the sky after sunset this month for observers in the Northern Hemisphere, its component stars seemingly brighter than before, as they have risen out of the thick, murky air low on the horizon and into the crisper skies overhead. Deneb, while still bright when lower in the sky, now positively sparkles overhead as night begins. What makes Deneb special, in addition to being one of the three points of the Summer Triangle? Its brilliance has stirred the imaginations of people for thousands of years!



Caption: Spot Vega and the other stars of the Summer Triangle by looking straight up after sunset in August!

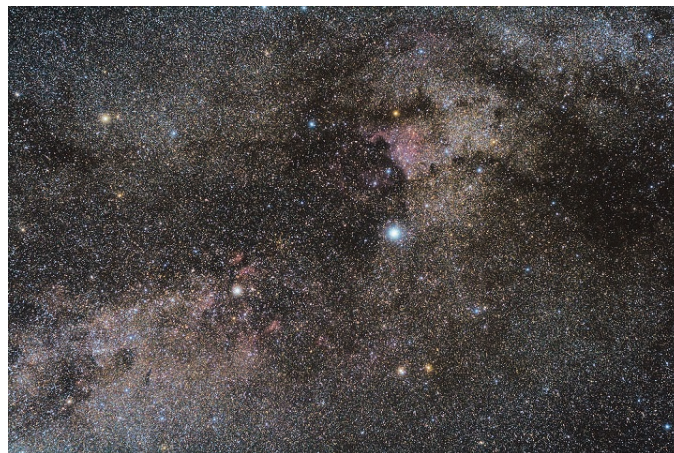
Deneb is the brightest star in Cygnus the Swan and is positioned next to a striking region of the Milky Way, almost as a guidepost. The ancient Chinese tale of the Cowherd (Niulang) and the Weaver Girl (Zhinü) - represented by the stars Altair and Vega - also features Deneb. In this tale the two lovers are cast apart to either side of the Milky Way, but once a year a magical bridge made of helpful magpies - marked by Deneb - allows the lovers to meet. Deneb has inspired many tales since and is a staple setting of many science fiction stories, including several notable episodes of Star Trek.

Astronomers have learned quite a bit about this star in recent years, though much is still not fully understood - in part because of its intense brightness. The distance to Deneb from our Sun was measured by the ESA's Hipparcos mission and estimated to be about 2,600 light years. Later analysis of the same data suggested Deneb may be much closer: about 1,500 light years away. However, the follow-up mission to

Hipparcos, Gaia, is unable to make distance measurements to this star! Deneb, along with a handful of other especially brilliant stars, is too bright to be accurately measured by the satellite's ultra-sensitive instruments.

Deneb is unusually vivid, especially given its distance. Generally, most of the brightest stars seen from Earth are within a few dozen to a few hundred light years away, but Deneb stands out by being thousands of light years distant! In fact, Deneb ranks among the top twenty brightest night time stars (at #19) and is easily the most distant star in that list. Its luminosity is fantastic but uncertain, since its exact distance is also unclear. What is known about Deneb is that it's a blue-white supergiant star that is furiously fusing its massive stocks of thermonuclear fuel and producing enough energy to make this star somewhere between 50,000 and 190,000 times brighter than our Sun if they were viewed at the same distance! The party won't last much longer; in a few million years, Deneb will exhaust its fuel and end its stellar life in a massive supernova, but the exact details of how this will occur, as with other vital details about this star, remain unclear.

Discover more about brilliant stars and their mysteries at nasa.gov.



Caption: Long exposure shot of Deneb (brightest star, near center) in its richly populated Milky Way neighborhood. Photo credit: Flickr user jpstansley. Source: <https://www.flickr.com/photos/jpstansley/1562619922> License: <https://creativecommons.org/licenses/by-nc-sa/2.0/>

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 (\$10). 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): Must be 18 or older.

_____ 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 (<http://www.trivalleystargazers.org/privacy.shtml>).

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