

# PrimeFocus

June 2024



## WHEN:

June 22, 2024  
Barbeque  
4:00 – 5:00pm  
No Lecture

## WHERE:

Unitarian Church  
1893 North Vasco Rd.  
Livermore, CA 94551  
and via Zoom

## TVS QR CODE



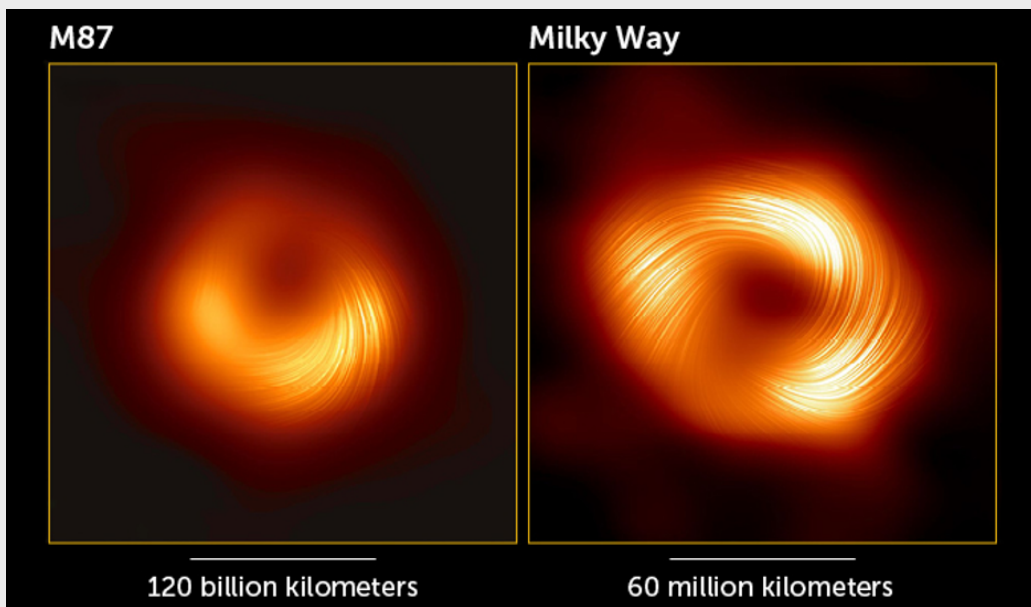
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## SAG A\*: THE UNSEEN MAMMOTH SAANIKA KULKARNI

In March of this year, the Event Horizon Telescope (EHT) Collaboration released a groundbreaking image of the magnetic field near Sag A\*, the black hole at the center of our galaxy. This isn't your average "picture-perfect" image. By observing Sgr A\* in polarized light, a technique sensitive to magnetic fields, the EHT team has captured the first glimpse of these invisible forces. The results, published in The Astrophysical Journal Letters, reveal a surprising twist: strong, organized magnetic fields spiraling outwards from the black hole's event horizon.

This discovery is significant for a few reasons. Firstly, it suggests a commonality among black holes. In 2019, the EHT famously captured the first image of a black hole, M87\*, located in the Messier 87 galaxy. M87\* also displayed a swirling magnetic field structure. Now, seeing a similar pattern around Sgr A\* hints that powerful magnetic fields might be a defining characteristic of black holes.



M87's magnetic field compared to ours, plus their respective sizes. Credit: EHT collaboration.

Secondly, the EHT data suggests the presence of a hidden jet emanating from Sgr A\*. In other black holes, powerful jets of superheated particles shoot out at near light speed, fueled by the intense magnetic fields around the event horizon. While no direct jet has been observed from Sgr A\*, the newly discovered magnetic field hints at a similar phenomenon happening on a smaller scale.

Capturing the faint glow of a supermassive black hole against the backdrop of a swirling galactic center requires a global village of astronomers and some truly innovative techniques. The EHT doesn't function as a single telescope, but rather as a virtual telescope the size of Earth. The EHT collaboration connects radio

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## Sag A\* Continued

telescopes around the world, from the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile to the South Pole Telescope. Capturing an image of Sgr A\* requires observing it at the same precise moment from all participating telescopes. This intricate coordination involves atomic clocks and meticulous planning to ensure all telescopes are collecting data simultaneously.

There's also the issue of Earth's "wobbling". As the Earth rotates, the baseline between telescopes constantly changes. To account for this, the EHT team employs complex image processing techniques that effectively remove the Earth's rotation from the data, allowing them to reconstruct a clear picture of Sgr A\*.

With all of this data, how do you analyze it efficiently? Each observation run generates a staggering amount of data. The raw data needs to be transported and meticulously combined from all telescopes. This massive data processing effort is facilitated by high-performance computers around the world.

The EHT's groundbreaking image of Sgr A\*'s magnetic field is just the first chapter in a captivating story. This discovery, along with the intricate dance of data collection and analysis, opens a new window into the world of black holes and the invisible forces that govern them. As the EHT collaboration continues to refine its techniques and delve deeper into the data, we can expect even more revolutionary insights into the nature of these enigmatic objects and their role in the grand cosmic drama. The future of black hole research is undoubtedly bright, fueled by the power of international collaboration, cutting-edge technology, and the insatiable human desire to explore the farthest reaches of the universe.

## NEWS AND NOTES

### 2024 Meeting Dates

Club Meeting	Board Meeting	PrimeFocus Deadline
Jun. 22 *BBQ*	Jun. 24	Jun. 5
Jul. 19	Jul. 22	Jul. 4
Aug. 16	Aug. 19	Aug. 3

### Money Matters

As of the last Treasurer's Report on 5/20/24, our club's account balance is \$60,536.44. This includes \$26,146.47 in the H2O Rebuild fund.

### TVS Welcomes New Members

TVS welcomes new members David Weaver, Johnathan Bailey, Tushar Kulkarni, Christina Taft, Edwin Walker, Chaitanya Pemmaraju, Shing Hwong, & Badri Sathya. Please say hello and chat with him during our meetings.

### 2024 Club Star Party Schedule

Save the dates for the 2024 Club Star Parties.

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.

**June 29:** Tesla Vintner's Star Party, 5143 Tesla Rd., Livermore. Set-up at 7:30pm, Observing 8:15-Midnight.

H2O Open House star parties are open to only club members and their guests. 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. No gas stations are available on the route, so be prepared. Admission is \$3/car-bring exact change. H2O is a primitive site with two porta-potties. Bring water, food, and warm clothing, as needed. Red flashlights are to be used so observers can preserve their night vision.

**Sept 28:** H2O Open House, at 5pm the caravan to H2O PROMPTLY leaves the corner of Mines and Tesla Rds., Livermore. Observing until 11:30pm.

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**June 24:** Outreach star party at Camp Arroyo; Set up 8:00 pm, observing starts at 9:00. Outreach star party for Camp Go Beyond; <https://www.campgobeyond.org/> Campers are immunocompromised, so all TVS volunteers must be fully vaccinated against COVID and boosted. All volunteers will need an on site COVID test (provided by the camp), and masks will be required until you have a negative test result. Volunteer forms provided by the camp must be signed. The location is across the road from the Arroyo Road Staging Area. There is a locked gate at the entrance to the site, so you must let Eric know ahead of time if you plan to come, so we can make sure you have access.

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**July 12-13:** Public stargazing at Glacier Point in Yosemite National Park; 5:00-11:00pm; We are happy to announce the return of the outreach star party at Glacier Point in Yosemite National Park after a several year hiatus due to COVID and road construction. In return for setting up our telescopes and binoculars at Glacier Point for the public to look through, we get free admission to the park, and free camping (typically at the nearby Bridal Veil Creek campground). The moon will be near first quarter, so it will set about midnight Friday night, and about 12:30 am Saturday night / Sunday morning. We will have our usual Saturday evening pot luck, and TVS will provide hamburgers, hot dogs and veggie burgers. Due to limited park staffing, the park has scheduled about half of the usual number of public astronomy events this summer. Therefore, we are sharing the camp site with the East Bay Astronomical Society (EAS). We are limited to 15 people total, depending on how many come from EAS, so you must sign up ahead of time by sending an email to [outreach@trivalleystargazers.org](mailto:outreach@trivalleystargazers.org). Also, let me know how many people in your group, how many telescopes, how many nights, and what you want for dinner Saturday. Due to the limited space available at the campground, we may need to limit the number of TVS attendees. Priority will be given to those who can commit to participating both nights, who have a minimum number of non-astronomer guests, and who sign up early. We may need to share tents and/or carpool.

## CALENDAR OF EVENTS

### June 21, 22, 28, 29, July 5, 6, 12, 13, 7:30-10:30 PM

What Free Telescope Viewing  
Who Chabot Staff  
Where Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619  
Cost Free

Join Chabot astronomers on the Observatory Deck for a free telescope viewing! Weather permitting, this is a chance to explore stars, planets and more through Chabot's historic telescopes. Chabot's three large historic telescopes offer a unique way to experience the awe and wonder of the Universe. Three observatory domes house the Center's 8-inch (Leah, 1883) and 20-inch (Rachel, 1916) refracting telescopes, along with a 36-inch reflecting telescope (Nellie, 2003).

Are the skies clear for viewing tonight? Viewing can be impacted by rain, clouds, humidity and other weather conditions. Conditions can be unique to Chabot because of its unique location in Joaquin Miller Park. Before your visit, check out the [Weather Station](#) to see the current conditions at Chabot.

For more information, see:  
<https://chabotspace.org/events/events-listing/>

### June 22-23, 10:00 AM - 4:00 PM

What NASA Fest at Chabot  
Who Chabot Staff  
Where Chabot Space and Science Center, 10000 Skyline Blvd. Oakland, CA 94619  
Cost \$30 Adults, \$25 Youth & Seniors, \$15 Members Adult, \$10 Member Youth

How do you organize a space party? You plan-et! Join us at Chabot for two days of astronomical fun for the whole family! Step into the shoes of a NASA engineer, discover and play with real world space tech, design and test your own Rovers, and hear from extraordinary guest speakers working at the forefront of the development of aerospace technology right here in the Bay!

For more information, see:  
<https://chabotspace.org/events/nasa-fest-at-chabot/>

### June 25, 7:15 PM

What Astronomy Lecture: Hubble Space Telescope Primary Mirror Failure  
Who Mt. Diablo Astronomical Society MDAS  
Where Lindsay Wildlife Experience Community Room, 1931 First Avenue, Walnut Creek, CA 94597  
Cost Free

Please join the Mt. Diablo Astronomical Society for their June 25 general meeting featuring MDAS member Dr. Alan Agrawal, who will review the history of the Hubble telescope failure that almost halted its mission at the outset. He will discuss in detail the amazing story and events that led to the blurry images from the faulty primary mirror, which surprised and shocked the scientific community, and how it was repaired.

For more information, see:  
<https://www.meetup.com/a-a-n-c/events/301567416/>

### July 1, 7:30 PM

What The Future Human Exploration of Mars  
Who SETI Institute and NASA Ames Research Center  
Where Morrison Planetarium; 55 Music Concourse Drive, San Francisco, CA 94118  
Cost Public: \$15; Members and seniors: \$12

The first human mission to Mars will be humanity's greatest adventure in space exploration this century. As with all expeditions, its success depends on planning. The first steps are already under way, as we build more efficient rockets, achieve longer space flights, plan our return to the Moon, and work in extreme environments on Earth viewed as Mars "analogs."

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Dr. Lee will present the progress being made around the world, from the Arctic to Antarctica, from basement labs to the International Space Station and the Artemis Program, to achieve the first human voyage to Mars, examining in turn the what, why, how, where, when, and who of the first human mission to Mars.

For more information, see:

<https://www.calacademy.org/events/benjamin-dean-astronomy-lectures/the-future-human-exploration-of-mars>

## EXPERIENCING THE SOLAR ECLIPSE AVEESH AGRAWAL



These pictures of the partial solar eclipse were taken in Pleasanton, CA. (On the left) A picture at the peak of the eclipse, (On the Right) A picture at the end of the eclipse. Credit Aveesh Agrawal

### Introduction

Since I was a kid, I have been interested in Astronomy. Pictures taken by NASA's telescopes, videos on the internet, and personal stargazing expeditions have built my curiosity in this field for years. It started with a telescope I got from my grandfather when I lived in India. Every night I would look out into the sky, staring at the dark sky brightened by the flashing stars. Since then, I have changed countries, schools, and hobbies but my passion for astronomy has stayed. I've always hoped to mix my hobby of photography with my passion for Astronomy, and this eclipse proved to be the perfect event to make this dream come true.

### Before the Eclipse

As March rolled around, I had learned about a solar eclipse that would be visible from the United States this year. It was going to be the first ever solar eclipse I had seen in person. The timing however could not have been

more unfortunate. It would be taking place on the last day of my spring break, limiting me to viewing the eclipse from California. I did not let this bring me down, so I decided to capture pictures of this partial solar eclipse anyway. I started talking with Mr. Shere, the TVS Webmaster, who provided me with a Rainbow Symphony 70mm solar lens and glasses I used on the day of the eclipse, about how I could go about accomplishing my goal. As touching the camera during the eclipse could unfocus and decenter the sun from the camera, Mr. Shere told me to buy a tripod and install an app to control the camera remotely. I practiced multiple times the weekend before the eclipse to perfect my skills so that I would be able to handle everything.

One thing I couldn't control, however, was the weather. The entire week had been filled with cloudy days and all I could do was hope that April 8th would not face the same fate. Though looking at weather predictions from the week, there was no guarantee.

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## Experiencing the Solar Eclipse Continued

### The Day of the Eclipse (April 8th, 2024)

On the day of the eclipse, I woke up excited to see there were no clouds. I set up my tripod in my backyard and connected it to my computer. Using my Canon Rebel T7, I set it to manual mode at maximum zoom, 1/30 shutter speed, F14 Aperture, and an Auto ISO. I had to adjust the zoom manually before completely putting on the solar lens to prevent an auto focus which would ruin the photos. Watching the eclipse take place in real time was a surreal experience. Before this, I had only seen time-lapses of the eclipse so this felt unreal.

Though I could not travel to a location in the path of totality, I still thoroughly enjoyed the eclipse. I watched in awe and took pictures almost every minute. I had always thought of the moon, a tiny rock orbiting our planet,

insignificant when compared to the sun, a giant fireball at the center of our solar system, but this eclipse has changed my perspective. Despite the smaller size, the moon is able to cover up the entire sun. How lucky are we that our moon and sun are the perfect distance and the perfect size for such an event to occur?

Furthermore, this event has provided me an opportunity to grow and expand my hobbies such as photography and build my astrophotography experience. I'm excited to photograph future astronomical events with the new skills I picked up from this year's solar eclipse. The next Solar eclipse will not be visible for a very long time until August 23, 2044, which follows a very similar path to this recent eclipse. All I can do is hope I can plan a trip to see the totality. Until then, I will photograph any interesting events happening, from comet showers to supernovas such as the T. Coronae Borealis, which is set to explode sometime this year.

## OFFICERS AND VOLUNTEER POSITIONS

<b>Officers</b>	<b>Club Star Party Coordinator</b> Eric Dueltgen <a href="mailto:coordinator@trivalleystargazers.org">coordinator@trivalleystargazers.org</a>	<b>Night Sky Network Rep.</b> Ross Gaunt <a href="mailto:nnsn@trivalleystargazers.org">nnsn@trivalleystargazers.org</a>	<b>Refreshment Coordinator</b> OPEN
<b>President</b> Ron Kane <a href="mailto:president@trivalleystargazers.org">president@trivalleystargazers.org</a>	<b>Del Valle Coordinator</b> David Wright <a href="mailto:delvalle@trivalleystargazers.org">delvalle@trivalleystargazers.org</a>	<b>H2O Observatory Director / Rebuild Chairman</b> Chuck Grant <a href="mailto:H2O@trivalleystargazers.org">H2O@trivalleystargazers.org</a>	<b>Web and Email</b> <a href="http://www.trivalleystargazers.org">www.trivalleystargazers.org</a> <a href="mailto:info@trivalleystargazers.org">info@trivalleystargazers.org</a>
<b>Vice-President</b> Eric Dueltgen <a href="mailto:vice_president@trivalleystargazers.org">vice_president@trivalleystargazers.org</a>	<b>Historian</b> OPEN <a href="mailto:historian@trivalleystargazers.org">historian@trivalleystargazers.org</a>	<b>Observing Program Coordinator</b> Ron Kane <a href="mailto:awards@trivalleystargazers.org">awards@trivalleystargazers.org</a>	TVS E-Group To Join the TVS E-Group just send an email to TVS at <a href="mailto:info@trivalleystargazers.org">info@trivalleystargazers.org</a> asking to join the group. Make sure you specify the email address you want to use to read and post to the group.
<b>Treasurer</b> John Forrest <a href="mailto:treasurer@trivalleystargazers.org">treasurer@trivalleystargazers.org</a>	<b>Librarian</b> Ron Kane <a href="mailto:librarian@trivalleystargazers.org">librarian@trivalleystargazers.org</a>	<b>Outreach Coordinator</b> Eric Dueltgen <a href="mailto:outreach@trivalleystargazers.org">outreach@trivalleystargazers.org</a>	
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<b>Volunteer Positions</b>	<b>Webmaster</b> Swaroop Shere <a href="mailto:webmaster@trivalleystargazers.org">webmaster@trivalleystargazers.org</a>	<b>Publicity and Fundraising</b> OPEN <a href="mailto:publicity@trivalleystargazers.org">publicity@trivalleystargazers.org</a>	
<b>Astronomical League Rep.</b> Don Dossa <a href="mailto:alrep@trivalleystargazers.org">alrep@trivalleystargazers.org</a>			

TVS ASTROPHOTOGRAPHY



**Sh2-132 – The Lion Nebula**, by Imran Badr

Congratulations to Imran for getting his first APOD on June 10, 2024 for his photo above.

For a full resolution image see <https://apod.nasa.gov/apod/ap240610.html>



**North American and Pelican Nebula**, by Michael Clive

I finally got my permanent setup working in the backyard. Thanks to another club member, I was able to secure an AP130GTX for the primary imaging instrument. I picked the North American Nebular region because it was one of the only nebulas up right now, everything else is galaxies, and I don't have the FL/patience to do much galaxy and globular work right now. This is what I would consider my first serious AP photo. I chose to focus on the dust lane between the Pelican and the NA nebula because it has such beautiful texture.

See the full resolution image: <https://www.astrobin.com/eyvzg3/0/>

## WHATS UP

Adapted from Sky & Telescope

All times are Pacific Standard Time

### June 2024

- 19 Wed Looking south see the almost full moon  $3.5^\circ$  to the right of Antares
- 20 Thu Longest day of the year
- 22 **Sat Full Moon**
- 28 Sun Moon at last quarter

### July 2024

- 1 Mon Facing east at dawn see the Moon  $4^\circ$  above Mars and Jupiter to the lower left
- 5 **Fri New Moon**; Earth is at aphelion, the farthest from the sun for the year at 95.4 million miles
- 7 Sun Mercury and 2 day old moon are  $3^\circ$  apart at northwestern horizon
- 8 Mon Just before sunrise, see Jupiter less than  $5^\circ$  away from Aldebaran
- 9 Tue In the evening the waxing crescent Moon trails Regulus by  $6^\circ$
- 13 Sat Moon at first quarter
- 17 Wed In the evening, Moon is  $3.5^\circ$  left of the heart of Scorpius, Antares

# NAVIGATING THE NIGHT SKY FOR JUNE

## Navigating the June Night Sky

For observers in the middle northern latitudes, this chart is suitable for early June at 11:30 p.m. or late June near 10:30 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.

The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

**Navigating the June night sky: Simply start with what you know or with what you can easily find.**

- 1 Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Draw another line in the opposite direction. It strikes the constellation Leo high in the west.
- 3 Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the June evening sky, then Spica.
- 4 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 5 To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 6 High in the east are the three bright stars of the Summer Triangle: Vega, Altair, and Deneb.

**Binocular Highlights**

- A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
- B: Between the bright stars of Antares and Altair, hides an area containing many star clusters and nebulae.
- C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
- D. Sweep along the Milky Way for an astounding number of faint glows and dark bays.

Astronomical League [www.astroleague.org/outreach](http://www.astroleague.org/outreach); duplication is allowed and encouraged for all free distribution.

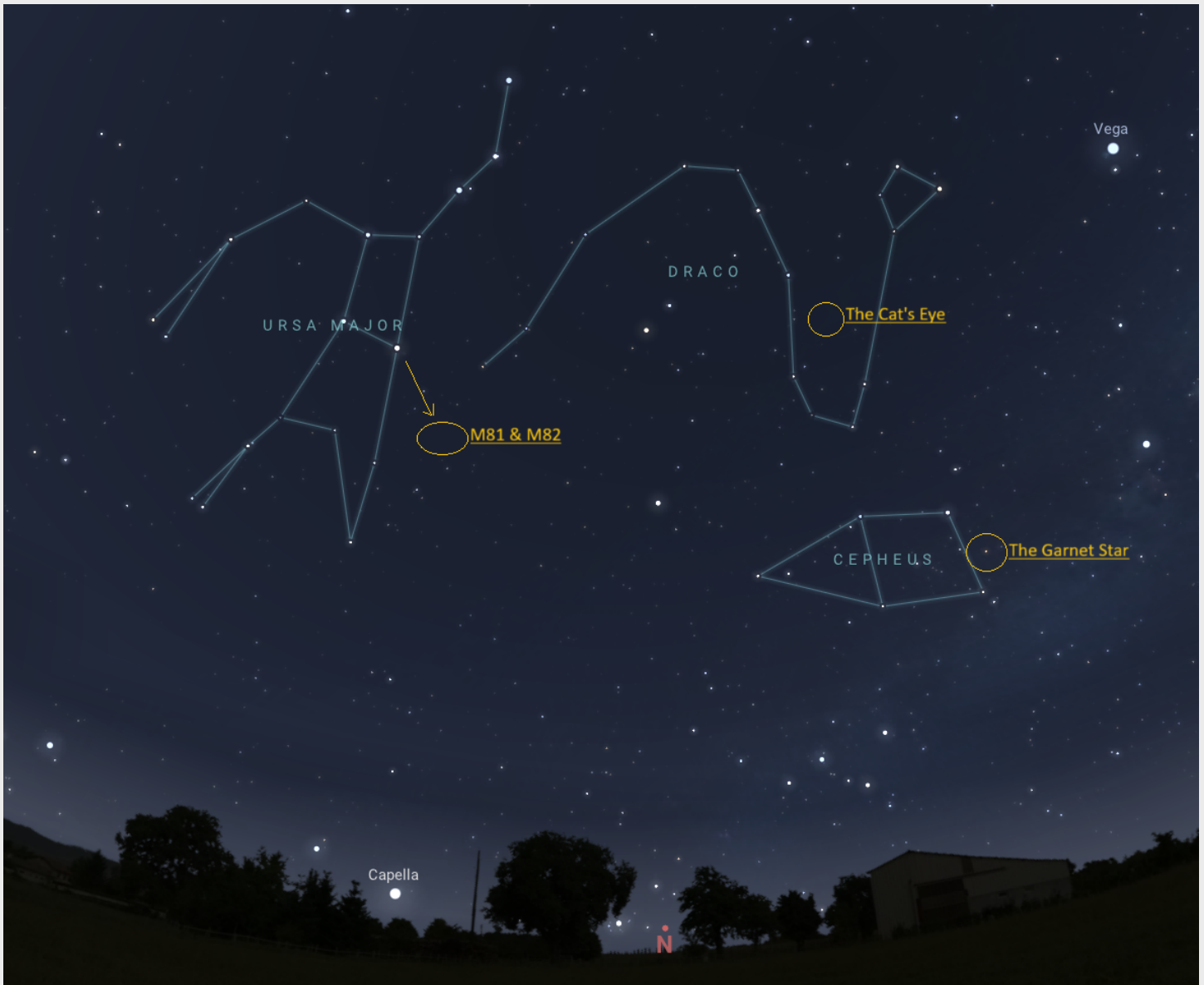


## NASA NIGHT SKY NOTES

### Constant Companions: Circumpolar Constellations, Part III

By Kat Troche

In our final installment of the stars around the North Star, we look ahead to the summer months, where depending on your latitude, the items in these circumpolar constellations are nice and high. Today, we'll discuss Cepheus, Draco, and Ursa Major. These objects can all be spotted with a medium to large-sized telescope under dark skies.

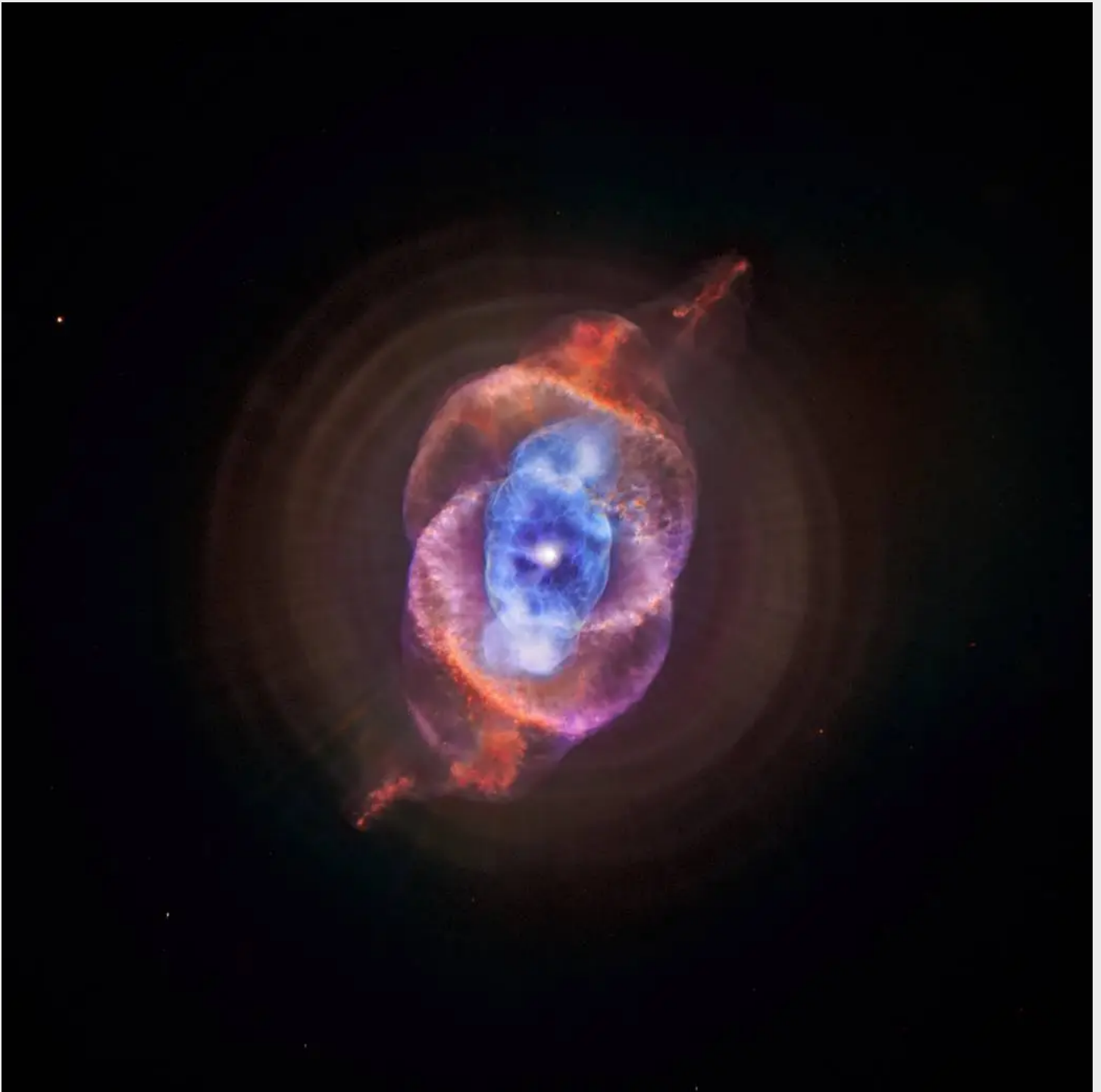


From left to right: Ursa Major, Draco, and Cepheus. Credit: Stellarium Web.

- **Herschel's Garnet Star:** Mu Cephei is a deep-red hypergiant known as The Garnet Star, or Erakis. While the star is not part of the constellation pattern, it sits within the constellation boundary of Cepheus, and is more than 1,000 times the size of our Sun. Like its neighbor Delta Cephei, this star is variable, but is not a reliable Cepheid variable. Rather, its brightness can vary anywhere between 3.4 to 5.1 in visible magnitude, over the course of 2-12 years.
- **The Cat's Eye Nebula:** Labeled a planetary nebula, there are no planets to be found at the center of this object. Observations taken with NASA's Chandra X-ray Observatory and Hubble Space Telescopes give astronomers a better understanding of this complex, potential binary star, and how its core ejected enough mass to produce

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the rings of dust. When searching for this object, look towards the 'belly' of Draco with a medium-sized telescope.



This composite of data from NASA's Chandra X-ray Observatory and Hubble Space Telescope gives astronomers a new look for NGC 6543, better known as the Cat's Eye nebula. This planetary nebula represents a phase of stellar evolution that our sun may well experience several billion years from now. Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI

- **Bode's Galaxy and the Cigar Galaxy:** Using the arrow on the star map, look diagonal from the star Dubhe in Ursa Major. There you will find Bode's Galaxy (Messier 81) and the Cigar Galaxy (Messier 82). Sometimes referred to as Bode's Nebula, these two galaxies can be spotted with a small to medium-sized telescope. Bode's Galaxy is a classic spiral shape, similar to our own Milky Way galaxy and our neighbor, Andromeda. The Cigar Galaxy, however, is known as a starburst galaxy type, known to have a high star formation rate and

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incredible shapes. This image composite from 2006 combines the power of three great observatories: the Hubble Space Telescope imaged hydrogen in orange, and visible light in yellow green; Chandra X-Ray Observatory portrayed X-ray in blue; Spitzer Space Telescope captured infrared light in red.



The Cigar Galaxy. Credit: NASA, ESA, CXC, and JPL-Caltech

Up next, we celebrate the solstice with our upcoming mid-month article on the [Night Sky Network](#) page through NASA's website!



This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!



Tri-Valley Stargazers  
P.O. Box 2476  
Livermore, CA 94551  
[www.trivalleystargazers.org](http://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).

**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.