

# PrimeFocus

November 2024



## CHASING SHADOWS: SUPPORTING THE LUCY MISSION TO JUPITER'S TROJAN ASTEROIDS

BY TED BLANK

### WHEN:

November 15, 2024  
Doors open at 7:00pm  
Meeting at 7:30pm  
Lecture at 8:00pm

### WHERE:

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

### TVS QR CODE

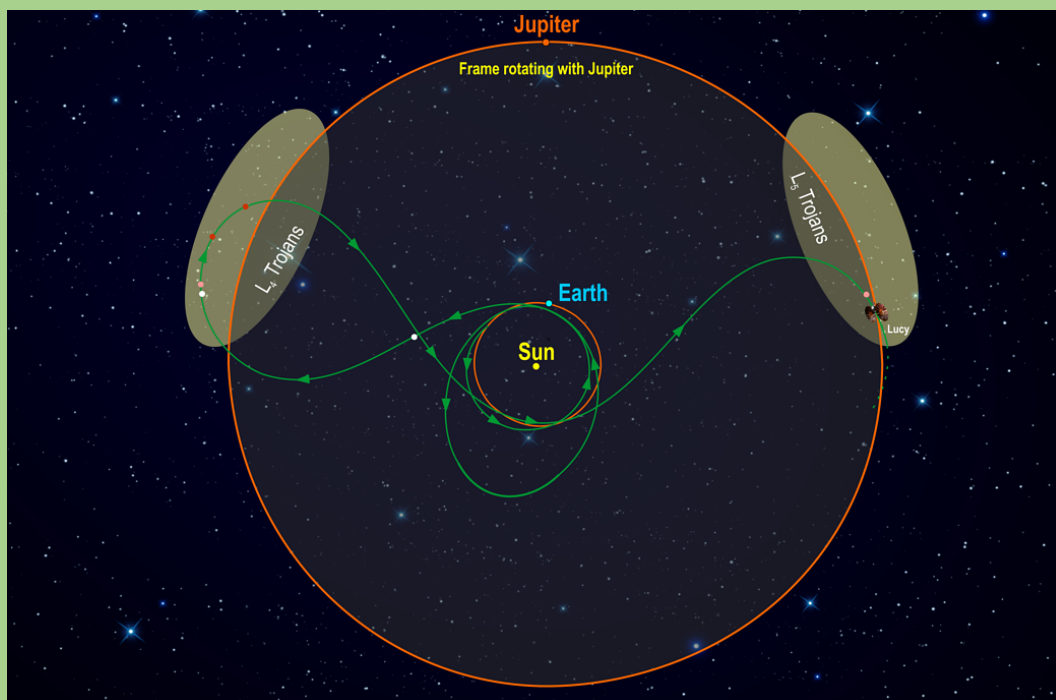


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Ted participated in an occultation expedition for the mission in August, where 31 telescopes were deployed across Texas and New Mexico to try to observe and record video of one of the Lucy mission target asteroids passing in front of a star (and making the star disappear for several seconds). The improved knowledge of the asteroid's location and orbit we obtained will help the mission controllers more accurately direct the spacecraft to perform its science missions as it flies by this particular asteroid in 2033.

Ted Blank is a NASA solar system ambassador and Past President of the New Hampshire astronomical society. He enjoys taking his telescope out on the sidewalk for the public. He is a retired IT professional and currently resides with his wife Peggy in Fountain Hills Arizona, the world's 17th dark sky community.



This diagram illustrates Lucy's orbital path. The spacecraft's path (green) is shown in a frame of reference where Jupiter remains stationary, giving the trajectory its pretzel-like shape. After launch in October 2021, Lucy has two close Earth flybys before encountering its Trojan targets. In the L4 cloud Lucy will fly by (3548) Eurybates (white), (15094) Polymele (pink), (11351) Leucus (red), and (21900) Orus (red) from 2027-2028. After diving past Earth again Lucy will visit the L5 cloud and encounter the (617) Patroclus-Menoetius binary (pink) in 2033. As a bonus, in 2025 on the way to the L4, Lucy flies by a small Main Belt asteroid, (52246) Donaldjohanson (white), named for the discoverer of the Lucy fossil. After flying by the Patroclus-Menoetius binary in 2033, Lucy will continue cycling between the two Trojan clouds every six years. Southwest Research Institute

To learn more about NASA's active Lucy Mission please visit the following website:  
<https://science.nasa.gov/mission/lucy/>

## NEWS AND NOTES

### 2024 Meeting Dates

Club Meeting	Board Meeting	PrimeFocus Deadline
Nov. 15	Nov. 18	Nov. 2
Dec. 20	Dec. 23	Dec. 7
Jan. 17	Jan. 20	Jan. 4

### Money Matters

As of the last Treasurer’s Report on 9/23/24, our club’s account balance is \$46,625.85, this includes \$13,104.47 in the H2O Rebuild fund. No report for October, Treasurer was out at the time of this publication.

### TVS Welcomes New Members

TVS welcomes new members Dick Larder, Ganesh Panneer, Sonya Archer, Sanjeev Rangan, Xuan Liu, Jayson Martin, and Lisa Ouimette. Please say hello and chat with them 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. No parties currently planned.

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. No parties currently planned.

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. No open house star parties currently planned.

**Dec 4:** School star party at Dublin Elementary School, 7979 Vomic Road, Dublin. Set up 4:30pm, observing from 5:30pm to 8:00pm.

## CALENDAR OF EVENTS

**November 23, 24, 29, 30,  
December 6, 7, 13, 14, 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/>

### November 20, 6:00 - 9:00 PM

What Celebrating 40 years of history and beyond

Who SETI Institute

Where Sharon Heights Golf and Country Club  
2900 Sand Hill Rd  
Menlo Park, California 94025

Cost \$250 per individual

Featured Events:

- Special recognition of Dr. Jill Tarter
- Lightning Talks featuring bold predictions and foresight
- Interactive “Show and Tell Booths” - meteors, exploration, art, and more
- Live music from "Wasabi The Band" - Space Funk Future
- 40th Anniversary space-themed cocktails
- AI Alien Photo Booth – choose your avatar!

We hope you’ll join us for an unforgettable celebration in recognition of our groundbreaking accomplishments over the past four decades. Together, let’s toast to the endless possibilities that lie ahead.

For more information, see:

<https://www.seti.org/event/celebrating-40-years-history-and-beyond>

### December 2, 7:30 PM

What An Exploration of the Milky Way: Our Cosmic Home

Who California Academy of Sciences

Where Morrison Planetarium

Cost Public: \$15 Members and seniors: \$12

Featuring Dr. Keith Hawkins, University of Texas - Austin

Our Universe is made up of many billions of galaxies, yet astronomers are still trying to figure out how they form, evolve, and assemble themselves. The question of how and when galaxies—including our own—take shape across cosmic time is among the most fundamental in modern astronomy. But the answer still eludes us. One of the best ways to answer this question is to explore our home galaxy, the Milky Way, which is made up of some 200 billion stars—and is the optimal laboratory for answering the questions of galaxy formation because, to date, it is one of the only systems where we can obtain detailed and precise data on the positions, motions, and chemical compositions of billions of individual stars. Using our own galaxy as a sandbox for exploring galaxy assembly is the essence of galactic archaeology. In this talk, Dr. Keith Hawkins will take us on a journey through our own galaxy and explore how we can use state-of-the-art data from large-scale missions—visualized in the planetarium—to chart the Milky Way’s structure and assembly over the last 10 billion years.

Dr. Keith Hawkins is an Associate Professor of Astronomy at the University of Texas at Austin. He received his B.S. in astrophysics with minors in

Mathematics and African Studies from the Honors Tutorial College at Ohio University as a Templeton and Goldwater Scholar in 2013. After which, Dr. Hawkins completed a 2.5 year Ph.D. in Astronomy at the Institute of Astronomy, University of Cambridge in the UK as a British Marshall Scholar. He was appointed a Junior Fellow in the Simons Foundation’s Society of Fellows at Columbia University between 2016-18. In 2018, he entered the Faculty at the University of Texas at Austin. He has won numerous awards, including the Vera Rubin Distinguished Visiting Professor (2023) and the Flatiron Institute IDEA Fellowship (2022), and has been a Scialog and Kavli Fellow. His research interests are primarily in Galactic archaeology, with the goal of revealing the formation and evolution of our Galaxy, the Milky Way, through detailed chemical and dynamical studies of its billions of stars.

For more information, see:

<https://www.calacademy.org/events/benjamin-dean-astronomy-lectures/an-exploration-of-the-milky-way-our-cosmic-home>

## 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
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<b>Astronomical League Rep.</b> Don Dossa <a href="mailto:alrep@trivalleystargazers.org">alrep@trivalleystargazers.org</a>			

## COMET C/2023 A3 TSUCHINSHAN-ATLAS: A CELESTIAL SPECTACLE BY SAANIKA KULKARNI

Comets have long fascinated humanity, weaving through our collective imagination as cosmic wanderers from the far reaches of space. These icy bodies, made of ancient dust, rock, and frozen gasses, have lit up our skies and stirred wonder for millennia. One comet in particular is currently generating significant excitement: C/2023 A3 Tsuchinshan-ATLAS, a rare visitor that could offer a spectacle for the ages.

In January 2023, astronomers at the Tsuchinshan Observatory in China and Hawaii's ATLAS (Asteroid Terrestrial-impact Last Alert System) independently identified this comet, sparking a wave of interest across the astronomical community. C/2023 A3's discovery marked the beginning of what could be one of the most memorable celestial events of our time. Early observations placed the comet on a hyperbolic trajectory, suggesting that it's not bound to the Sun's gravitational pull and may be a true interstellar traveler. This means it's likely making its first—and only—close approach to our solar system before returning to the distant void of interstellar space.



The comet, pictured by High Point Scientific.

### The Science Behind the Spectacle

Though some early predictions of its brightness have proven slightly optimistic, C/2023 A3 still holds enormous scientific value. Astronomers are particularly interested in its pristine composition, largely unchanged since the birth of the solar system. By studying its makeup, they hope to unlock secrets about the conditions that existed when the planets, moons, and comets were first forming billions of years ago.

In addition to its composition, the comet's interaction with the solar wind—the stream of charged particles flowing from the Sun—provides insight into the processes shaping not just our solar system, but also the behavior of interstellar objects. Observing such a rare, hyperbolic visitor is a unique opportunity, and scientists are using an array of ground-based and space telescopes to analyze every aspect of this cosmic wanderer.

### A Once-in-a-Lifetime Event

With a calculated orbital period of approximately 80,000 years, the spectacle of C/2023 A3 Tsuchinshan-ATLAS truly is a once-in-a-lifetime event. Its brief passage will offer skywatchers a rare chance to witness an awe-inspiring display as it streaks through our skies.



My image of the comet. This was taken around 5:16 PM on October 15th.

**TVS ASTROPHOTOGRAPHY**



**Comet C/2023 A3 (Tsuchinshan-ATLAS), by Bill Fisher**



**Comet C/2023 A3 (Tsuchinshan-ATLAS), by Ojas Girish**



**Comet C/2023 A3 (Tsuchinshan-ATLAS)**, by Dwight M Lanpher



**Comet C/2023 A3 (Tsuchinshan-ATLAS),** by Muriel Holzer



**Comet C/2023 A3 (Tsuchinshan-ATLAS),** by Madhan Guna



**Comet C/2023 A3 (Tsuchinshan-ATLAS)**, by John Barclay





Comet C/2023 A3 (Tsuchinshan-ATLAS), by Gopal K

## WHATS UP

Adapted from Sky & Telescope

All times are Pacific Standard Time

### November 2024

**15 Fri Full Moon**

17 Sun The Leonid meteor shower peaks

19 Tue Moon  $2\frac{1}{2}^\circ$  from below Pollux

20 Wed Looking East see moon  $4\frac{1}{2}^\circ$  lower left of Mars

23 Sat Moon at last quarter

25 Mon Algol shines at minimum brightness from about 4:14pm to 6:14pm

27 Wed Waning Moon occults Spica for viewers in central and eastern United States

### December 2024

**1 Sun New Moon**

4 Wed Looking southwest for the waxing crescent Moon about  $2\frac{1}{2}^\circ$  below Venus

7 Sat Looking southwest moon just  $4^\circ$  lower right of Saturn

8 Sun Moon at first quarter

13-14 Fri-Sat The Geminid meteor shower peaks; but almost full moon may hamper viewing

16 Mon Moon forms triangle with Castor and Pollux, it sits about  $5^\circ$  right of the stars

18 Wed Algol shines at minimum brightness from about 5:58pm to 7:58pm

# NAVIGATING THE NIGHT SKY FOR NOVEMBER

## Navigating the November Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid November at 8 p.m. or early December at 7 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.

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

- 1 Face south. Almost overhead lies the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend a line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the south. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second brightest star in the south.
- 2 Draw a line westward following the southern edge of the Square until it strikes Altair, part of the "Summer Triangle."
- 3 Locate Vega and Deneb, the other two stars of the Summer Triangle. Vega is its brightest member, while Deneb sits in the middle of the Milky Way.
- 4 Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, then to Perseus, and finally to Auriga with its bright star Capella.

**Binocular Highlights**

**A and B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas. **E:** The Double Cluster.

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

## NASA NIGHT SKY NOTES

### Snowballs from Space

By Kat Troche

If you spotted comet C/2023 A3 (Tsuchinshan-ATLAS) in person, or seen photos online this October, you might have been inspired to learn more about these visitors from the outer Solar System. Get ready for the next comet and find out how comets are connected to some of our favorite annual astronomy events.

### Comet Composition

A comet is defined as an icy body that is small in size and can develop a 'tail' of gas as it approaches the Sun from the outer Solar System. The key traits of a comet are its nucleus, coma, and tail.

The nucleus of the comet is comprised of ice, gas, dust, and rock. This central structure can be up to 80 miles wide in some instances, as recorded by the Hubble Space Telescope in 2022 – large for a comet but too small to see with a telescope. As the comet reaches the inner Solar System, the ice from the nucleus starts to vaporize, converting into gas. The gas cloud that forms around the comet as it approaches the Sun is called the coma. This helps give the comet its glow. But beware: much like Icarus, sometimes these bodies don't survive their journey around the Sun and can fall apart the closer it gets.

The most prominent feature is the tail of the comet. Under moderately dark skies, the brightest comets show a dust tail, pointed away from the Sun. When photographing comets, you can sometimes resolve the second tail, made of ionized gases that have been electronically charged by solar radiation. These ion tails can appear bluish, in comparison to the white color of the dust tail. The ion tail is also always pointed away from the Sun. In 2007, NASA's STEREO mission captured images of C/2006 P1 McNaught and its dust tail, stretching over 100 million miles. Studies of those images revealed that solar wind influenced both the ion and dust tail, creating striations – bands – giving both tails a feather appearance in the night sky.



Comet McNaught over the Pacific Ocean. Image taken from Paranal Observatory in January 2007. Credits: ESO/Sebastian Deiries

Continued to next page

## PrimeFocus

Snowballs from Space continued.

### Coming and Going

Comets appear from beyond Uranus, in the Kuiper Belt, and may even come from as far as the Oort Cloud. These visitors can be short-period comets like Halley's Comet, returning every 76 years. This may seem long to us, but long-period comets like Comet Hale-Bopp, observed from 1996-1997 won't return to the inner Solar System until the year 4385. Other types include non-periodic comets like NEOWISE, which only pass through our Solar System once.

But our experiences of these comets are not limited to the occasional fluffy snowball. As comets orbit the Sun, they can leave a trail of rocky debris in its orbital path. When Earth finds itself passing through one of these debris fields, we experience meteor showers! The most well-known of these is the Perseid meteor shower, caused by Comet 109P/Swift-Tuttle. While this meteor shower happens every August in the northern hemisphere, we won't see Comet Swift-Tuttle again until the year 2126.



A view of the 2023 Perseid meteor shower from the southernmost part of Sequoia National Forest, near Piute Peak. Debris from comet Swift-Tuttle creates the Perseids. Credit: NASA/Preston Dyches

See how many comets (and asteroids!) have been discovered on [NASA's Comets page](#), learn how you can [cook up a comet](#), and check out our mid-month article where we'll provide tips on how to take astrophotos with your smartphone!



**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.