

PrimeFocus



WHEN:

September 15, 2023
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

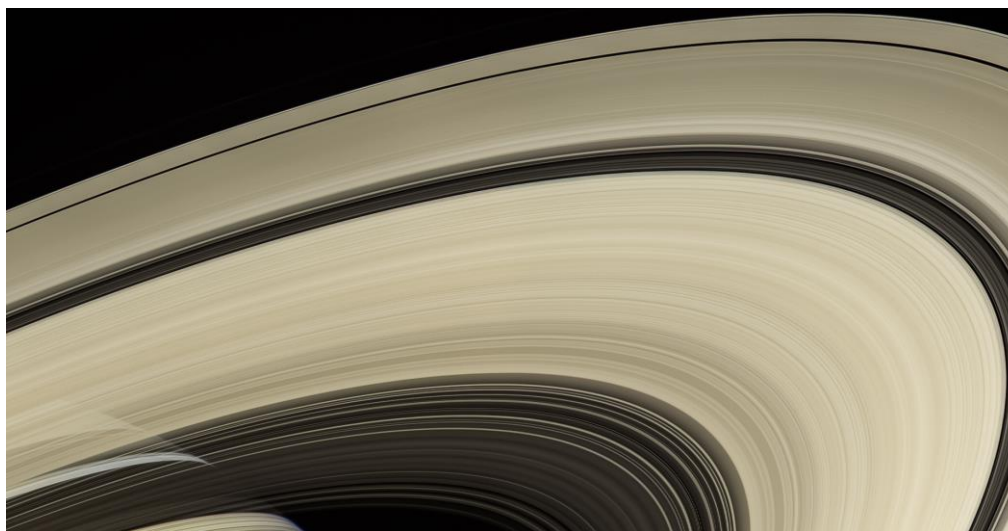


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13 Years at Saturn - Saturn's Rings as Revealed by the Cassini Orbiter; Robert French, SETI Institute

When NASA's Cassini orbiter arrived at Saturn in 2004, it ushered in a golden age of research on Saturn's rings. With more than 1 million images, spectra, occultations, and particle and magnetic field measurements of the rings taken between 2004 and 2017, Cassini provided enough data to satisfy generations of researchers. In this talk we will discuss some of the more striking discoveries and mysteries discovered during this time, such as the origin of the E ring from the Enceladus ice geysers, the clumps and strands of the hyperactive F ring, the "propellers" of the A ring, and the obscure dance of the moons Janus and Epimetheus and their effect on the edge of the ring system. We will also discuss recent research on the age of Saturn's rings and its implications for the evolution of the Saturn system.



Caption: Saturn's rings are perhaps the most recognized feature of any world in our solar system. Credit: www.nasa.gov/sites/default/files/thumbnails/image/pia14943-full.jpg

Robert French has been a Planetary Astronomer at the SETI Institute in Mountain View, CA for the past 15 years. His primary research interest is the origin, evolution, and eventual demise of the moons and rings of the outer solar system. He has used images from the Hubble Space Telescope to investigate the chaotic orbits of the Uranian moons and co-discovered Hippocamp, a small moon of Neptune. His current focus is using data from Cassini to analyze Saturn's mysterious F ring. Rob has more than 40 published papers and conference presentations to his name, including a chapter on the F Ring in the book Planetary Ring Systems published by Cambridge University Press. In addition, Rob helps run the Ring-Moon Systems Node of NASA's Planetary Data System, which archives outer planet mission data for future researchers, and is the lead developer of its OPUS search tool. In his free time, Rob is an avid pilot and flight instructor, square dance caller, and swing dancer.

WANTED: TVS Newsletter Editor

Ken Sperber will step down as the TVS Newsletter Editor at the end of this year. If you are interested in becoming the next TVS Newsletter Editor, please contact any club officer (see the Officer's Block on p.3 for email addresses).

News and Notes

2023 Meeting Dates

Lecture Meeting	Board Meeting	PrimeFocus Deadline
Sep. 15	Sep. 18	
Oct. 20	Oct. 23	Oct. 6
Nov. 17	Nov. 20	Nov. 3
Dec. 15	Dec. 18	Dec. 1

Money Matters

As of the last Treasurer's Report on 08/21/23, our club's account balance is \$62,246.17. This includes \$33,144.47 in the H2O Rebuild fund.

TVS Welcomes New Member

TVS welcomes new members Christopher Gammage, Greg Scott, Himanjal Sharma, Bradley Tyma, and Rajiv Vora. Please say hello and chat with them during our meetings.

2023 Club Star Party Schedule

Save the dates for the 2023 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.

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.

October 7: Tesla Vintners, 5143 Tesla Rd., Livermore. Set-up at 6:30pm, observing until 11:30pm.

October 14: Outreach star party at Las Positas College, 3000 Campus Hill Drive, Livermore to observed the partial solar eclipse. Set-up at 7:30am. The eclipse starts at 8:30am, with maximum eclipse (~90%) at 9:15am.

October 18: Livermore Library, 1188 S. Livermore Ave., Livermore. Set-up at 6:00pm, Introductory Talk at 6:45pm, observing 7:00-9:00pm.

October 21: Outreach star party at Del Valle, Arroyo Staging Area, just past 5055 Arroyo Road, Livermore. Set-up at 5:30pm, Observing 6:30-8:00pm.

Calendar of Events

September 16, 22, 23, 29, 30, October 6, 7, 13, 14 7:30pm-10:30pm

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://chabot.space.org/events/events-listing/>

September 26, 7:15pm-9:00pm

What: The Fascinating Journey of Photons From the Big Bang to Us

Who: Prof. Boryana Hadzhiyska, (UC Santa Barbara)

Where: Lindsay Wildlife Experience Community Room, 1931 First Avenue, Walnut Creek, CA 94597

Cost: Lecture: Free, see link below for parking info

No details available.

For more information, see: nightsky.jpl.nasa.gov/event-view.cfm?Event_ID=125703

October 2, 7:30pm

What: Mapping Cosmic Magnetism in the Space Between Stars

Who: Dr. Susan Clark (Stanford University)

Where: Golden Gate Park, 55 Music Concourse Drive, San Francisco

Cost: Members and Seniors \$12, Public \$15

The Universe is magnetic. From stars to galaxies to intergalactic space, magnetic fields thread the cosmos. Our home galaxy, the Milky Way, hosts a magnetic field that helps to sculpt the interstellar medium: the "stuff between the stars" out of which new stars are born, and into which some old stars explode. Join us on a tour of magnetism in the Milky Way galaxy and beyond, and learn how we measure magnetic fields in interstellar space.

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Calendar of Events (con't)

Susan Clark received her Ph.D. in 2017 from Columbia University, spent time as a NASA Hubble postdoctoral fellow at the Institute for Advanced Study, and has been an Assistant Professor of Physics at Stanford University since 2021.

Her research focuses on astrophysical magnetism and the physics of the interstellar medium, from diffuse gas to dense, star-forming regions. Susan's research group at Stanford uses both data and numerical simulations to study the magnetic universe and the complex processes that shape the interstellar environment.

Susan is also passionate about making STEM more inclusive.

For more information, see: [Benjamin Dean Astronomy Lecture](#)

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

What: First Friday: Light & Dark

Who: Chabot Staff

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

Cost: \$15 Adults, \$5 Youth, Members Free

Since the creation of our planet, light has been crucial to the survival of all living things on Earth. Equally important is the absence of that light where shadows play an important role in understanding the world around us. At October's First Friday event, try your hand at creating an eclipse post card or solar paper craft. Discover more about the phenomena of solar and lunar eclipses and their astronomical and cultural significance throughout history with exciting guest speakers. View the night sky through our historic telescopes on Chabot's Observation Deck. Then end the night with stunning visuals

from our Tales of the Maya Skies Planetarium show, exploring how Maya civilization was able to predict celestial events, including eclipses.

For more information, see:

<https://chabotspace.org/events/events-listing/>

October 11, 7:00pm

What: The Perils and Profit of Near-Earth Objects

Who: Prof. Robert Jedicke (University of Hawaii, IfA)

Where: Foothill College, Smithwick Theater, 12345 E. Monte Rd., Los Altos, CA 94022

Cost: Free

No details available.

We ask that attendees wear a mask while indoors at the event. Extra masks will be provided.

For more information, see: <https://foothill.edu/astronomy/>

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TVS E-Group

To join the TVS e-group just send an email message to TVS at: 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.

A Tale of Three Observatories: Part 1: A Man, A Vision, and A Legacy; By Saanika Kulkarni

Palomar Observatory, located in San Diego, California, celebrated its 75th anniversary in February 2023. The observatory has a long and illustrious history, and there is no better way to commemorate this occasion than to discuss the brilliant mastermind behind this site and others. George Ellery Hale was the enigma behind this site. He had a vision like no other of his time. He was a visionary who saw the potential of Williams Bay, Mount Wilson, and Palomar Mountain for astronomical research and worked tirelessly to make his dream a reality. In addition to being a visionary, he was also a brilliant astrophysicist who made significant contributions to our understanding of the sun and other stars.

In part one of this series, I'll be talking about the first official (and unofficial) observatory envisioned and constructed by Dr. Hale—Yerkes Observatory in Williams Bay, Wisconsin. I was fortunate enough to be able to visit Yerkes in the summer of 2022, and let me tell you, it's a sight worth seeing! Yerkes is formally considered Hale's first observatory, but actually, the story starts earlier: in the Hale's family backyard.

Building From the Ground Up

The Hale's were, to say the least, very well-to-do, making their fortune from the elevator industry of Chicago. After the Chicago fire of 1871, the city had to be rebuilt, preferably with tall skyscrapers, and you needed elevators for those! So the Hale's were very rich and had a comfortable lifestyle. George Hale's childhood was very inquisitive and Hale demonstrated interest in many fields, much to his parent's delight. Hale showed immense interest in one particular field: astronomy. Vivaciously, he started demanding equipment from his father, who was more than happy to indulge. However, Hale's dad wanted George to build important people and scientific skills, like writing proposals to justify the scientific importance of why he should obtain the necessary equipment, in this case, a professional-grade 12-inch refractor worth quite the pretty penny. It was this habit of writing science proposals for money that Hale was able to build his financial extraction skills which he used often in his professional career.

Hale's proposal for the 12-inch refractor was accepted, and so the Kenwood Observatory was constructed in George's backyard. This was a serious observatory! Hale even hired an assistant.

While the Kenwood Observatory is interesting in itself, that's not the focus of this article. Hale found himself increasingly dissatisfied with his equipment and wanted more professional-grade instruments. Enter Yerkes Observatory!

Yerkes Observatory: The Start of a Lasting Legacy

Last summer, I visited Yerkes Observatory while I was at a summer program in Chicago. Yerkes is such a beautiful site

with so much history. Let me tell you a little about it. It's located in Williams Bay, Wisconsin (yes, not the best place for a telescope- more on that later!) near a beautiful lake which happened to be very, VERY, crowded the day I visited. It was named after Charles Yerkes, a somewhat hated figure in Chicago who was known for his pretentious personality and deep pockets. So, why of all people would Hale ask Yerkes to fund his observatory? Well, Yerkes needed glamorization, if you will, of his reputation. In simpler terms, Yerkes needed an outlet to show his generosity and public interest.

It really paid off! The construction of the observatory was done beautifully, almost as if it was a work of art (see Fig. 1). You can really see the effect of Roman architecture on America's buildings!



Figure 1: Yerkes Observatory. Credit: Saanika Kulkarni.

Now, why Wisconsin? I mean, it's the midwest! Isn't it super cloudy and snowy all the time? Yes, and that's one of the reasons why Hale opted to go to California for his next expenditures (oops, a little foreshadowing there!). But Yerkes was really a "starter" observatory, though there was really fundamental science done there! The Kuiper Belt, proposed by

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A Tale of 3 Observatories (con't)

Gerard Kuiper, was first discovered here, and the first inadvertent photograph of Pluto was taken here. There were also many, many advances in solar and stellar astronomy and astrophysics, for which photo plates still exist in the Yerkes basement.



Figure 2: Mechanical Calculator at the Yerkes Library. Credit: Saanika Kulkarni.

I also had the privilege of going into the Yerkes library, which resident astronomers like Carl Sagan and Edwin Hubble used! I also saw some ancient equipment used for precise calculations, like a mechanical calculator (see Fig. 2)!

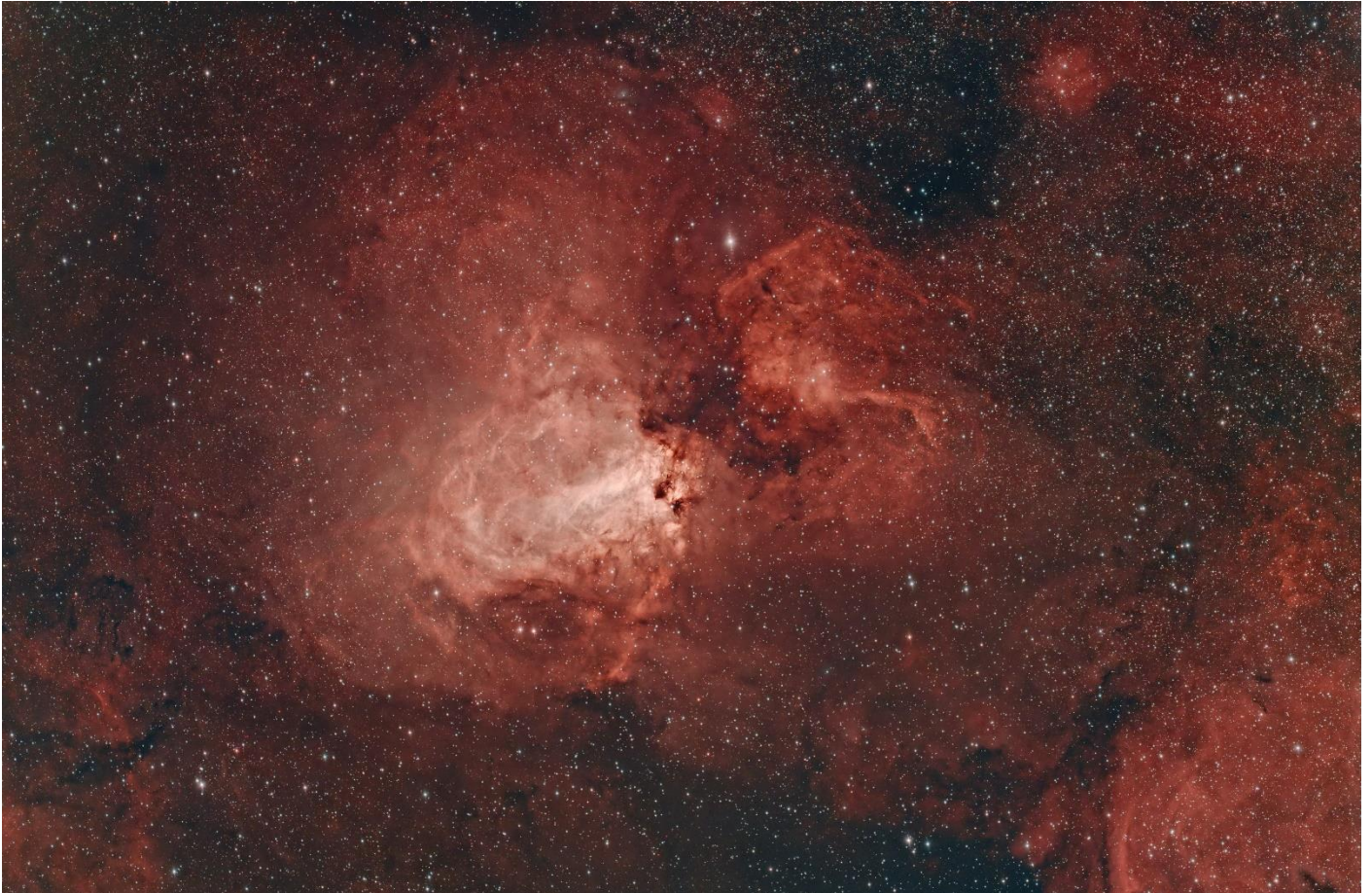
The experience itself was ethereal and I highly recommend the trip to anyone interested in a bit of astro-history!!

TVS Astrophotography: Comet Nishimura (C/2023 P1)



Caption: Swaroop Shere battled the rising Sun to capture this image of Comet Nishimura on September 8. He used an Astro-Physics StarFire130 ED telescope with a QHYCCD QHY268M camera and 10 x 10sec exposures.

TVS Astrophotography



Caption: Gert Gottschalk imaged M17, the Swan/Omega Nebula, from his balcony in Fremont. He used a 14" Schmidt-Cassegrain Telescope equipped with the f/2 Hyperstar system using an ASI2600MC camera with a L-eNhanche filter. The exposures were 91 x 5min.



Caption: Munish Kapoor chose the Veil Nebula (NGC6692/95) for his first ever image capture and processing of a Deep Sky Object. He used a GT81 refractor with a 6AIII focal reducer using an ASI533MC-Pro camera using an L-Extreme filter. The exposures were 60 x 60 sec.

What's Up

By Ken Sperber (adapted from S&T)

All times are Pacific Daylight Time

September

- 11 Mon In the East, the crescent Moon is $\sim 3.5^\circ$ left of the Beehive Cluster (M44) (Dawn)
- 12- Tue- In the East, from a dark location, the Zodiacal Light should be visible beginning ~ 2 hours before morning twilight. It will stretch up through Cancer and Gemini, and it should be visible for about the next 2 weeks.
- 13 Wed The thin crescent Moon and Regulus, separated by $\sim 4.5^\circ$, rise together in the East.
- 14 Thu New Moon (6:40pm)**
- 16 Sat Algol shines at minimum brightness for ~ 2 hours centered on 10:12pm PDT (Evening)
- 20 Wed Sinking toward the horizon in the SW, the crescent Moon is $\sim 4^\circ$ to the lower right of Antares (Dusk)
- 22 Fri Autumn begins in the Northern Hemisphere at 11:50pm PDT
- 22 Fri First-Quarter Moon (12:32pm)**
- 26 Tue In the SSE, the waxing gibbous Moon is $\sim 3^\circ$ below Saturn (Evening)
- 30 Sat Full Moon (2:58am)**

October

- 1 Sun In the ENE, the waning gibbous Moon and Jupiter are separated by $\sim 2^\circ$ (Evening)
- 2 Mon In the ENE, the Moon and the Pleiades (M45) are separated by $\sim 1.5^\circ$ (Evening)
- 6 Fri Last-Quarter Moon (6:48am)**
- 6 Fri Algol shines at minimum brightness for ~ 2 hours centered on 11:53pm PDT (Evening)
- 7 Sat In the East, the Moon is $\sim 1.5^\circ$ to the lower right of Castor with Pollux above (Morning)
- 8 Sun The Moon is $\sim 3.5^\circ$ to the upper left of the Beehive Cluster (M44) (Morning)
- 9 Mon Venus is $\sim 2.5^\circ$ from Regulus (Dawn)
- 9 Mon Algol shines at minimum brightness for ~ 2 hours centered on 8:42pm PDT (Evening)
- 10 Tue The crescent Moon forms a line with Venus and Regulus (Dawn)
- 14 Sat New Moon (10:55am, Annular or Partial Eclipse Visible in the Americas, see p.34, Oct. S&T)**
- 18 Wed In the SW, the crescent Moon is $\sim 5^\circ$ from Antares (Dusk)
- 21 Sat First-Quarter Moon (8:29pm)**
- 21 Sat The Orionid meteor shower peaks the night of Oct 21-22 (All Night)
- 23 Mon In the SSW, the waxing gibbous Moon is $\sim 5^\circ$ below Saturn (Evening)
- 28 Sat Full Moon (1:24pm)**
- 28 Sat In the SE, the Moon is $\sim 2.5^\circ$ above Jupiter (Evening)
- 29 Sun Algol shines at minimum brightness for ~ 2 hours centered on 10:23pm PDT (Evening)



Looking Beyond the Stars

By Brian Kruse

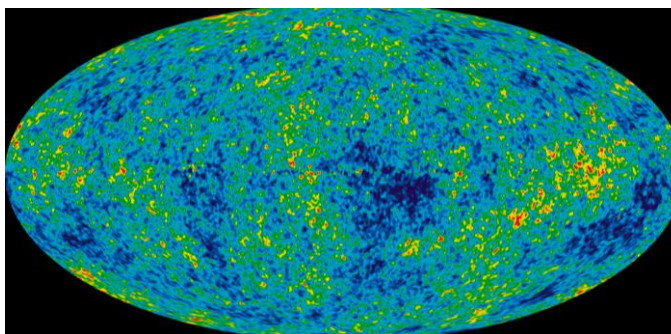
Looking up in awe at the night sky, the stars and planets pop out as bright points against a dark background. All of the stars that we see are nearby, within our own Milky Way Galaxy. And while the number of stars visible from a dark sky location seems immense, the actual number is measurable only in the thousands. But what lies between the stars and why can't we see it? Both the Hubble telescope and the James Webb Space Telescope (Webb) have revealed that what appears as a dark background, even in our backyard telescopes, is populated with as many galaxies as there are stars in the Milky Way.



Caption: NASA's James Webb Space Telescope has produced the deepest and sharpest infrared image of the distant universe to date. Known as Webb's First Deep Field, this image of galaxy cluster SMACS 0723 is overflowing with detail. This slice of the vast universe is approximately the size of a grain of sand held at arm's length by someone on the ground. (Image Credit: NASA, ESA, CSA, STScI) <https://bit.ly/webbdeep>

So, why is the night sky dark and not blazing with the light of all those distant galaxies? Much like looking into a dense forest where every line of sight has a tree, every direction we look in the sky has billions of stars with no vacant spots. Many philosophers and astronomers have considered this paradox. However, it has taken the name of Heinrich Wilhelm Olbers, an early 19th century German astronomer. Basically, Olbers Paradox asks why the night sky is dark if the Universe is infinitely old and static – there should be stars everywhere. The observable phenomenon of a dark sky leads us directly into the debate about the very nature of the Universe – is it eternal and static, or is it dynamic and evolving?

It was not until the 1960s with the discovery of the Cosmic Microwave Background that the debate was finally settled, though various lines of evidence for an evolving universe had built up over the previous half century. The equations of Einstein's General Theory of Relativity suggested a dynamic universe, not eternal and unchanging as previously thought. Edwin Hubble used the cosmic distance ladder discovered by Henrietta Swan Leavitt to show that distant galaxies are moving away from us – and the greater the distance, the faster they're moving away. Along with other evidence, this led to the recognition of an evolving Universe.



Caption: The oldest light in the universe, called the cosmic microwave background, as observed by the Planck space telescope is shown in the oval sky map. An artist's concept of Planck is next to the map. The cosmic microwave background was imprinted on the sky when the universe was just 380,000 years old. It shows tiny temperature fluctuations that correspond to regions of slightly different densities, representing the seeds of all future structure: the stars and galaxies of today. (Image credit: ESA and the Planck Collaboration - D. Ducros) <https://go.nasa.gov/3qC4G5q>

The paradox has since been resolved, now that we understand that the Universe has a finite age and size, with the speed of light having a definite value. Here's what's happening – due to the expansion of the Universe, the light from the oldest, most distant galaxies is shifted towards the longer wavelengths of the electromagnetic spectrum. So the farther an object is from us, the redder it appears. The Webb telescope is designed to detect light from distant objects in infrared light, beyond the visible spectrum. Other telescopes detect light at still longer wavelengths, where it is stretched into the radio and microwave portions of the spectrum. The farther back we look, the more things are shifted out of the visible, past the infrared, and all the way into the microwave wavelengths. If our eyes could see microwaves, we would behold a sky blazing with the light of the hot, young Universe – the Cosmic Microwave Background.

The next time you look up at the stars at night, turn your attention to the darkness between the stars, and ponder how you are seeing the result of a dynamic, evolving Universe.

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 to find local clubs, events, 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).

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.