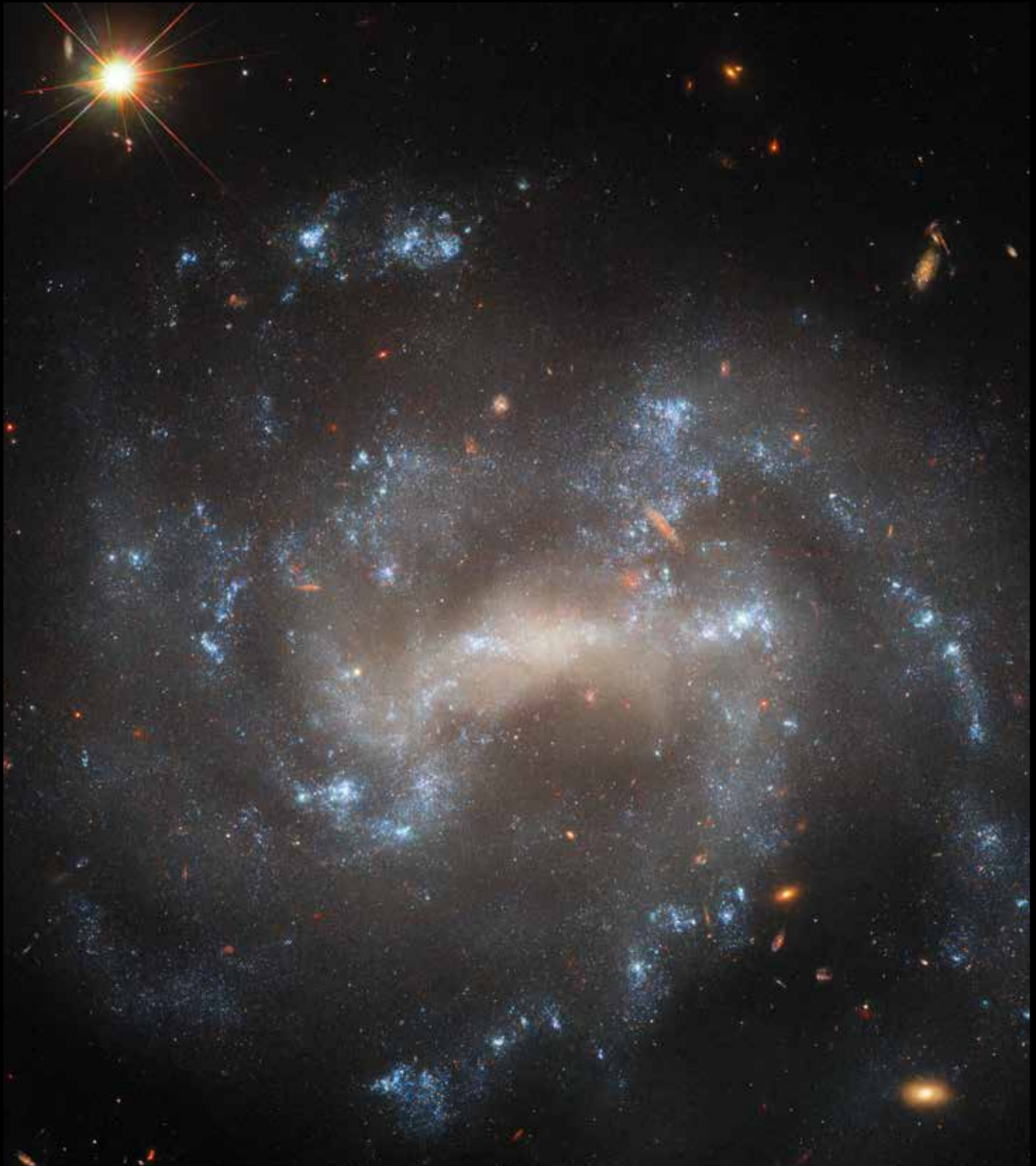


Volume 45.4

April 2025

# Desert Sky Observer

Antelope Valley Astronomy Club



# Desert Sky Observer

www.avastronomyclub.org

April 2025

## Upcoming Events

April 11: Club Meeting  
April 19: Moonwalk @ PDW 8:00 pm  
April 25: College of the Canyons Star Party  
April 26: DSSP @ Chuchupate  
Every clear night: Personal Star Party

May 9: Club Meeting / Painting Class  
May 17: Moonwalk @ PDW 8:30 pm  
May 24: DSSP @ Chuchupate  
May 24: Mt Wilson Field trip  
May 31: Lunar Club @ Matt's house

## Board Members

**President:** Phil Wriedt (661) 917-4874  
[president@avastronomyclub.org](mailto:president@avastronomyclub.org)

**Vice-President:** Matt Leone (661) 713-1894  
[vice-president@avastronomyclub.org](mailto:vice-president@avastronomyclub.org)

**Secretary:** Rose Moore (661) 972-1953  
[secretary@avastronomyclub.org](mailto:secretary@avastronomyclub.org)

**Treasurer:** Rod Girard (661) 803-7838  
[treasurer@avastronomyclub.org](mailto:treasurer@avastronomyclub.org)

**Director of Community Development:**  
Christian Amaya(661) 972-0091  
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## Appointed Positions

**Newsletter Editor:** Phil Wriedt (661) 917-4874  
[dso@avastronomyclub.org](mailto:dso@avastronomyclub.org)

**Equipment & Library:**  
vacant  
[library@avastronomyclub.org](mailto:library@avastronomyclub.org)

**Club Historian:** vacant  
[history@avastronomyclub.org](mailto:history@avastronomyclub.org)

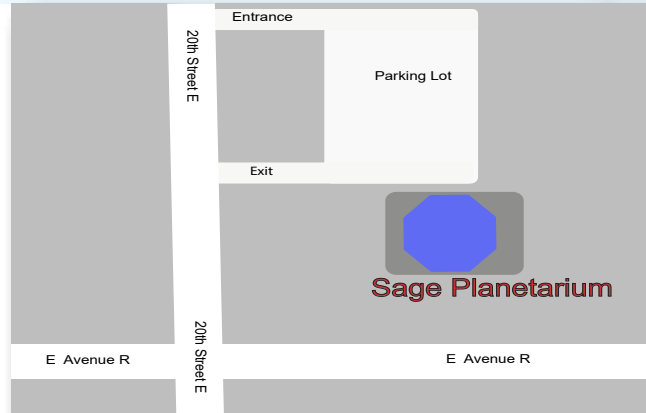
**Webmaster:** Steve Trotta (661) 269-5428  
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**Night Sky Coordinator:**  
Rose Moore (661) 972-1953

**Astronomical League Coordinator:**  
Phil Wriedt (661) 917-4874  
[al@avastronomyclub.org](mailto:al@avastronomyclub.org)



AVAC Calendar



## Monthly Meetings

Monthly meetings are held at the **S.A.G.E. Planetarium** in Palmdale, the second Friday of each month except December. The meeting location is at the northeast corner of Avenue R and 20<sup>th</sup> Street East. Meetings start at 7 p.m. and are open to the public. *Please note that food and drink are not allowed in the planetarium.*

## Membership

Membership in the Antelope Valley Astronomy Club is open to any individual or family.

The Club has three categories of membership.

- Family membership at \$30.00 per year.
- Individual membership at \$25.00 per year.
- Junior membership at \$15.00 per year.

Membership entitles you to ...

- The Desert Sky Observer -- monthly newsletter
- The AVAC Membership Manual.
- To borrow club equipment, books, videos, and other items.

AVAC  
PO Box 8545  
Lancaster, CA 93539-8545



Visit the Antelope Valley Astronomy Club website at [www.avastronomyclub.org/](http://www.avastronomyclub.org/)  
[www.instagram.com/av\\_astronomyclub](https://www.instagram.com/av_astronomyclub)

[www.avastronomyclub.org](http://www.avastronomyclub.org)

The Antelope Valley Astronomy Club, Inc. is a  
26 USC §503(c)(3) California Non-Profit Corporation.

## President's Message

By Phil Wriedt

Hi y'all

There was a Lunar eclipse on Thursday night March 13. We gathered at the SAGE, held a "Moon Party" and invited the public to watch the eclipse. A few members were there to watch with mostly large binoculars. I was there too. I have to admit, watching someone else watching an eclipse, was like watching paint dry, while sitting in a freezer. It was cold.

The next meeting is on the 11th. We have a NASA/JPL astronomer who will speak about exoplanets. Please get your friends, neighbors, and their kids to come listen to this speaker.

Our next Moonwalk is on April 19th. Sunset is at 7:28 pm and astronomical dusk is late at 8:58 pm. Saturn, Venus and Mercury are now in the morning twilight. The Moon won't be visible as it's waning gibbous and won't rise until 1:12 am. Get there early so you can setup in daylight. If you have a telescope bring it, or if not, just come join the party at Prime Desert Woodland. Don't forget warm clothes, jackets, gloves, etc. Hopefully it will be warmer than an icebox. The more members there, the better it will be.

We have a public star party at the College of the Canyons on the 25th. This a great opportunity to meet with members of the Santa Clarita Club (The Local Group) and mostly science students interested in astronomy. Watch for emails for more details.

On the 26/27th of April we will have our next, first Dark Sky Star Party of the year, this time at Chuchupate. I know I said that a month ago. The DSSP at Red Cliffs was supposed to be a Messier Marathon, unfortunately our plans were impacted by winds and clouds. Every other site for our star parties were plagued by the same problems. Keep in mind that a M.M. can be done at anytime of the year, it's just easier in March. Personally, I'm going to break the Marathon list into chunks and do a bit each night till I have learned all the objects. Like the Moonwalks, the weather will rule what happens. Please don't forget warm clothes, food, water and toilet paper.

Keep Looking Up, Phil

**On The Cover** Note: North is 20.8° right of vertical RA: 10h 8' 9.83" DEC: 51° 50' 45.81" Dist: 60 mly AMag: 13.9 (U Major)

*The sparkling spiral galaxy gracing this NASA/ESA Hubble Space Telescope Picture of the Week is UGC 5460 [PGC29469], which sits about 60 million light-years away in the constellation Ursa Major. This image combines four different wavelengths of light to reveal UGC 5460's central bar of stars, winding spiral arms and bright blue star clusters. Also captured in the upper left-hand corner of this image is a far closer object: a star just 577 light-years away in our own galaxy.*

*UGC 5460 has hosted two recent supernovae named SN 2011ht and SN 2015as. It's because of these two stellar explosions that Hubble targeted this galaxy, collecting data for three observing programmes that aim to study various kinds of supernovae.*

*SN 2015as was what's known as a core-collapse supernova: a cataclysmic explosion that happens when the core of a star far more massive than the Sun runs out of fuel and collapses under its own gravity, initiating a rebound of material outside the core. Hubble observations of SN 2015as will help researchers understand what happens when the expanding shockwave of a supernova collides with the gas that surrounds the exploded star.*

*SN 2011ht might have been a core-collapse supernova as well, but it could also be an impostor called a luminous blue variable. Luminous blue variables are rare stars that experience eruptions so large that they can mimic supernovae. Crucially, luminous blue variables emerge from these eruptions unscathed, while stars that go supernova do not. Hubble will search for a stellar survivor at SN 2011ht's location, and the explosion's identity may be revealed at last.*

## From the Secretary

By Rose Moore

Members:

Coming up in April, we have a speaker for our meeting on Friday April 11th. Our speaker will be David Daniels-Watanabe from JPL/NASA. He will be speaking on Exoplanets. Come out and enjoy this presentation at the SAGE Planetarium! Bring a family member or friend. Free and open to the public, children are welcome.

On Saturday April 19th we have a Prime Desert Moon Walk with Jeremy. Starting time is 8pm, rain or shine. We need members with telescopes, weather permitting the set up time will be 30-60 minutes prior to event; or just come out to take the walk, its free and open to the public, children are welcome. For new members, the location is: Prime Desert Woodland Preserve, 43201 35th St W, Lancaster, CA 93536,

We will be supporting the College of the Canyons Spring Star Party on Friday April 25th, from 6:30pm to 10pm. This is at the Canyon Campus, Santa Clarita, on Sierra Highway. Set up time is about 40-60 mins prior to event. We will be setting up in a different area this year, and further info and directions will be sent out via email later. Their guest speaker will be Michaela Blain, Professor of Astronomy, speaking on 'The Unfolding Story of Exoplanets'.

Our dark sky star party for April will be on April 26th, Saturday. More information to come. If weather allows, we will be having this at Chuchupate.

For the month of May we have our club meeting on May 9th, which will be Sue's Astronomy Paint Class; a Prime Desert Moon Walk, and a trip to Mt Wilson! And for our June meeting we have another speaker: Tim Thompson, who will be speaking on the Sun.

We are still taking sign ups for the trip to Mt. Wilson. This is for use of the 60 inch scope for 1/2 a night, and a possible pre tour. Please check your emails for further information. The link for PayPal is up on the website, as well as in the emails I have sent out.

See you there! Rose

## On The Cover ... continued

*[Image Description: A spiral galaxy seen close to face-on. The centre of its disc is a bright, pale yellowish oval shape. Spiral arms extend from either side of the oval through the disc on irregular paths. They are marked throughout by bright bluish-white patches of stars. Distant background galaxies appear as small orangish blobs around the spiral galaxy. In the top-left corner a nearby star shines brightly, spikes radiating from it.]*

**Links:** [Pan of UGC 5460](#)

**Credit:** ESA/Hubble & NASA, W. Jacobson-Galán, A. Filippenko, J. Mauerhan

## AVAC Membership Renewal

There is still time to renew memberships! The easiest way to renew your membership is through the AVAC website via our PayPal account . But you can still renew using a check via the club's Post Office Box:

Antelope Valley Astronomy Club  
PO BOX 8545  
Lancaster, CA 93539-8545

## Space News

News from around the Net

### **It's Official: Saturn Has 128 New Moons**

A sudden listing by the Minor Planet Center this week nearly doubled the number of known moons of Saturn, and in the process provided strong evidence for at least one major collision between Saturnian moons within the last 100 million years. Although the data on the 128 new moons was reported all at once on March 11th in a series of Minor Planet Center circulars, the data had been collected intermittently since 1999, and information for some of the moons had been informally reported before. . . . (continued at <https://skyandtelescope.org/astronomy-news/its-official-saturn-has-128-new-moons/> )



### **Four Small Planets Discovered Around One Of The Closest Stars To Earth—An Expert Explains What We Know**

Barnard's Star is a small, dim star of the type that astronomers call red dwarfs. Consequently, even though it is one of the closest stars to Earth, such that its light takes only six years to get here, it is too faint to be seen with the naked eye. Now, four small planets have been found orbiting the star. Teams in America and Europe achieved this challenging detection by exploiting precision instruments on the world's largest telescopes. . . . (continued at <https://phys.org/news/2025-03-small-planets-closest-stars-earth.html> )



### **A Mars Chopper Mission Over Glaciers And Canyons**

Ingenuity proved beyond a shadow of a doubt that a helicopter can operate on another planet. Over 72 flights, the little quadcopter that could captivated the imagination of space exploration fans everywhere. But, several factors limited it, and researchers at NASA think they can do better. Two papers presented at the recent Lunar and Planetary Science Conference, held March 10-14 in The Woodlands, Texas, and led by Pascal Lee of NASA Ames and Derric Loya of the SETI Institute and Colorado Mesa University, describe a use case for that still-under-development helicopter, which they call Nighthawk. . . . (continued at <https://www.universetoday.com/articles/a-mars-chopper-mission-over-glaciers-and-canyons> )



### **Astronomers Have Spotted The Most Distant Comet Ever Discovered**

Comets develop the spectacular long tails that they are known for by approaching the Sun. When they get too close, their icy volatile materials begin to sublimate away, carrying along clouds of dust. But this activity usually only happens relatively close to the Sun, as comets spend most of their time in the outer solar system on highly elongated orbits. A new comet, recently discovered by Hannes Gröller of the University of Arizona, an observer with the Catalina Sky Survey, and now known as C/2025 D1 (Gröller), is smashing records. Still way out in the solar system between the orbits of Saturn and Uranus, . . . (continued at <https://www.astronomy.com/science/astronomers-have-spotted-the-most-distant-comet-ever-discovered/> )



### **World's Largest Digital Camera To Help New Vera Rubin Observatory Make A 'Time-Lapse Record Of The Universe'**

A major milestone with the Vera C. Rubin Observatory has been reached with the installation of the telescope's enormous LSST Camera — the last optical component required before the last phase of testing can begin. The car-sized Large Synoptic Survey Telescope (LSST) Camera that was recently installed on the Vera C. Rubin Observatory is the largest digital camera ever built and will be used to capture detailed images of the southern hemisphere sky over a decade. "The installation of the LSST Camera on the telescope is a triumph of science and engineering," said Harriet Kung, Acting Director of the Department of Energy's Office of Science in a statement. "We look forward to seeing the unprecedented images this camera will produce." . . . (continued at <https://www.space.com/space-exploration/tech/worlds-largest-digital-camera-to-help-new-vera-rubin-observatory-make-a-time-lapse-record-of-the-universe-photos> )



## Space News

News from around the Net

### **T Crb Not The Only Star Ready To Blow, Meet U Gem**

Every clear night before going to bed, I look out my front room window and check on T Cor Bor. T Corona Borealis is a recurrent nova that blows its top about every 80 years. The last eruption occurred in February 1946, when it rose to magnitude 2.0, briefly outshining the constellation's brightest star, Alphecca (mag. 2.2). So far, T CrB has refused to perform, even though a dip in its light in 2023 — a near-match to one that preceded the 1946 eruption — seemed to portend an imminent outburst last year. . . . (continued at <https://skyandtelescope.org/astronomy-news/t-crb-not-the-only-star-ready-to-blow-meet-u-gem/> )



### **'Extremely Large Telescope' Being Built In Chile Could Detect Signs Of Alien Life In A Single Night**

The Extremely Large Telescope (ELT), currently under construction in northern Chile, will give us a better view of the Milky Way than any ground-based telescope before it. It's difficult to overstate how transformative it will be. The ELT's primary mirror array will have an effective diameter of 39 meters. It will gather more light than previous telescopes by an order of magnitude, and it will give us images 16 times sharper than the Hubble Space Telescope. It's scheduled to come online in 2028. . . (continued at <https://www.livescience.com/space/exoplanets/extremely-large-telescope-being-built-in-chile-could-detect-signs-of-alien-life-in-a-single-night> )



### **NASA's Webb Images Young, Giant Exoplanets, Detects Carbon Dioxide**

NASA's James Webb Space Telescope has captured direct images of multiple gas giant planets within an iconic planetary system. HR 8799, a young system 130 light-years away, has long been a key target for planet formation studies. The observations indicate that the well-studied planets of HR 8799 are rich in carbon dioxide gas. This provides strong evidence that the system's four giant planets formed much like Jupiter and Saturn, by slowly building solid cores that attract gas from within a protoplanetary disk, a process known as core accretion. The results also confirm that Webb can infer the chemistry of exoplanet atmospheres through imaging. . . . (continued at <https://webbtelescope.org/contents/news-releases/2025/news-2025-114> )



### **Astronomers Unveil 'Baby Pictures' Of The First Stars And Galaxies**

The clearest and most precise images yet of the universe in its infancy—the earliest cosmic time accessible to humans—have been produced by an international team of astronomers. Measuring light, known as the cosmic microwave background (CMB), that traveled for more than 13 billion years to reach a telescope high in the Chilean Andes, the new images reveal the universe when it was about 380,000 years old—the equivalent of hours-old baby pictures of a now middle-aged cosmos. The research, by the Atacama Cosmology Telescope (ACT) collaboration, shows both the intensity and polarization of the earliest light after the Big Bang with unprecedented clarity. . . . (continued at <https://phys.org/news/2025-03-astronomers-unveil-baby-pictures-stars.html> )



### **SPHEREx Telescope Aims To Unlock Secrets Of Universe's First Moments**

On March 11, NASA launched a new space telescope into orbit to explore the origins of the universe. The mission will use sophisticated software, developed at the Arizona Cosmology Lab at the University of Arizona, to analyze data and help astronomers understand what happened in the first trillionth of a second after the Big Bang. SPHEREx—which stands for Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer—is a NASA mission that will use a wide-field telescope to gather optical and infrared data on more than 450 million galaxies, as well as more than 100 million stars in the Milky Way, over the course of two years. . . . (continued at <https://phys.org/news/2025-03-spherex-telescope-aims-secrets-universe.html> )



## April's Night Sky Notes: Catch the Waves!

By Kat Troche, Astronomy Society of the Pacific, NASA Night Sky Network

### The Electromagnetic Spectrum

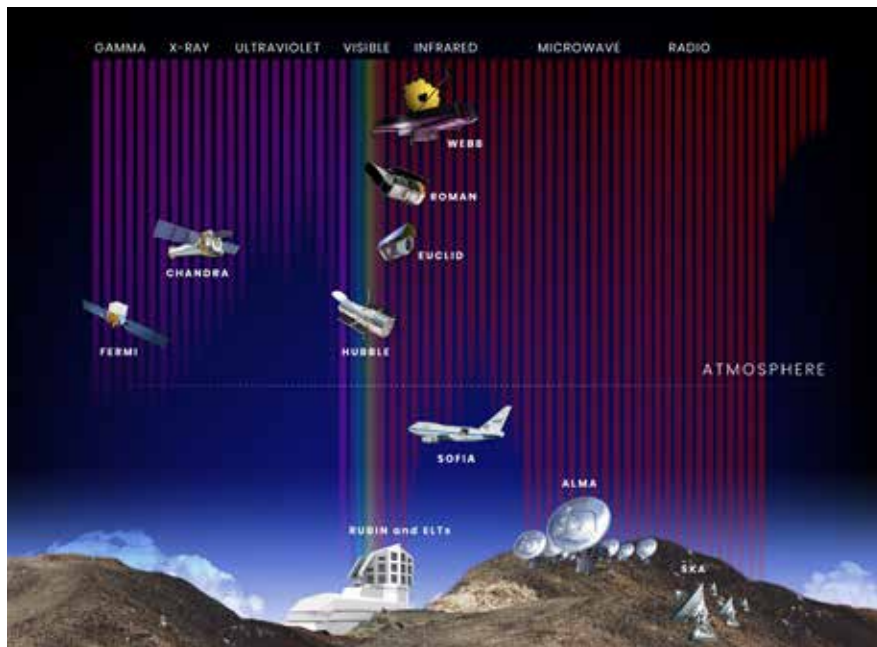
If you've ever heard the term "radio waves," used a microwave or a television remote, or had an X-ray, you have experienced a broad range of the electromagnetic spectrum! But what is the [electromagnetic spectrum](#)? According to Merriam-Webster, this spectrum is "the entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light." But what does that mean? Scientists think of the entire electromagnetic spectrum as many types of light, only some that we can see with our eyes. We can detect others with our bodies, like infrared light, which we feel as heat, and ultraviolet light, which can give us sunburns. Astronomers have created [many detectors](#) that can "see" in the full spectrum of wavelengths.



*This collage of images from the Flame Nebula shows a near-infrared light view from NASA's Hubble Space Telescope on the left, while the two insets at the right show the near-infrared view taken by NASA's James Webb Space Telescope. Much of the dark, dense gas and dust, as well as the surrounding white clouds within the Hubble image, have been cleared in the Webb images, giving us a view into a more translucent cloud pierced by the infrared-producing objects within that are young stars and brown dwarfs. Credit: NASA, ESA, CSA, STScI, Michael Meyer (University of Michigan), Matthew De Furio (UT Austin), Massimo Robberto (STScI), Alyssa Pagan (STScI)*

### Telescope Types

While multiple types of telescopes operate across the electromagnetic spectrum, here are some of the largest, based on the wavelength they primarily work in:



*This illustration shows the wavelength sensitivity of a number of current and future space- and ground-based observatories, along with their position relative to the ground and to Earth's atmosphere. The wavelength bands are arranged from shortest (gamma rays) to longest (radio waves). The vertical color bars show the relative penetration of each band of light through Earth's atmosphere. Credit: NASA, STScI*

- **Radio:** probably the most famous radio telescope observatory would be the Very Large Array (VLA) in Socorro County, New Mexico. This set of 25-meter radio telescopes was featured in the 1997 movie Contact. Astronomers use these telescopes to observe protoplanetary disks and black holes. Another famous set of radio telescopes would be the Atacama Large Millimeter Array (ALMA) located in the Atacama Desert in Chile. ALMA was one of eight radio observatories that helped produce the first image of supermassive black holes at the center of M87 and Sagittarius A\* at the center of our galaxy. Radio telescopes have also been used to study the microwave portion of the electromagnetic spectrum.
- **Infrared:** The James Webb Space Telescope (JWST) operates in the infrared, allowing astronomers to see some of the earliest galaxies formed nearly 300 million years after the Big

Bang. Infrared light allows astronomers to study galaxies and nebulae, which dense dust clouds would otherwise obscure. An excellent example is the [Pillars of Creation](#) located in the [Eagle Nebula](#). With the side-by-side image comparison below, you can see the differences between what JWST and the Hubble Space Telescope (HST) were able to capture with their respective instruments.



*NASA's Hubble Telescope captured the Pillars of Creation in 1995 and revisited them in 2014 with a sharper view. Webb's infrared image reveals more stars by penetrating dust. Hubble highlights thick dust layers, while Webb shows hydrogen atoms and emerging stars. You can find this and other parts of the Eagle Nebula in the Serpens constellation. Credit: NASA, ESA, CSA, STScI, Hubble Heritage Project (STScI, AURA)*

- **Visible:** While it does have some near-infrared and ultraviolet capabilities, the Hubble Space Telescope (HST) has primarily operated in the visible light spectrum for the last 35 years. With over 1.6 million observations made, HST has



*The Crab Nebula, located in the Taurus constellation, is the result of a bright supernova explosion in the year 1054, 6,500 light-years from Earth. Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Infrared: NASA/JPL/Caltech; Radio: NSF/NRAO/VLA; Ultraviolet: ESA/XMM-Newton*

played an integral role in how we view the universe. [Review Hubble's Highlights here.](#)

- **X-ray:** Chandra X-ray Observatory was designed to detect emissions from the hottest parts of our universe, like exploding stars. X-rays help us better understand the composition of deep space objects, highlighting areas unseen by visible light and infrared telescopes. This image of the [Crab Nebula](#) combines data from five different telescopes: The VLA (radio) in red; Spitzer Space Telescope (infrared) in yellow; Hubble Space Telescope (visible) in green; XMM-Newton (ultraviolet) in blue; and Chandra X-ray Observatory (X-ray) in purple. You can view the breakdown of this multiwavelength image [here](#).

## Try This At Home

Even though we can't see these other wavelengths with our eyes, learn how to create multiwavelength images with the [Cosmic Coloring Compositor](#) activity and explore how astronomers use representational color to show light that our eyes cannot see with our [Clues to the Cosmos](#) activity.

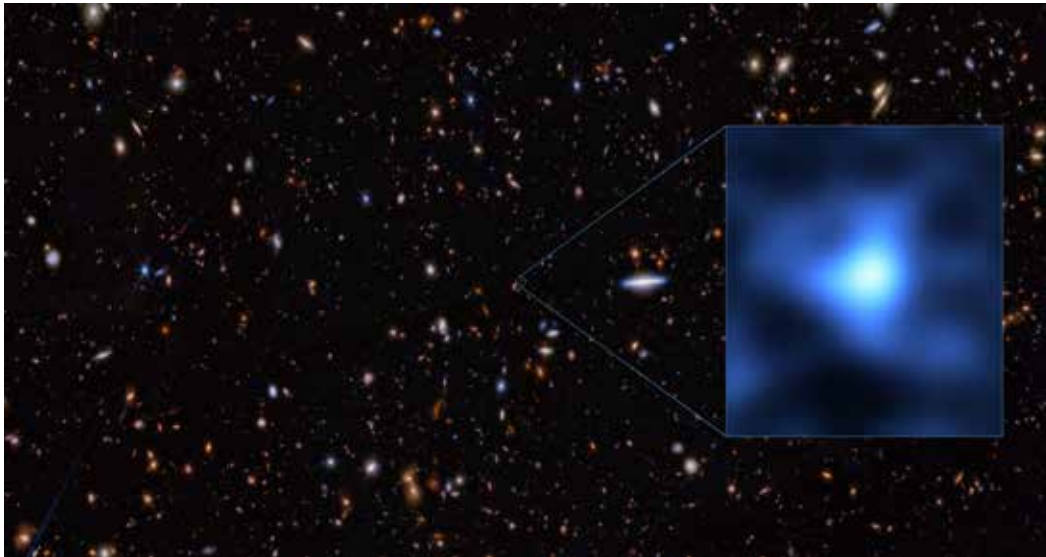
## Additional Skywatching Resources

Plan your skywatching with help from our planner page, featuring daily stargazing tips courtesy EarthSky monthly sky maps, and videos from NASA/JPL. You can even find out how to spot the International Space Station! Both Astronomy and Sky and Telescope magazines offer regular stargazing guides to readers, both in print and online. Want to join a group of folks for a star party? Find clubs and astronomy events near you, and may you have clear skies!

This article is distributed by NASA Night Sky Network  
The Night Sky Network 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!

## Oxygen Discovered In Most Distant Known Galaxy

[eso2507](#) — Press Release 20 March 2025



Two different teams of astronomers have detected oxygen in the most distant known galaxy, JADES-GS-z14-0. The discovery, reported in two separate studies, was made possible thanks to the Atacama Large Millimeter/submillimeter Array (ALMA), in which the European Southern Observatory (ESO) is a partner. This record-breaking detection is making astronomers rethink how quickly galaxies formed in the early Universe.

[Discovered last year](#), JADES-GS-z14-0 is the most distant confirmed galaxy ever found: it is so far away, its light took 13.4 billion years to reach us, meaning we see it as it was when the Universe was less than 300 million years old, about 2% of its present age. The new oxygen detection with [ALMA](#), a telescope array in Chile's Atacama Desert, suggests the galaxy is much more chemically mature than expected.

"It is like finding an adolescent where you would only expect babies," says Sander Schouws, a PhD candidate at Leiden Observatory, the Netherlands, and first author of the Dutch-led study, now accepted for publication in *The Astrophysical Journal*. "The results show the galaxy has formed very rapidly and is also maturing rapidly, adding to a growing body of evidence that the formation of galaxies happens much faster than was expected."

Galaxies usually start their lives full of young stars, which are made mostly of light elements like hydrogen and helium. As stars evolve, they create heavier elements like oxygen, which get dispersed through their host galaxy after they die. Researchers had thought that, at 300 million years old, the Universe was still too young to have galaxies ripe with heavy elements. However, the two ALMA studies indicate JADES-GS-z14-0 has about 10 times more heavy elements than expected.

"I was astonished by the unexpected results because they opened a new view on the first phases of galaxy evolution," says Stefano Carniani, of the Scuola Normale Superiore of Pisa, Italy, and lead author on the paper now accepted for publication in *Astronomy & Astrophysics*. "The evidence that a galaxy is already mature in the infant Universe raises questions about when and how galaxies formed."

The oxygen detection has also allowed astronomers to make their distance measurements to JADES-GS-z14-0 much more accurate. "The ALMA detection offers an extraordinarily precise measurement of the galaxy's distance down to an uncertainty of just 0.005 percent. This level of precision — analogous to being accurate within 5 cm over a distance of 1 km — helps refine our understanding of distant galaxy properties," adds Eleonora Parlanti, a PhD student at the Scuola Normale Superiore of Pisa and author on the *Astronomy & Astrophysics* study [1].

"While the galaxy was originally discovered with the [James Webb Space Telescope](#), it took ALMA to confirm and precisely determine its enormous distance," [2] says Associate Professor Rychard Bouwens, a member of the team at Leiden Observatory. "This shows the amazing synergy between ALMA and JWST to reveal the formation and evolution of the first galaxies."

continued on next page

# Desert Sky Observer

www.avastronomyclub.org

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Gergö Popping, an ESO astronomer at the European ALMA Regional Centre who did not take part in the studies, says: "I was really surprised by this clear detection of oxygen in JADES-GS-z14-0. It suggests galaxies can form more rapidly after the Big Bang than had previously been thought. This result showcases the important role ALMA plays in unraveling the conditions under which the first galaxies in our Universe formed."

## Notes

[1] Astronomers use a measurement known as redshift to determine the distance to extremely distant objects. Previous measurements indicated that the galaxy JADES-GS-z-14-0 was at a redshift between about 14.12 and 14.4. With their oxygen detections, both teams have now narrowed this down to a redshift around 14.18.

[2] The James Webb Space Telescope is a joint project of NASA, the European Space Agency (ESA) and the Canadian Space Agency (CSA).

## More information

This research was presented in two papers to appear in *Astronomy & Astrophysics* (<https://aanda.org/10.1051/0004-6361/202452451>) and *The Astrophysical Journal*.

The teams are composed of:

Italian-led, *Astronomy & Astrophysics* paper: Stefano Carniani (Scuola Normale Superiore, Pisa, Italy [SNS]), Francesco D'Eugenio (Kavli Institute for Cosmology, University of Cambridge, Cambridge, UK [CAM-KIC]; Cavendish Laboratory, University of Cambridge, Cambridge, UK [CAM-CavL] and INAF – Osservatorio Astronomico di Brera, Milano, Italy), Xihan Ji (CAM-KIC and CAM-CavL), Eleonora Parlanti (SNS), Jan Scholtz (CAM-KIC and CAM-CavL), Fengwu Sun (Center for Astrophysics | Harvard & Smithsonian, Cambridge, USA [CfA]), Giacomo Venturi (SNS), Tom J. L. C. Bakx (Department of Space, Earth, & Environment, Chalmers University of Technology, Gothenburg, Sweden), Mirko Curti (European Southern Observatory, Garching bei München, Germany), Roberto Maiolino (CAM-KIC, CAM-CavL and Department of Physics and Astronomy, University College London, London, UK [UCL]), Sandro Tacchella (CAM-KIC and CAM-CavL), Jorge A. Zavala (National Astronomical Observatory of Japan, Tokyo, Japan), Kevin Hainline (Steward Observatory, University of Arizona, Tucson, USA [UArizona-SO]), Joris Witstok (Cosmic Dawn Center, Copenhagen, Denmark [DAWN] and CAM-CavL), Benjamin D. Johnson [CfA], Stacey Alberts [UArizona-SO], Andrew J. Bunker (Department of Physics, University of Oxford, Oxford, UK [Oxford]), Stéphane Charlot (Sorbonne Université, CNRS, Institut d'Astrophysique de Paris, Paris, France), Daniel J. Eisenstein (CfA), Jakob M. Helton (UArizona-SO), Peter Jakobsen (DAWN and Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark), Nimisha Kumari (Space Telescope Science Institute, Baltimore, USA), Brant Robertson (Department of Astronomy and Astrophysics University of California, Santa Cruz, USA), Aayush Saxena (Oxford and UCL), Hannah Übler (CAM-KIC and CAM-CavL), Christina C. Williams (NSF NOIRLab, Tucson, USA), Christopher N. A. Willmer (UArizona-SO) and Chris Willott (NRC Herzberg, Victoria, Canada).

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The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership of ESO, the U.S. National Science Foundation (NSF) and the National Institutes of Natural Sciences (NINS) of Japan in cooperation with the Republic of Chile. ALMA is funded by ESO on behalf of its Member States, by NSF in cooperation with the National Research Council of Canada (NRC) and the National Science and Technology Council (NSTC) in Taiwan and by NINS in cooperation with the Academia Sinica (AS) in Taiwan and the Korea Astronomy and Space Science Institute (KAS). ALMA construction and operations are led by ESO on behalf of its Member States; by the National Radio Astronomy Observatory (NRAO), managed by Associated Universities, Inc. (AUI), on behalf of North America; and by the National Astronomical Observatory of Japan (NAOJ) on behalf of East Asia. The Joint ALMA Observatory (JAO) provides the unified leadership and management of the construction, commissioning and operation of ALMA.

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## Links

- [Research paper \(Carniani et al.\)](#)
- [Research paper \(Schouws et al.\)](#)
- [Photos of ALMA](#)
- [New ESO analysis confirms severe damage from industrial complex planned near Paranal Stefano Carniani](#)

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## Dark Sky Observing Sites

**The Chuchupate** parking lot is a half a mile beyond the Mt Pinos ranger station (on some maps The Chuchupate Ranger Sta.), the parking lot is also called Frazier Mountain trailhead.

To get there, take the Frazier Mountain Park RD east about 7 miles from I-5, to Lake Of The Woods, Turn left on Lockwood Valley Rd. ( If you see Mike’s Pizza on your left you missed the turn) In less than a mile there is a road to the left, go past the ranger station, the parking lot is on the right. The Club gathers in the upper end of the lot. The Elevation is 5430 feet. There is a vault toilet. (link to GoogleMaps) [RX3R+3F, Frazier Park, CA 93225](#)



**Mt Pinos** is a parking lot at 8350 feet for the “Mt Pinos Nordic Base.” There is a vault toilet 300 yds to the east in the Chula Vista campground.

To get there: From I-5, get off at Frazier Mountain Park Rd and drive west about 7 miles to Mike’s Pizza/Market Deli at Lockwood Valley Rd. Keep on the main roadway (don’t turn left to go to Chuchupate). Continue past Mike’s Pizza on Cuddy Valley Rd (the road’s new name) about 5 miles. Continue straight (do not turn right on to Mil Potrero Hwy) for another 8 1/2 miles to the parking area.

Note: The entire drive from I-5 is uphill.

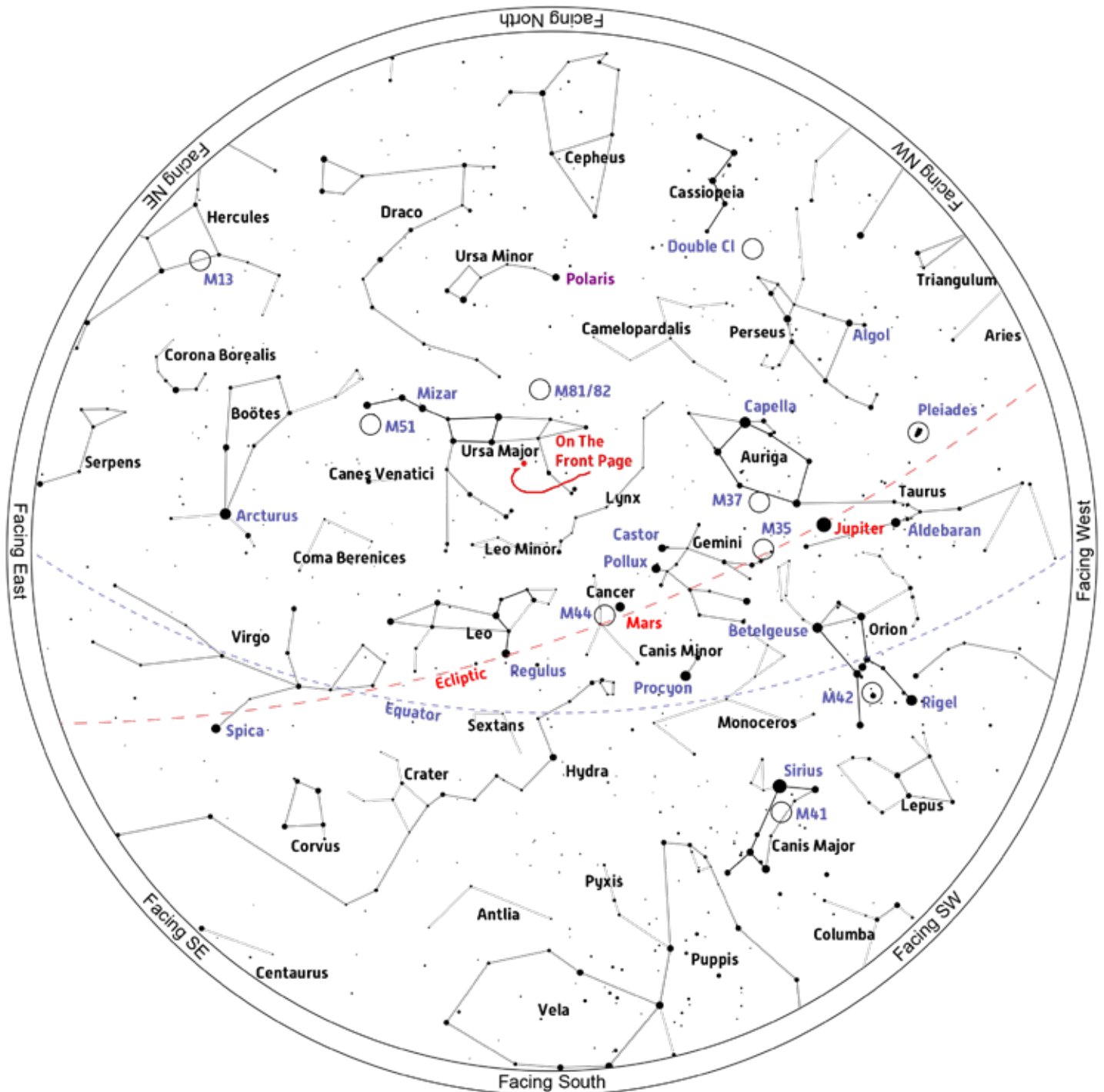
[RV7F+FF Frazier Park, California](#) (link to GoogleMaps)

**The Red Cliffs Natural Area** is part of **Red Rock Canyon State Park** is a day use area and is not for use by the public after dark. The Club gets a special permit for a star party and pays a fee.

To get there: Take the CA-14 north 25 miles past Mojave. You will see giant red cliffs on the right side and a small sign that says “Red Cliffs Natural Area” and a dirt road. (If you see the large sign for the Ricardo campground, you drove a mile too far). Follow the road to the large parking lot (that hasn’t been graded in a long time). Elevation is 2410 feet. There is a vault toilet. . . . (link to GoogleMaps). [926F+X5 Ricardo, California](#)



## Sky Chart



Location: Palmdale, CA 93551  
Latitude: 34° 36' N, longitude: 118° 11' W  
Time: 2025 April 26, 20:00 (UTC -07:00)

Powered by: Heavens-Above.com

## Solar System Summary

The **Sun** starts the month in central Pisces ending the month in central Aries.

### The Planets

**Mercury** starts each morning moving in retrograde away from the Sun after its inferior conjunction last month. On the 6th it crosses the ecliptic and starts beading back towards the Sun. On the 10th it passes east of Saturn by 2°, and west of Neptune 3°.

**Venus** in the morning twilight is moving in retrograde till the 10th (as far west as Saturn) when it stops and reverts to normal motion, all the while getting brighter everyday.

**Mars** starts the month in Gemini resumes it's normal motion making a beeline for the Beehive Cluster(M44) in Cancer, arriving on the 4th of May.

**Jupiter** continues it's normal motion heading east in Taurus, just south of the ecliptic. The first-quarter Moon passes almost 6° north on the 2nd.

**Saturn** in the morning twilight, still moving normally in Aquarius, passes into Pisces on the 20th. On the 25th the Moon, Neptune, and Venus are within a few degrees of each other.

**Uranus** continues moving normally at mag 5.8 in eastern Taurus.

**Neptune** in the morning twilight is moving in normal motion near the southern border in Pisces at 7.9, and by the end of the month about 3° east of Saturn.

### Dwarf Planets

**134340 Pluto** spends the month in normal motion, still moving toward the center of Capricorn, at mag 14.5.

**1 Ceres** spends the month moving toward Cetus in eastern Aquarius at mag 9.2,

**2 Pallas** is in normal motion passing through central Delphinus at magnitude 10.4.

**3 Juno** continues its retrograde moves into Serpens Caput like Vesta some 15° to the west.

**4 Vesta** continuing moving northwest in retrograde in Libra and then continuing into eastern Virgo.

## Moon Phases



First Qtr  
Apr 4

Full  
Apr 12

Third Qtr  
Apr 20

New  
Apr 27

## Sun and Moon Rise and Set\*

Date	Moonrise	Moonset	Sunrise	Sunset
4/1/2025	08:36	23:41	06:39	19:14
4/5/2025	12:30	02:46	06:33	19:17
4/10/2025	17:34	05:21	06:27	19:21
4/15/2025	22:23	07:29	06:20	19:25
4/20/2025	01:57	11:42	06:14	19:29
4/25/2025	04:43	17:26	06:08	19:33
4/30/2025	08:06	23:40	06:03	19:37

## Planet Data\*

April 1

	Rise	Transit	Set	Mag	Phase%
Mercury	05:59	12:03	18:05	2.71	8.1
Venus	05:33	11:50	18:06	-4.24	3.9
Mars	12:41	19:55	03:12	0.45	90.5
Jupiter	10:02	17:10	00:18	-2.18	99.2
Saturn	06:03	11:54	17:45	1.19	99.9

April 15

	Rise	Transit	Set	Mag	Phase%
Mercury	05:20	11:18	17:15	0.73	35.1
Venus	04:44	10:51	16:57	-4.50	15.3
Mars	12:18	19:22	02:34	0.71	89.9
Jupiter	09:16	16:25	23:34	-2.08	99.3
Saturn	05:13	11:05	16:58	1.18	99.9

April 30

	Rise	Transit	Set	Mag	Phase%
Mercury	05:06	11:17	17:30	0.10	58.7
Venus	04:10	10:15	16:21	-4.52	28.5
Mars	11:46	18:50	01:55	0.94	89.7
Jupiter	08:28	15:38	22:48	-2.02	99.6
Saturn	04:18	10:12	16:07	1.16	99.8

\*All time mentioned are local and approximate.

\*Sun, Moon and Planetary date based on Quartz Hill, CA

## Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Deep Sky Star Party or the Saturday nearest the New Moon, in this case April 26, 2025. The list is sorted by the transit time of the object.

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
Barnard202	B202	DkNeb	Ari	03h 25m 38s	+30° 16.0'		06:25	14:05	21:44
Barnard204	B204	DkNeb	Ari	03h 28m 29s	+30° 11.0'		06:29	14:08	21:46
NGC1350		Galaxy	For	03h 31m 08s	-33° 37.7'	10.5	09:57	14:10	18:24
Barnard1	B1	DkNeb	Per	03h 32m 57s	+31° 09.0'		06:29	14:12	21:55
Barnard2	B2	DkNeb	Per	03h 33m 31s	+32° 19.0'		06:25	14:13	22:01
Barnard3	B3	DkNeb	Per	03h 40m 01s	+31° 58.0'		06:33	14:19	22:06
NGC1407		Galaxy	Eri	03h 40m 12s	-18° 34.8'	9.8	09:10	14:19	19:28
IC347		Galaxy	Eri	03h 42m 32s	-04° 17.9'	13.0	08:31	14:22	20:12
NGC1448		Galaxy	Hor	03h 44m 32s	-44° 38.6'	11.0	11:12	14:24	17:35
IC348		Open	Per	03h 44m 34s	+32° 09.7'	7.3	06:36	14:24	22:11
M45	Seven Sisters	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	07:11	14:27	21:42
NGC1461		Galaxy	Eri	03h 48m 27s	-16° 23.5'	11.7	09:12	14:27	19:43
IC353		Neb	Tau	03h 53m 00s	+25° 48.0'		07:10	14:32	21:54
IC2003		P Neb	Per	03h 56m 22s	+33° 52.5'	13.0	06:40	14:35	22:30
NGC1499	California Nebula	Neb	Per	04h 03m 14s	+36° 22.0'		06:35	14:42	22:49
NGC1515		Galaxy	Dor	04h 04m 03s	-54° 06.0'	11.0	13:23	14:43	16:03
NGC1496		Open	Per	04h 04m 32s	+52° 39.7'	10.0	04:09	14:44	01:18
NGC1502		Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circ	14:47	Circ
IC360		Neb	Tau	04h 09m 00s	+26° 06.0'		07:25	14:48	22:11
NGC1514	Crystal Ball Nebula	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	07:07	14:48	22:30
NGC1513		Open	Per	04h 09m 57s	+49° 30.8'	8.4	05:03	14:49	00:35
IC359		Neb	Tau	04h 12m 28s	+27° 42.1'		07:23	14:52	22:20
NGC1535		P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	09:27	14:53	20:20
Barnard10	B10	DkNeb	Tau	04h 18m 41s	+28° 16.0'		07:27	14:58	22:29
NGC1545		Open	Per	04h 20m 57s	+50° 15.2'	6.2	05:05	15:00	00:55
NGC1569		Galaxy	Cam	04h 30m 49s	+64° 50.8'	11.2	Circ	15:10	Circ
Barnard18	B18	DkNeb	Tau	04h 31m 13s	+24° 21.0'		07:54	15:10	22:27
NGC1582		Open	Per	04h 31m 53s	+43° 49.0'	7.0	06:18	15:11	00:03
NGC1560		Galaxy	Cam	04h 32m 48s	+71° 52.7'	11.5	Circ	15:12	Circ
Barnard19	B19	DkNeb	Tau	04h 33m 00s	+26° 16.0'		07:49	15:12	22:36
Barnard20	B20	DkNeb	Per	04h 37m 04s	+50° 58.0'		05:11	15:16	01:21
IC2087		Neb	Tau	04h 40m 00s	+25° 44.5'		07:57	15:19	22:41
Barnard23	B23	DkNeb	Tau	04h 40m 33s	+29° 52.0'		07:42	15:20	22:57
NGC1624		Open	Per	04h 40m 36s	+50° 27.6'	10.4	05:22	15:20	01:17
NGC1640		Galaxy	Eri	04h 42m 14s	-20° 26.0'	11.7	10:18	15:21	20:24

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April 2025

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC1647		Open	Tau	04h 45m 55s	+19° 06.8'	6.4	08:26	15:25	22:24
IC2118	Witch Head Nebula	Neb	Eri	05h 04m 54s	-07° 15.0'		10:01	15:44	21:26
NGC1851	C73	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	12:12	15:53	19:35
IC405	Flaming Star Nebula	Neb	Aur	05h 16m 29s	+34° 21.3'		07:58	15:56	23:53
M79	NGC1904	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	11:14	16:03	20:52
M38	Starfish Cluster	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	08:03	16:08	00:12
M1	Crab Nebula	SNR	Tau	05h 34m 32s	+22° 00.8'	8.4	09:05	16:14	23:22
M42	Great Orion Nebula	Open+D Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	10:27	16:14	22:02
M43	De Mairan's Nebula	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	10:26	16:15	22:03
M36	Pinwheel Cluster	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	08:19	16:15	00:12
M78	NGC2068	D Neb	Ori	05h 46m 45s	+00° 04.8'	8.0	10:23	16:26	22:29
M37	Salt-and-pepper Cluster	Open	Aur	05h 52m 18s	+32° 33.2'	6.0	08:42	16:31	00:20
M35	NGC2168	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	09:32	16:48	00:05
M41	Little Beehive	Open	CMA	06h 46m 01s	-20° 45.3'	5.0	12:23	17:25	22:27
M50	Heart-shaped Cluster	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	12:02	17:42	23:21
M47	NGC2422	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	12:54	18:16	23:37
M46	NGC2437	Open	Pup	07h 41m 46s	-14° 48.6'	6.5	13:00	18:21	23:41
M93	NGC2447	Open	Pup	07h 44m 30s	-23° 51.4'	6.5	13:32	18:24	23:15
M48	NGC2548	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	13:06	18:53	00:39
M44	Beehive Cluster	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	12:19	19:19	02:20
M67	King Cobra	Open	Cnc	08h 51m 18s	+11° 48.0'	7.5	12:54	19:30	02:07
M81	Bode's Galaxy	Galaxy	UMa	09h 55m 33s	+69° 03.9'	7.8	Circ	20:35	Circ
M82	Cigar Galaxy	Galaxy	UMa	09h 55m 53s	+69° 40.8'	9.2	Circ	20:35	Circ
M95	NGC3351	Galaxy	Leo	10h 43m 58s	+11° 42.2'	10.6	14:47	21:23	03:59
M96	NGC3368	Galaxy	Leo	10h 46m 46s	+11° 49.2'	10.1	14:49	21:26	04:02
M105	NGC3379	Galaxy	Leo	10h 47m 50s	+12° 34.9'	10.5	14:48	21:27	04:05
M108	NGC3556	Galaxy	UMa	11h 11m 31s	+55° 40.4'	10.6	Circ	21:51	Circ
M97	Owl Nebula	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	Circ	21:54	Circ
M65	Leo Triplet	Galaxy	Leo	11h 18m 56s	+13° 05.5'	10.1	15:18	21:58	04:38
M66	Leo Triplet	Galaxy	Leo	11h 20m 15s	+12° 59.4'	9.7	15:20	21:59	04:39
M109	NGC3992	Galaxy	UMa	11h 57m 36s	+53° 22.4'	10.6	11:45	22:37	09:28
M98	NGC4192	Galaxy	Com	12h 13m 48s	+14° 54.0'	10.9	16:07	22:53	05:38
M99	Coma Pinwheel Galaxy	Galaxy	Com	12h 18m 50s	+14° 25.0'	10.4	16:14	22:58	05:42
M106	NGC4258	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	13:36	22:58	08:20
M61	Swelling Spiral	Galaxy	Vir	12h 21m 55s	+04° 28.3'	10.1	16:46	23:01	05:16
M40	Winnecke 4	Dbl+Asterism	UMa	12h 22m 12s	+58° 05.0'	8.7	Circ	23:01	Circ
M100	Mirror of M99	Galaxy	Com	12h 22m 55s	+15° 49.3'	10.1	16:14	23:02	05:50
M84	NGC4374	Galaxy	Vir	12h 25m 04s	+12° 53.2'	10.2	16:25	23:04	05:44
M85	NGC4382	Galaxy	Com	12h 25m 24s	+18° 11.4'	10.0	16:09	23:04	06:00

# Desert Sky Observer

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April 2025

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M86	NGC4406	Galaxy	Vir	12h 26m 12s	+12° 56.7'	9.9	16:26	23:05	05:45
M49	NGC4472	Galaxy	Vir	12h 29m 47s	+08° 00.0'	9.3	16:44	23:09	05:34
M87	Smoking Gun	Galaxy	Vir	12h 30m 49s	+12° 23.4'	9.6	16:32	23:10	05:48
M88	NGC4501	Galaxy	Com	12h 31m 59s	+14° 25.2'	10.2	16:27	23:11	05:55
M91	Missing Messier Object	Galaxy	Com	12h 35m 27s	+14° 29.7'	10.9	16:30	23:14	05:59
M89	NGC4552	Galaxy	Vir	12h 35m 40s	+12° 33.3'	10.9	16:36	23:15	05:53
M90	NGC4569	Galaxy	Vir	12h 36m 50s	+13° 09.7'	10.2	16:36	23:16	05:56
M58	NGC4579	Galaxy	Vir	12h 37m 44s	+11° 49.1'	10.4	16:40	23:17	05:53
M68	NGC4590	Globular	Hya	12h 39m 28s	-26° 44.5'	9.0	18:37	23:19	04:00
M104	Sombrero Galaxy	Galaxy	Vir	12h 39m 59s	-11° 37.3'	9.2	17:49	23:19	04:49
M59	NGC4621	Galaxy	Vir	12h 42m 02s	+11° 38.7'	10.7	16:45	23:21	05:57
M60	NGC4649	Galaxy	Vir	12h 43m 40s	+11° 33.1'	9.8	16:47	23:23	05:58
M94	Croc's Eye Galaxy	Galaxy	CVn	12h 50m 53s	+41° 07.1'	8.9	14:56	23:30	08:04
M64	Black Eye Galaxy	Galaxy	Com	12h 56m 44s	+21° 41.0'	9.3	16:28	23:36	06:43
M53	NGC5024	Globular	Com	13h 12m 55s	+18° 10.1'	8.5	16:56	23:52	06:48
M63	Sunflower Galaxy	Galaxy	CVn	13h 15m 49s	+42° 01.7'	9.3	15:15	23:55	08:35
NGC5139	Omega Centauri	Globular	Cen	13h 26m 48s	-47° 29.0'	3.6	21:17	00:06	02:55
NGC5169		Galaxy	CVn	13h 28m 10s	+46° 40.3'	14.0	14:51	00:07	09:23
NGC5204		Galaxy	UMa	13h 29m 36s	+58° 25.1'	11.3	Circ	00:09	Circ
M51	Whirlpool Galaxy	Galaxy	CVn	13h 29m 52s	+47° 11.7'	8.9	14:48	00:09	09:30
Arp85	M51B	Galaxy	CVn	13h 29m 58s	+47° 16.0'	9.6	14:48	00:09	09:30
NGC5182		Galaxy	Hya	13h 30m 41s	-28° 09.0'	13.0	19:34	00:10	04:46
NGC5214		Galaxy	CVn	13h 32m 49s	+41° 52.3'	14.0	15:33	00:12	08:51
M83	Southern Pinwheel Galaxy	Galaxy	Hya	13h 37m 00s	-29° 51.8'	8.0	19:47	00:16	04:45
HR5144	HD119055	Triple	Boo	13h 40m 40s	+19° 57.3'	5.8	17:18	00:20	07:21
NGC5283		Galaxy	Dra	13h 41m 06s	+67° 40.3'	14.0	Circ	00:20	Circ
M3	NGC5272	Globular	CVn	13h 42m 11s	+28° 22.5'	7.0	16:50	00:21	07:53
NGC5286	C84	Globular	Cen	13h 46m 24s	-51° 22.0'	7.6	22:18	00:25	02:32
NGC5292		Galaxy	Cen	13h 47m 40s	-30° 56.4'	14.0	20:02	00:27	04:52
NGC5356		Galaxy	Vir	13h 54m 59s	+05° 20.0'	14.0	18:16	00:34	06:52
NGC5363		Galaxy	Vir	13h 56m 07s	+05° 15.2'	10.2	18:18	00:35	06:53
NGC5447	III-787	Neb	UMa	14h 02m 29s	+54° 16.3'		13:19	00:42	12:04
M101	Pinwheel Galaxy	Galaxy	UMa	14h 03m 13s	+54° 20.9'	8.2	13:15	00:42	12:09
NGC5461	III-788	Neb	UMa	14h 03m 42s	+54° 19.0'		13:17	00:43	12:08
NGC5485		Galaxy	UMa	14h 07m 11s	+55° 00.0'	11.5	Circ	00:46	Circ
NGC5460		Open	Cen	14h 07m 27s	-48° 20.6'	5.6	22:05	00:46	03:27
NGC5500		Galaxy	Boo	14h 10m 15s	+48° 32.7'	14.0	15:15	00:49	10:24
IC991		Galaxy	Vir	14h 17m 48s	-13° 52.3'	13.0	19:34	00:57	06:20
HR5362	HD125383	Dbl	Lup	14h 20m 10s	-43° 03.5'	5.6	21:36	00:59	04:22

# Desert Sky Observer

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April 2025

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC4406	Retina Nebula	P Neb	Lup	14h 22m 26s	-44° 09.0'	11.0	21:46	01:01	04:17
HR5409	105 Vir	Triple	Vir	14h 28m 12s	-02° 13.6'	4.8	19:11	01:07	07:04
NGC5669		Galaxy	Boo	14h 32m 44s	+09° 53.4'	12.0	18:41	01:12	07:42
NGC5689		Galaxy	Boo	14h 35m 30s	+48° 44.5'	11.9	15:38	01:15	10:51
M102	duplicate of M101?	Galaxy	Dra	15h 06m 30s	+55° 45.7'	10.8	Circ	01:46	Circ
NGC5875		Galaxy	Boo	15h 09m 13s	+52° 31.6'	13.0	15:17	01:48	12:20
NGC5907	Splinter Galaxy	Galaxy	Dra	15h 15m 54s	+56° 19.7'	11.4	Circ	01:55	Circ
NGC5882		P Neb	Lup	15h 16m 50s	-45° 38.9'	11.0	22:52	01:56	05:00
NGC5897		Globular	Lib	15h 17m 24s	-21° 00.6'	8.6	20:55	01:56	06:58
M5	NGC5904	Globular	Ser	15h 18m 33s	+02° 04.9'	7.0	19:49	01:58	08:06
IC4593	White Eyed Pea	P Neb	Her	16h 11m 44s	+12° 04.3'	11.0	20:14	02:51	09:28
M80	NGC6093	Globular	Sco	16h 17m 03s	-22° 58.5'	8.5	22:02	02:56	07:51
IC4601		Neb	Sco	16h 20m 18s	-20° 04.9'		21:55	02:59	08:03
Abell38		P Neb	Sco	16h 23m 17s	-31° 44.9'	11.7	22:41	03:02	07:24
M4	Cat's Eye	Globular	Sco	16h 23m 35s	-26° 31.5'	7.5	22:21	03:03	07:45
IC4603	Rho Ophiuchi Complex [1]	Neb	Oph	16h 25m 24s	-24° 28.0'		22:15	03:04	07:54
IC4604	Rho Ophiuchi Complex [2]	Neb	Oph	16h 25m 33s	-23° 26.5'		22:12	03:05	07:58
NGC6124	C75	Open	Sco	16h 25m 36s	-40° 40.0'	5.8	23:27	03:05	06:42
Abell39		P Neb	Her	16h 27m 33s	+27° 54.5'	12.9	19:37	03:07	10:36
IC4605		Neb	Sco	16h 30m 12s	-25° 06.8'		22:22	03:09	07:56
NGC6153		P Neb	Sco	16h 31m 31s	-40° 15.2'	12.0	23:30	03:11	06:51
NGC6181		Galaxy	Her	16h 32m 21s	+19° 49.5'	11.9	20:10	03:11	10:12
NGC6171		Globular	Oph	16h 32m 32s	-13° 03.1'	8.1	21:46	03:12	08:37
NGC6178		Open	Sco	16h 35m 47s	-45° 38.6'	7.2	00:11	03:15	06:19
NGC6193	C82	Open	Ara	16h 41m 18s	-48° 46.0'	5.2	00:43	03:20	05:57
M13	Hercules Globular Cluster	Globular	Her	16h 41m 41s	+36° 27.5'	7.0	19:13	03:21	11:28
NGC6210	Turtle Planetary Nebula	P Neb	Her	16h 44m 30s	+23° 48.0'	9.0	20:09	03:24	10:38
M12	Gumball Globular	Globular	Oph	16h 47m 14s	-01° 56.8'	8.0	21:29	03:26	09:24
M62	Flickering Globular	Globular	Oph	17h 01m 13s	-30° 06.7'	8.0	23:12	03:40	08:09

And - Andromeda  
Ant - Antlia  
Aps - Apus  
Aql - Aquila  
Aqr - Aquarius  
Ara - Ara  
Ari - Aries  
Aur - Auriga  
Boo - Bootes  
Cae - Caelum  
Cam - Camelopardis  
Cap - Capricornus  
Car - Carina  
Cas - Cassiopeia  
Cen - Centaurus

Cep - Cepheus  
Cet - Cetus  
Cha - Chamaeleon  
Cir - Circinus  
CMA - Canis Major  
CMi - Canis Minor  
Cnc - Cancer  
Col - Columba  
Com - Coma Berenices  
CrA - Corona Australis  
CrB - Corona Borealis  
Crt - Crater  
Cru - Crux  
Crv - Corvus  
CVn - Canes Venatici

Cyg - Cygnus  
Del - Delphinus  
Dor - Dorado  
Dra - Draco  
Equ - Equuleus  
Eri - Eridanus  
For - Fornax  
Gem - Gemini  
Gru - Grus  
Her - Hercules  
Hor - Horologium  
Hya - Hydra  
Hyi - Hydrus  
Ind - Indus  
Lac - Lacerta

Leo - Leo  
Lep - Lepus  
Lib - Libra  
LMi - Leo Minor  
Lup - Lupus  
Lyn - Lynx  
Lyr - Lyra  
Men - Mensa  
Mic - Microscopium  
Mon - Monoceros  
Mus - Musca  
Nor - Norma  
Oct - Octans  
Oph - Ophiuchus  
Ori - Orion

Pav - Pavo  
Peg - Pegasus  
Per - Perseus  
Phe - Phoenix  
Pic - Pictor  
PsA - Pisces Austrinus  
Psc - Pisces  
Pup - Puppis  
Pyx - Pyxis  
Ret - Reticulum  
Scl - Sculptor  
Sco - Scorpius  
Sct - Scutum  
Ser - Serpens  
Sex - Sextans

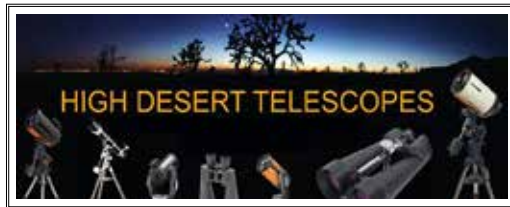
Sge - Sagitta  
Sgr - Sagittarius  
Tau - Taurus  
Tel - Telescopium  
TrA - Triangulum Australe  
Tri - Triangulum  
Tuc - Tucana  
UMa - Ursa Major  
UMi - Ursa Minor  
Vel - Vela  
Vir - Virgo  
Vol - Volans  
Vul - Vulpecula

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