Volume 44.12 December 2024

Desert Sky Observer

Antelope Valley Astronomy Club

Upcoming Events

December 5: Star Party @ Manzanita ElementarySchool
set up by 4:30 pm
December 7: Moonwalk @ PDW (no telescopes)
December 7: Club Christmas Party @ Gino's 6:00 - 9:30pm

Every clear night: Personal Star Party

AVAC Calendar

January 10: Club Meeting
January 25: Moonwalk @ PDW 6:00 pm
February 14: Club Meeting
February 22: Moonwalk @ PDW 6:00 pm

Board Members

President: Phil Wriedt (661) 917-4874
president@avastronomyclub.org

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

Secretary: Rose Moore (661) 972-1953
secretary@avastronomyclub.org

Treasurer: Rod Girard (661) 803-7838
treasurer@avastronomyclub.org

Director of Community Development:
Christian Amaya(661) 972-0091
community@avastronomyclub.org

Appointed Positions

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

Equipment & Library:
vacant
library@avastronomyclub.org

Club Historian: vacant
history@avastronomyclub.org

Webmaster: Steve Trotta (661) 269-5428
webmaster@avastronomyclub.org

Night Sky Coordinator:
Rose Moore (661) 972-1953

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

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 20th 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

www.avastronomyclub.org

Visit the Antelope Valley Astronomy Club website at www.avastronomyclub.org/
www.instagram.com/av_astronomyclub

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

President's Message

By Phil Wriedt

Hi There!

Now that it's just past Thanksgiving Day, I hope that all went well, and no one overate. We decided we had had far too much turkey over the years, so we opted for Barbecuing a rib roast, and voilà, no leftovers! With Christmas coming up I'm guessing the BBQ will be pressed into service again.

Talking about Christmas, the Club is celebrating another trip around the Sun, among other things. Currently there are still empty seats for the Christmas Party. We are raffling off the Grand Prize, a beautiful smart electronic telescope, but you have to be there to collect the prize. We have to thank Farah, from Woodland Hill's Camera & Telescope, for allowing us to purchase this telescope at such a discount that we can say it was donated.

I want to express a heartfelt **Thank You** to all those members who came to the last Moonwalk. It was a clear night, no wind, and it was very cold. I think it took a hour to regain feeling in my fingertips. There were at least 9 member telescopes and over 70 members of the public. I was happy there were so many members there. It is true, the more the merrier.

The same is true for our meetings. When we ask an organization to provide a speaker, they always ask: How many are going to be there? It's hard to answer .... ah, maybe 10? It's like a self-fullfiling prophecy. The more butts in the seats, the easier it is to get a speaker. At the October meeting in the parking lot, there were so many great suggestions for the coming year. We are going to act on those ideas and make them come to life.

Some members have asked to renew their membership early. So, it's renewal season again. We haven't allowed inflation to influence the price of dues. The amount for dues has been the same for at least the last 24 years.

See you at the Christmas Party on December 7th.

Keep Looking Up, Phil

On The Cover

Note: North is 141.0° right of vertical RA: 6h 32' 48.32" DEC: 63° 40' 31.56" Dist:128mly (Camelopardalis)

Looking past its long spiral arms filled with stars and the dark threads of dust crossing it, your eye might be caught by the shining point at the centre of UGC 3478, the spiral galaxy starring in this Hubble Picture of the Week. This point is the galaxy's nucleus, and indeed there is something special about it: it is a growing giant black hole which astronomers call an active galactic nucleus, or AGN.

UGC 3478, located in the constellation Camelopardalis, is what is known as a Seyfert galaxy. This is a type of galaxy with an AGN at its core. Like all such 'active galaxies', the brightness that you see here hides a supermassive black hole at the centre of the galaxy. A disc of gas spirals into this black hole, and as the material crashes together and heats up it emits very strong radiation. The spectrum of this radiation includes hard X-ray emission, which clearly mark it out from the stars in the galaxy. Despite the strong brightness of the compact central region, we can still clearly see the disc of the galaxy around it, which is a defining factor of a Seyfert galaxy.

Many active galaxies are known to astronomers at vast distances from Earth, thanks to the great brightness of their nuclei highlighting them next to other, dimmer galaxies. At 128 million light-years from Earth, UGC 3478 is positively neighbourly to us. The data used to make this image come from a Hubble survey of nearby powerful AGNs identified by their output of relatively high-energy X-rays, like this one, which it is hoped can help astronomers to understand how the galaxies interact with the supermassive black holes at their hearts.

[Image Description: A spiral galaxy, with two glowing spiral arms. They are filled with thin lines of dark dust, and surrounded by a faint cloud. One arm stretches further from the galaxy than the other. The point at the centre of the spiral is particularly bright. It is on a black background, mostly empty, except for some distant galaxies and a few bright stars in the foreground.]

Credit: ESA/Hubble & NASA, M. Koss, A. Barth

From the Secretary

By Rose Moore

Members,

I hope you all had a wonderful Thanksgiving! Coming up is our annual Christmas Party on Saturday, December 7th, at Gino's Restaurant in the Marketplace in Lancaster. Start time is 6pm, buffet starting at 6:30pm. If you haven't signed up, and would like to attend, please contact a Board member asap.

Thanks to those members who came out to support our events this year! I will be sending in the names to Night Sky Network for our pins and certificates by the time you read this; they will be handed out at January or February's meeting. Also, many thanks to those who came out to support the bone cold Prime Desert Moon Walk for November, we had 9 members and 73 public come out to the event!

Matt and I are working on booking some speakers for 2025. Our first club meeting is on Friday January 10th. We'll keep you posted! We have Sue's astronomy paint class scheduled for the March meeting at this time. Coming up for 2025 is a possible Mt. Wilson trip, Moon Walks, dark sky star parties, and maybe a summer picnic. The Board is always open to suggestions from club members to help improve our meetings and events, so please come to our meetings!

Merry Christmas and Happy New Year!

Rose

AVAC Membership Renewal

Take some time now to renew your membership! The easiest way to renew is through the AVAC website via our PayPal account. Just Login, go to your Profile, click on the Membership Tab.... 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

For sale: 4 inch Celestron Equatorial telescope. Includes mount, solar filter, finder scope, eyepieces, two inch diagonal, carrying bag. Few scratches on finish. Price: $250. Email either Duane (gurba1826@gmail.com) or Rose (rmorion1@bak.rr.com)

December's Night Sky Notes: Spot the King of Planets

By Dave Prosper Updated by Kat Troche, Astronomy Society of the Pacific, NASA Night Sky Network

Jupiter is our solar system's undisputed king of the planets! Jupiter is bright and easy to spot from our vantage point on Earth, helped by its massive size and banded, reflective cloud tops. Jupiter even possesses moons the size of planets: Ganymede, its largest, is bigger than the planet Mercury. What's more, you can easily observe Jupiter and its moons with a modest instrument, just like Galileo did over 400 years ago.

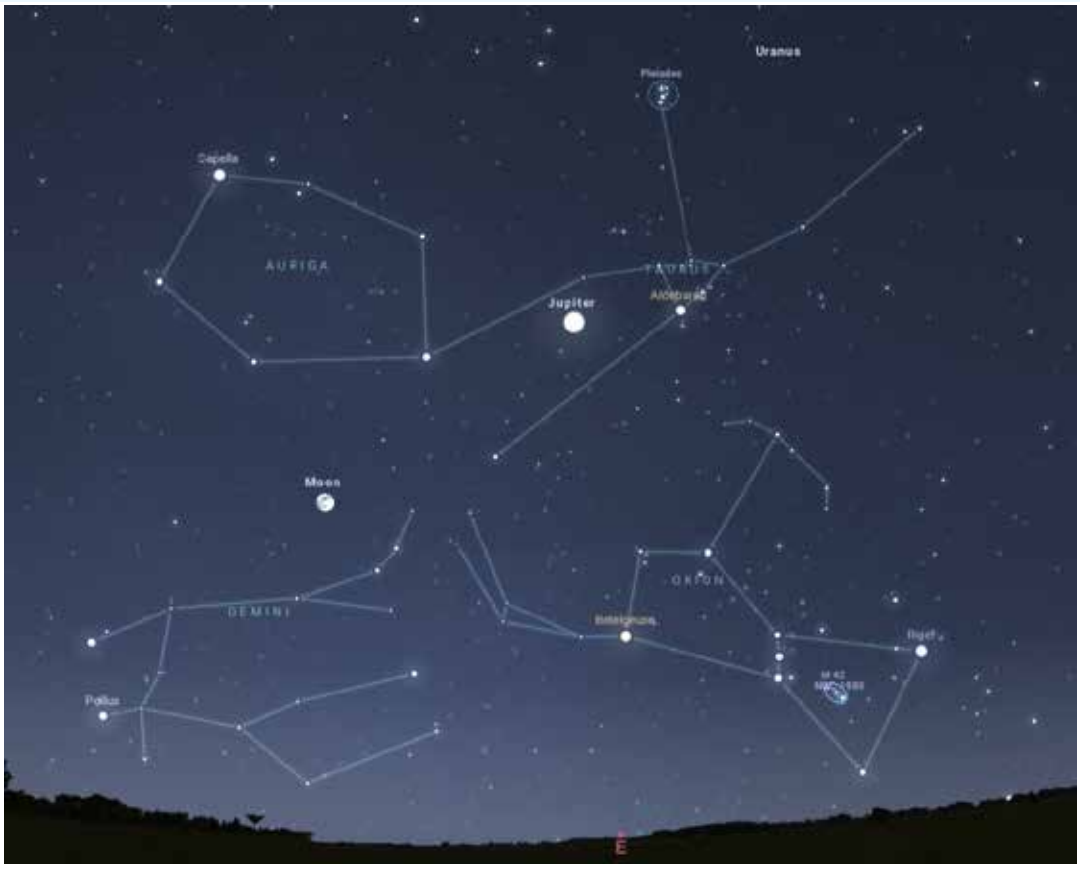
NASA's Juno mission captured this look at the southern hemisphere of Jupiter on Feb. 17, 2020, during one of the spacecraft's close approaches to the giant planet. This high-resolution view is a composite of four images captured by the JunoCam imager and assembled by citizen scientist Kevin M. Gill. Credit: NASA, JPL-Caltech, SwRI, MSSS | Image processing by Kevin M. Gill, © CC BY

Jupiter's position as our solar system's largest planet is truly earned; you could fit 11 Earths along Jupiter's diameter, and in case you were looking to fill up Jupiter with some Earth-size marbles, you would need over 1300 Earths to fill it up – and that would still not be quite enough! However, despite its formidable size, Jupiter's true rule over the outer solar system comes from its enormous mass. If you took all of the planets in our solar system and put them together, they would still only be half as massive as Jupiter all by itself. Jupiter's mighty mass has shaped the orbits of countless comets and asteroids. Its gravity can fling these tiny objects towards our inner solar system and also draw them into itself, as famously observed in 1994 when Comet Shoemaker-Levy 9, drawn towards Jupiter in previous orbits, smashed into the gas giant's atmosphere. Its multiple fragments slammed into Jupiter's cloud tops with such violence that the fireballs and dark impact spots were not only seen by NASA's orbiting Galileo probe but also by observers back on Earth!

Jupiter is easy to observe at night with our unaided eyes, as well-documented by the ancient astronomers who carefully recorded its slow movements from night to night. It can be one of the brightest objects in our nighttime skies, bested only by the Moon, Venus, and occasionally Mars, when the red planet is at opposition. That's impressive for a planet that, at its closest to Earth, is still over 365 million miles (587 million km) away. It's even more impressive that the giant world remains very bright to Earthbound observers at its furthest distance: 600 million miles (968 million km)! While the King of Planets has a coterie of 95 known moons, only the four large moons that Galileo originally observed in 1610 – Io, Europa, Ganymede, and Calisto – can be easily observed by Earth-based observers with very modest equipment. These are called,

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!



Look for Jupiter near the Eye of the Bull, Aldebaran, in the Taurus constellation on the evening of December 15, 2024. Binoculars may help you spot Jupiter's moons as small bright star-like objects on either side of the planet. A small telescope will show them easily, along with Jupiter's famed cloud bands. How many can you count? Credit: Stellarium Web

appropriately enough, the Galilean moons. Most telescopes will show the moons as faint star-like objects neatly lined up close to bright Jupiter. Most binoculars will show at least one or two moons orbiting the planet. Small telescopes will show all four of the Galilean moons if they are all visible, but sometimes they can pass behind or in front of Jupiter or even each other. Telescopes will also show details like Jupiter's cloud bands and, if powerful enough, large storms like its famous Great Red Spot, and the shadows of the Galilean moons passing between the Sun and Jupiter. Sketching the positions of Jupiter's moons during the course of an evening – and night to night – can be a rewarding project! You can download an activity guide from the Astronomical Society of the Pacific at bit.ly/drawjupitermoons

Now in its eighth year, NASA's Juno mission is one of just nine spacecraft to have visited this impressive world. Juno entered Jupiter's orbit in 2016 to begin its initial mission to study this giant world's mysterious interior. The years have proven Juno's mission a success, with data from the probe revolutionizing our understanding of this gassy world's guts. Juno's mission has since been extended to include the study of its large moons, and since 2021 the plucky probe, increasingly battered by Jupiter's powerful radiation belts, has made close flybys of the icy moons Ganymede and Europa, along with volcanic Io. What else will we potentially learn in 2030 with the Europa Clipper mission?

Find the latest discoveries from Juno and NASA's missions to Jupiter at science.nasa.gov/jupiter/

Originally posted by Dave Prosper: February 2023 Last Updated by Kat Troche: November 2024

Space News

News from around the Net

Arecibo's Powerful Radar May Have Contributed To The Telescope's Demise

While it was in operation, the radar system at the Arecibo Observatory in Puerto Rico was the most powerful source of electromagnetic radiation on this planet. It enabled incredibly detailed imaging of near-Earth asteroids as they passed by. But then, in 2020, support cables for the giant dish's observing platform failed, resulting in the collapse and permanent closing of the storied telescope. Now, a new study has found the collapse was likely triggered by . . . (continued at https://skyandtelescope.org/astronomy-news/arecibos-powerful-radar-may-have-contributed-to-the-telescopes-demise/)

Astronomers' Theory Of How Galaxies Formed May Be Upended

The standard model for how galaxies formed in the early universe predicted that the James Webb Space Telescope (JWST) would see dim signals from small, primitive galaxies. But data are not confirming the popular hypothesis that invisible dark matter helped the earliest stars and galaxies clump together. Instead, the oldest galaxies are large and bright, in agreement with an alternate theory of gravity, according to new research from Case Western Reserve University published Tuesday November 12 in The Astrophysical Journal.. . . (continued at https://www.sciencedaily.com/releases/2024/11/241112123028.htm)

Newfound Stellar Companion May Explain Black Hole System

Sometimes, the best things come in threes. The system V404 Cygni is an old favorite with astronomers. The binary contains a 9-solar-mass black hole that's slurping gas from a star slightly less massive than the Sun. Astronomically speaking, only a hair's breath separates the pair: 0.14 astronomical unit, or less than half Mercury's average distance from the Sun. The hot gas swirling down onto the black hole creates an X-ray beacon.. . . (continued at https://skyandtelescope.org/astronomy-news/newfound-stellar-companion-may-explain-black-hole-system/)

How Carbon Dioxide Glaciers Gave Mars Liquid Water

Mars is tantalizingly similar to Earth in many ways, but especially in its surface features, which often resemble Earth deserts to an eerie degree. Both Earth and Mars share features such as valleys; canyons; fanlike washes of sand and rock; and long, winding gravel ridges called eskers. All are formed by flowing water, marking the surface over millennia and remaining long after the water disappears. The puzzle of Mars is not how these features came to be — scientists know it was moving water. But figuring out how and when Mars could hold such large amounts. . . .(continued at https://www.astronomy.com/science/how-carbon-dioxide-glaciers-gave-mars-liquid-water/)

Learn The Difference Between Common Astronomical Terms

Astronomy is a science and a hobby that loves long words, acronyms, and abbreviations. At times, listening to someone talking about an event happening in the sky or an object faraway in space can feel like watching one of those episodes of Star Trek where the characters spend 10 minutes just speaking in "technobabble," so you're left feeling as lost as a dog listening to opera — being sung in Klingon.. . . . (continued at https://www.astronomy.com/astronomy-for-beginners/learn-the-difference-between-common-astronomical-terms/)

Chandra X-Ray Telescope, Facing Chopping Block, Gets Reprieve From NASA

Scientists breathed a collective sigh of relief last week when NASA announced that the Chandra X-ray Observatory had been spared the chopping block — at least for another year. It was an abrupt about-face from plans announced in March to decommission the space-based telescope by this December. Much of the credit for the 11th-hour stay of execution goes to a grassroots movement that dramatically demonstrated how public opinion can impact s. . . (continued at https://www.astronomy.com/science/chandra-x-ray-telescope-facing-chopping-block-gets-reprieve-from-nasa/)

Space News

News from around the Net

Astronomers Discover A 'Hot Neptune' In A Tight Orbit

A Neptune-sized planet, TOI-3261 b, makes a scorchingly close orbit around its host star. Only the fourth object of its kind ever found, the planet could reveal clues as to how planets such as these form. An international team of scientists used the NASA space telescope, TESS (the Transiting Exoplanet Survey Satellite), to discover the exoplanet (a planet outside our solar system), then made further observations with ground-based telescopes in Australia, Chile, and South Africa. . . . (continued at https://phys.org/news/2024-11-astronomers-hot-neptune-tight-orbit.html)

Sombrero Galaxy Dazzles In New Webb Images And Video

A new mid-infrared image from the NASA/ESA/CSA James Webb Space Telescope features the Sombrero galaxy, also known as Messier 104 (M104). The signature, glowing core seen in visible-light images does not shine, and instead a smooth inner disk is revealed. The sharp resolution of Webb's MIRI (Mid-Infrared Instrument) also brings into focus details of the galaxy's outer ring, providing insights into how the dust, an essential building block for astronomical objects in the universe, is distributed. The galaxy's outer ring shows intricate clumps in the infrared for the first time. . (continued at https://phys.org/news/2024-11-sombrero-galaxy-dazzles-webb-images.html)

Planetary Scientist Proposes An Alternative Theory For What Lies Beneath The Surfaces Of Uranus And Neptune Diamond rain? Super-ionic water? These are just two proposals that planetary scientists have come up with for what lies beneath the thick, bluish, hydrogen-and-helium atmospheres of Uranus and Neptune, our solar system's unique, but superficially bland, ice giants. A planetary scientist at the University of California, Berkeley, now proposes an alternative theory—that the interiors of both these planets are layered, and that the two layers, like oil and water, don't mix. . . . (continued at https://phys.org/news/2024-11-planetary-scientist-alternative-theory-beneath.html)

Veil Of Fiery Gas Revealed Around The Disk Of Milky Way

Scientists may have finally hit upon the possible mysterious sources that have pumped heat and kept alive the fiery hot gas that has recently been detected surrounding the Milky Way but has so far remained unexplained. There is more gas than stars in our galaxy. The prevailing, massive gas reserve is the main source of star formation in our galaxy. The availability of such abundant gas has helped sustain this process until now. . . .(continued at https://phys.org/news/2024-11-veil-fiery-gas-revealed-disk.html)

Uranus's Wobbling Moons Could Point To Oceans Under The Ice

Subsurface oceans of liquid water are a common feature of the moon's of Jupiter and Saturn. Researchers are exploring whether the icy moons of Uranus and Neptune might have them as well. Their new paper suggests future missions to the outer Solar System could measure the rotation of the moons and detect any wobbles pointing to liquid oceans. Less wobble means the moons is mostly solid but large wobbles can indicate ice floating on an ocean of liquid. . . . (continued at https://www.universetoday.com/169926/uranuss-wobbling-moons-could-point-to-oceans-under-the-ice/)

This Black Hole Is Gulping Material 40 Times Faster Than The Theoretical Limit

For decades, astronomers have puzzled over how the supermassive black holes residing in the center of galaxies form. Now, researchers may have found the biggest clue yet to how these monstrous objects — weighing millions of solar masses — came to exist. An international team used the James Webb Space Telescope's (JWST) high sensitivity to investigate a group of galaxies previously studied by the Chandra X-ray Observatory's COSMOS legacy survey. In that data, they found a small supermassive black hole (relatively speaking),. . . (continued at https://www.astronomy.com/science/this-black-hole-is-gulping-material-40-times-faster-than-the-theoretical-limit/)

NSF–DOE Rubin Observatory Test Camera Sees the Sky

28 October 2024 *ann24031 — Announcement*

NSF–DOE Vera C. Rubin Observatory passed its first end-to-end engineering test using a low-resolution testing camera known as the Commissioning Camera. The Commissioning Camera will later be replaced with the much higher resolution LSST Camera, the largest digital camera ever built, which Rubin Observatory will use to conduct the most comprehensive data-gathering mission in the history of astronomy — the 10-year Legacy Survey of Space and Time. Rubin is funded by the U.S. National Science Foundation and U.S. Department of Energy's Office of Science.

The mood in the observatory control room was electric as Rubin's first on-sky data were captured by the test camera and transferred successfully from the observatory in Chile to the U.S. Data Facility at SLAC National Accelerator Laboratory in California. This moment was the culmination of decades of hard work by the Rubin team. Those present in Chile gathered at the base of the Simonyi Telescope to celebrate the major milestone.

This engineering achievement demonstrates that Rubin Observatory now has a complete and functioning telescope, with light from the stars traveling through the telescope optics, being captured by Rubin's Commissioning Camera, and appearing on the Rubin teams' computer screens as a digital image. Rubin's Commissioning Camera was designed to be physically the same size as the planned LSST Camera, but the detector itself is about 20 times smaller: just 144 megapixels compared to the 3200-megapixel science camera. The test camera will enable the Rubin team to verify key components of the system and resolve issues before installation of the actual camera that will be used for science.

The process of taking Rubin's first data with the Commissioning Camera began well before sunset, with the team readying the telescope, dome, and mirrors. They conducted twilight calibrations while the sky was still dimming, then pointed the telescope towards a bright star to confirm pointing and focus. At 9:53 p.m. local time in Chile, with the sky fully dark, the team prompted the Commissioning Camera to take a 30-second exposure.

Once the team heard that the image had been successfully received in California, cheers erupted from Rubin staff members in Chile, as well as everyone who had gathered at various sites and online to participate in this momentous event.

Having reached this milestone, the engineering team will now focus on precisely aligning and shaping the mirrors to achieve optimal image quality with the Commissioning Camera. They will then test the pipelines that process Rubin data and make the data available to scientists. At the same time, work will continue on preparing the LSST Camera for installation on the telescope — expected in January 2025. A commissioning period of approximately six months will follow, leading to Rubin's first public release of astronomical images in mid-2025.

This important step brings us closer to the start of Rubin's Legacy Survey of Space and Time, which will revolutionize our quest to explore the cosmos. Rubin will create the ultimate movie of the night sky using the largest camera ever built — repeatedly scanning the sky for a decade to create an ultra-wide ultra-high-definition time-lapse record. This unique movie will bring the night sky to life, yielding a treasure trove of discoveries: asteroids and comets, pulsating stars, and supernova explosions. With Rubin data we will all be able to understand our Universe better, chronicle its evolution, delve into the mysteries of dark energy and dark matter, and reveal answers to questions we have yet to imagine.

More information

NSF–DOE Vera C. Rubin Observatory, funded by the U.S. National Science Foundation and the U.S. Department of Energy's Office of Science, is a groundbreaking new astronomy and astrophysics observatory under construction on Cerro Pachón in Chile, with first light expected in 2025. It is named after astronomer Vera Rubin, who provided the first convincing evidence for the existence of dark matter. Using the largest camera ever built, Rubin will repeatedly scan the sky for 10 years and create an ultra-wide, ultra-high-definition, time-lapse record of our Universe.

NSF–DOE Vera C. Rubin Observatory is a joint initiative of the U.S. National Science Foundation (NSF) and the U.S. Department of Energy's Office of Science (DOE/SC). Its primary mission is to carry out the Legacy Survey of Space and Time, providing an unprecedented data set for scientific research supported by both agencies. Rubin is operated jointly by NSF NOIRLab and SLAC National Accelerator Laboratory. NSF NOIRLab is managed by the Association of Universities for Research in Astronomy (AURA), and SLAC is operated by Stanford University.

France provides key support to the construction and operations of Rubin Observatory through contributions from CNRS/

continued on next page

IN2P3. Rubin Observatory gratefully acknowledges additional contributions from more than 40 international organizations and teams.

The U.S. National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 to promote the progress of science. NSF supports basic research and people to create knowledge that transforms the future.

The DOE's Office of Science is the single largest supporter of basic research in the physical sciences in the United States and is working to address some of the most pressing challenges of our time.

NSF NOIRLab (U.S. National Science Foundation National Optical-Infrared Astronomy Research Laboratory), the U.S. center for ground-based optical-infrared astronomy, operates the International Gemini Observatory (a facility of NSF, NRC–Canada, ANID–Chile, MCTIC–Brazil, MINCyT–Argentina, and KASI–Republic of Korea), Kitt Peak National Observatory (KPNO), Cerro Tololo Inter-American Observatory (CTIO), the Community Science and Data Center (CSDC), and Vera C. Rubin Observatory (in cooperation with DOE's SLAC National Accelerator Laboratory). It is managed by the Association of Universities for Research in Astronomy (AURA) under a cooperative agreement with NSF and is headquartered in Tucson, Arizona. The astronomical community is honored to have the opportunity to conduct astronomical research on I'oligam Du'ag (Kitt Peak) in Arizona, on Maunakea in Hawai'i, and on Cerro Tololo and Cerro Pachón in Chile. We recognize and acknowledge the very significant cultural role and reverence that these sites have to the Tohono O'odham Nation, to the Native Hawaiian community, and to the local communities in Chile, respectively.

SLAC National Accelerator Laboratory is a vibrant multiprogram laboratory that explores how the Universe works at the biggest, smallest, and fastest scales and invents powerful tools used by scientists around the globe. With research spanning particle physics, astrophysics and cosmology, materials, chemistry, bio- and energy sciences and scientific computing, SLAC helps solve real-world problems and advance the interests of the nation.

SLAC is operated by Stanford University for the U.S. Department of Energy's Office of Science. The Office of Science is the single largest supporter of basic research in the physical sciences in the United States and is working to address some of the most pressing challenges of our time.

Links

- Click here to see visuals submitted by members of the Rubin team who were present for this event
- Rubin Observatory announcement
- Vera C. Rubin Observatory website
- Vera C. Rubin Observatory images
- More Rubin images
- Rubin videos
- Rubin multimedia resources

Contacts

Željko Ivezić
Director of Rubin Construction
Professor of Astronomy, University of Washington/AURA
Cell: +1-206-403-6132
Email: ivezic@uw.edu

Sandrine Thomas
Deputy Director for Rubin Construction
Email: sthomas@lsst.org

Aaron Roodman
Deputy Director for Rubin Construction
Email: roodman@slac.stanford.edu

Victor Krabbendam
Project Manager for Rubin Construction
Email: vkrabbandam@lsst.org

Josie Fenske
Jr. Public Information Officer
NSF NOIRLab
Email: josie.fenske@noirlab.edu

Ranpal Gill
Communications Manager for Rubin Construction
Email: rgill@lsst.org

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.

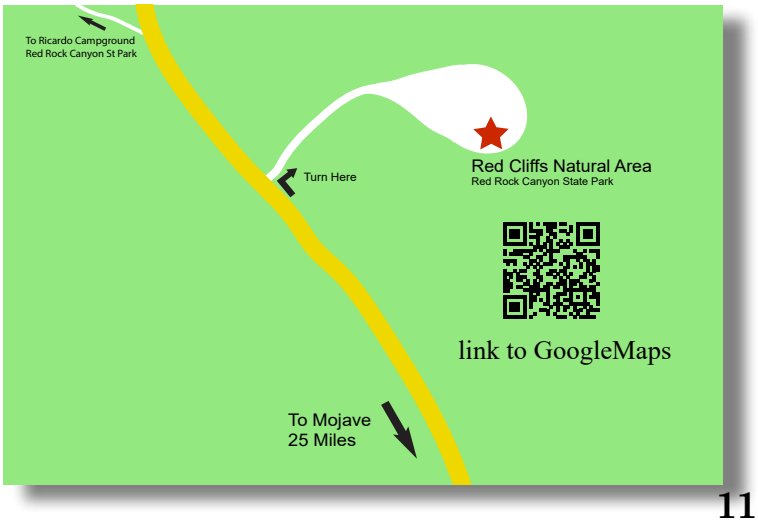
To get there, take the Frazier Mountain Park RD east about 7 miles from I-5, to Lake Of The Woods, Turn left on Lockwood Valley Rd. (If you see Mike's Pizza on your left you missed the turn) In less than a mile there is a road to the left, go past the ranger station, the parking lot is on the right.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

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.

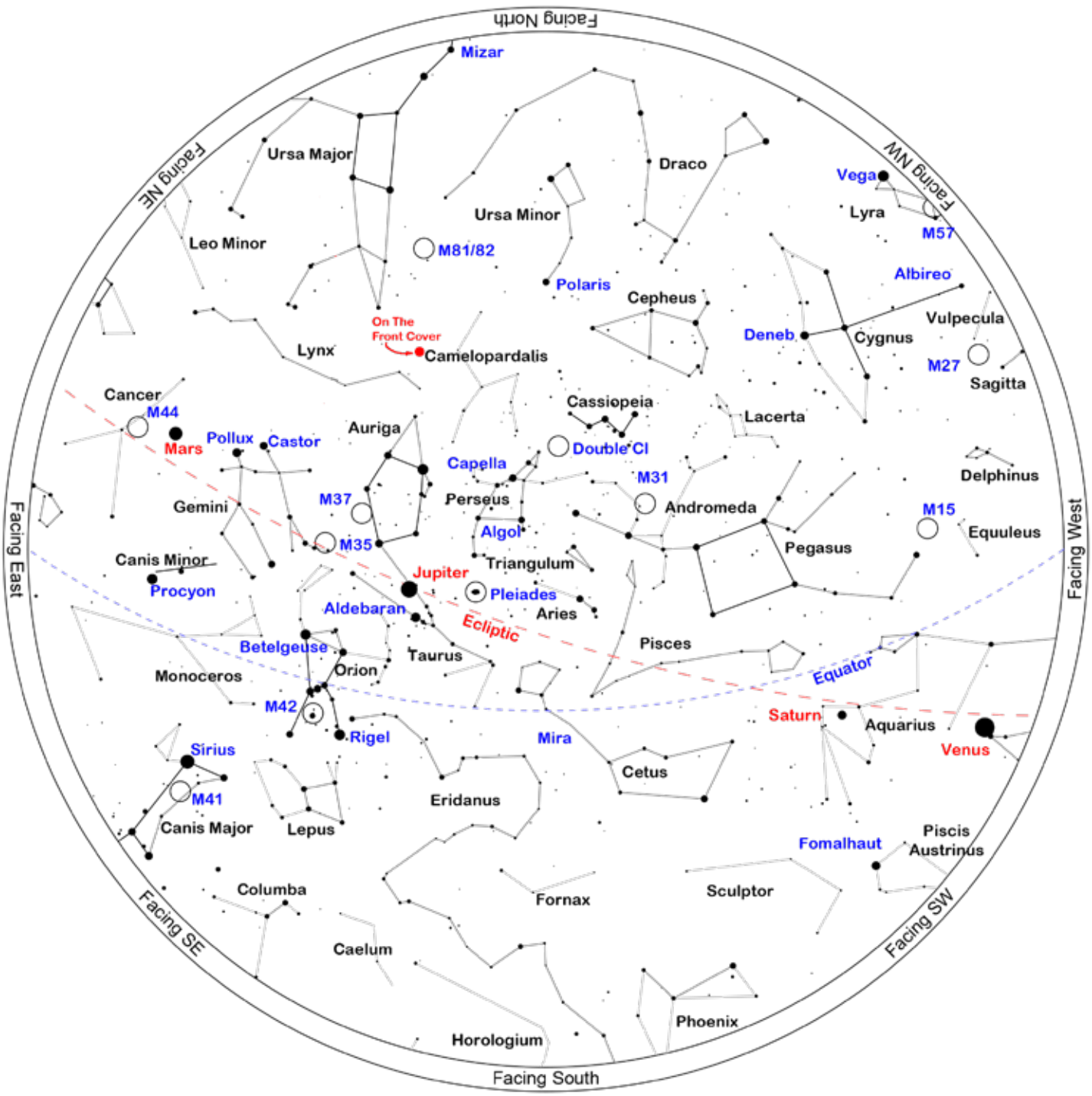
To get there: From I-5, get off at Frazier Mountain Park Rd and drive west about 7 miles to Mike's Pizza/ Market Deli at Lockwood Valley Rd. Keep on the main roadway (don't turn left to go to Chuchupate). Continue past Mike's Pizza on Cuddy Valley Rd (the road's new name) about 5 miles. Continue straight (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.

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.



Sky Chart



Location: Set from geolocation service
Latitude: 34° 39' N, longitude: 118° 10' W
Time: 2024 December 28, 20:00 (UTC -08:00)

Powered by: Heavens-Above.com

Solar System Summary

The **Sun** starts the month in western Ophiuchus, ending the month in central Sagittarius.

The Planets

Mercury too close to the Sun to be seen, moves into inferior conjunction on the 4th, achieving GEW on the 25th at mag -0.36.

Venus continues moving from Sagittarius to Capricorn after Sunset, brighting from -4.17 to -4.35 at years end. On the 4th the 15% waxing Moon passes 2¾° south.

Mars spends the month in Cancer. On the 7th the Red Planet reaches it's first stationary point, starting it's retrograde motion. At midnight on the 17th the 89% waning Moon passes by about ½ ° north.

Jupiter continues getting brighter as it achieves opposition on the 7th, while staying in central Taurus in retrograde motion till mid-February. The full moon passes by mid-day on the 15th.

Saturn continues moving in normal motion in Aquarius, that will continue till after the mid-March solar conjunction, when it passes into Pisces.

Uranus is moving in retrograde in Taurus, at mag 5.6, where it will remain till the end of the year as it steps over the line into Aries.

Neptune is moving in retrograde near the southern border in Pisces at 7.8. On the 9th it resumes normal motion as the 58% waxing Moon passes ½° north.

Dwarf Planets

134340 Pluto spends the month in normal motion, moving 48 arc-minutes east, on the western edge of Capricorn, south of M75 at mag 14.4.

1 Ceres starts at the eastern edge of Sagittarius moving east into southern Capricorn at mag 9.2.

2 Pallas in normal motion passing through northern Ophiuchus and then into Serpens Cauda at magnitude 10.35.

3 Juno is moving east from Virgo into Libra, by the end of year it is at mag 11.3.

4 Vesta spends the month moving east Virgo in the morning twilight less than 5°north of the ecliptic.

Moon Phases

First Qtr Dec 8 | Full Dec 15 | Third Qtr Dec 22 | New Dec 30

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
12/1/2024	07:21	16:52	06:42	16:41
12/5/2024	10:45	22:59	06:45	16:41
12/10/2024	13:16	01:30	06:49	16:42
12/15/2024	17:00	07:30	06:52	16:43
12/20/2024	22:22	10:58	06:52	16:45
12/25/2024	02:07	12:58	06:57	16:48
12/30/2024	07:08	16:35	06:59	16:51

Planet Data*

December 1

	Rise	Transit	Set	Mag	Phase%
Mercury	07:31	12:23	17:17	2.68	68.9
Venus	10:00	14:52	19:45	-4.17	68.1
Mars	20:37	03:46	10:50	-0.52	99.9
Jupiter	17:03	00:14	07:21	-2.81	99.7
Saturn	12:29	18:07	23:45	0.96	99.8

December 15

	Rise	Transit	Set	Mag	Phase%
Mercury	05:25	10:33	15:42	0.32	32.6
Venus	09:59	15:05	20:10	-4.25	62.2
Mars	19:39	02:50	09:57	-0.86	95.7
Jupiter	16:00	23:07	06:17	-2.8	99.9
Saturn	11:36	17:14	22:53	1.01	99.8

December 30

	Rise	Transit	Set	Mag	Phase%
Mercury	05:42	10:24	15:23	-0.36	76.1
Venus	09:48	15:11	20:34	-4.35	55.8
Mars	18:21	01:38	08:49	-1.17	98.6
Jupiter	14:54	22:00	05:10	-2.76	99.8
Saturn	10:39	16:19	21:59	1.06	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 December 28, 2024. The list is sorted by the transit time of the object.

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC6826	Blinking Planetary	P Neb	Cyg	19h 44m 48s	+50° 31.0'	8.8	03:15	13:13	23:11
Abell65		P Neb	Sgr	19h 46m 34s	-23° 08.2'	13.1	08:21	13:15	18:09
NGC6838		Globular	Sge	19h 53m 46s	+18° 46.6'	8.3	06:24	13:22	20:20
NGC6842		P Neb	Vul	19h 55m 02s	+29° 17.3'	14.0	05:48	13:23	20:58
HR7619	Psi Cyg	Mult	Cyg	19h 55m 38s	+52° 26.3'	4.9	02:54	13:24	23:54
Abell66		P Neb	Sgr	19h 57m 32s	-21° 36.6'	14.1	08:27	13:26	18:25
Barnard144	Fish on the platter nebula	DkNeb	Cyg	19h 58m 00s	+35° 20.0'		05:24	13:26	21:28
NGC6853	Apple Core Nebula	P Neb	Vul	19h 59m 36s	+22° 43.2'	8.1	06:17	13:28	20:39
NGC6857	III-144	Neb	Cyg	20h 02m 48s	+33° 31.4'	11.4	05:38	13:31	21:24
IC4954		Neb	Vul	20h 04m 45s	+29° 15.1'		05:58	13:33	21:08
M75	NGC6864	Globular	Sgr	20h 06m 05s	-21° 55.3'	9.5	08:36	13:34	18:32
Barnard342		DkNeb	Cyg	20h 09m 30s	+41° 12.0'		05:03	13:38	22:12
NGC6885	20 Vulpeculae Cluster	Open	Vul	20h 12m 00s	+26° 29.0'	5.9	06:16	13:40	21:05
NGC6891		P Neb	Del	20h 15m 09s	+12° 42.2'	12.0	07:04	13:43	20:22
NGC6894		P Neb	Cyg	20h 16m 24s	+30° 33.9'	14.0	06:04	13:45	21:25
IC4997		P Neb	Sge	20h 20m 09s	+16° 43.9'	12.0	06:57	13:48	20:40
Barnard345		DkNeb	Cyg	20h 21m 00s	+46° 33.0'		04:34	13:49	23:04
NGC6913	Cooling Tower	Open	Cyg	20h 23m 57s	+38° 30.5'	6.6	05:34	13:52	22:11
Abell70		P Neb	Aql	20h 31m 33s	-07° 05.3'	14.3	08:17	14:00	19:43
Barnard348		DkNeb	Cyg	20h 34m 00s	+42° 05.0'		05:22	14:02	22:43
NGC6940		Open	Vul	20h 34m 26s	+28° 17.0'	6.3	06:31	14:03	21:34
NGC6960	Filamentary Nebula	Neb	Cyg	20h 45m 58s	+30° 35.6'		06:34	14:14	21:55
IC5068		Neb	Cyg	20h 50m 29s	+42° 28.6'		05:36	14:19	23:02
IC5070	Pelican Nebula [2]	Neb	Cyg	20h 51m 00s	+44° 24.1'		05:22	14:19	23:16
NGC6979	II-206	Neb	Cyg	20h 51m 00s	+32° 09.0'	11.0	06:32	14:19	22:06
NGC6981		Globular	Aqr	20h 53m 28s	-12° 32.2'	9.4	08:54	14:22	19:49
IC5076		Neb	Cyg	20h 55m 33s	+47° 23.7'		05:01	14:24	23:46
IC1340		Neb	Cyg	20h 56m 08s	+31° 02.8'		06:42	14:24	22:07
NGC6992	Cirrus Nebula [2]	Neb	Cyg	20h 56m 19s	+31° 44.6'		06:39	14:25	22:10
NGC6996	VIII-58	Open	Cyg	20h 56m 30s	+44° 38.0'	10.0	05:26	14:25	23:23
NGC6997		Open	Cyg	20h 56m 39s	+44° 37.9'	10.0	05:26	14:25	23:24
Barnard352		DkNeb	Cyg	20h 57m 10s	+45° 53.0'		05:16	14:25	23:34
Barnard354		DkNeb	Cep	20h 58m 00s	+58° 09.0'		Circ	14:26	Circ
NGC7000	Gulf of Mexico	BrNeb	Cyg	20h 58m 48s	+44° 20.0'		05:31	14:27	23:23
M73	NGC6994	Open+Aster-ism	Aqr	20h 58m 56s	-12° 38.1'	9.0	09:00	14:27	19:54
NGC7006	C42	Globular	Del	21h 01m 30s	+16° 11.0'	10.6	07:40	14:30	21:19

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC7009	Saturn Nebula	P Neb	Aqr	21h 04m 12s	-11° 22.0'	8.0	09:02	14:32	20:03
NGC7027		P Neb	Cyg	21h 07m 02s	+42° 14.1'	10.0	05:54	14:35	23:17
Barnard151	B151	DkNeb	Cep	21h 08m 13s	+56° 19.0'		Circ	14:36	Circ
IC1369		Open	Cyg	21h 12m 09s	+47° 46.1'	6.8	05:14	14:40	00:07
Barnard153	B153	DkNeb	Cep	21h 21m 03s	+56° 26.0'		Circ	14:49	Circ
NGC7076		Neb	Cep	21h 26m 24s	+62° 53.5'		Circ	14:55	Circ
NGC7078	Great Pegasus Cluster	Globular	Peg	21h 29m 58s	+12° 10.0'	6.4	08:21	14:58	21:36
M39	NGC7092	Open	Cyg	21h 31m 42s	+48° 25.0'	5.5	05:27	15:00	00:33
M2	NGC7089	Globular	Aqr	21h 33m 27s	-00° 49.3'	7.5	09:01	15:02	21:02
NGC7090		Galaxy	Ind	21h 36m 28s	-54° 33.4'	11.0	13:56	15:05	16:13
IC1396	Elephant Trunk	Open	Cep	21h 38m 58s	+57° 29.3'	3.5	Circ	15:07	Circ
NGC7099		Globular	Cap	21h 40m 22s	-23° 10.7'	7.5	10:15	15:09	20:02
NGC7128		Open	Cyg	21h 43m 57s	+53° 42.9'	9.7	04:11	15:12	02:13
NGC7142		Open	Cep	21h 45m 09s	+65° 46.5'	9.3	Circ	15:13	Circ
NGC7139	III-696	P Neb	Cep	21h 46m 08s	+63° 47.5'	13.3	Circ	15:14	Circ
Barnard166		DkNeb	Cep	21h 51m 05s	+60° 05.0'		Circ	15:19	Circ
Barnard168		DkNeb	Cyg	21h 53m 20s	+47° 16.0'		06:00	15:22	00:43
IC5146	Cocoon Nebula	Open	Cyg	21h 53m 29s	+47° 16.0'	7.2	06:00	15:22	00:43
IC1434		Open	Lac	22h 10m 42s	+52° 51.0'	9.0	05:00	15:39	02:17
NGC7245		Open	Lac	22h 15m 11s	+54° 20.6'	9.2	04:17	15:43	03:10
NGC7232		Galaxy	Gru	22h 15m 38s	-45° 51.0'	13.0	12:41	15:44	18:47
NGC7261		Open	Cep	22h 20m 06s	+58° 03.0'	8.4	Circ	15:48	Circ
NGC7293	Helix Nebula	P Neb	Aqr	22h 29m 36s	-20° 48.0'	7.3	10:56	15:58	21:00
NGC7380		Open	Cep	22h 47m 21s	+58° 07.9'	7.2	Circ	16:16	Circ
C9	Cave Nebula	BrNeb	Cep	22h 56m 48s	+62° 37.0'		Circ	16:25	Circ
IC1470		Neb	Cep	23h 05m 10s	+60° 14.6'		Circ	16:33	Circ
NGC7492		Globular	Aqr	23h 08m 27s	-15° 36.6'	11.5	11:19	16:37	21:55
HR8872	Omi Cep	Triple	Cep	23h 18m 38s	+68° 06.6'	4.8	Circ	16:47	Circ
IC5308		Galaxy	Gru	23h 19m 21s	-42° 15.4'	12.0	13:19	16:48	20:16
M52	The Scorpion	Open	Cas	23h 24m 48s	+61° 35.6'	8.0	Circ	16:53	Circ
NGC7662	Blue Snowball	P Neb	And	23h 25m 54s	+42° 33.0'	8.3	08:11	16:54	01:38
NGC7686		Open	And	23h 30m 07s	+49° 08.0'	5.6	07:17	16:58	02:39
IC5332		Galaxy	Scl	23h 34m 27s	-36° 06.0'	10.6	13:01	17:03	21:05
NGC7785		Galaxy	Psc	23h 55m 19s	+05° 54.9'	11.6	11:04	17:24	23:43
HR9071	8 Cas	Triple	Cas	23h 59m 01s	+55° 45.3'	4.9	Circ	17:27	Circ
NGC129		Open	Cas	00h 30m 00s	+60° 13.1'	6.5	Circ	17:58	Circ
NGC133		Open	Cas	00h 31m 19s	+63° 21.0'	9.0	Circ	18:00	Circ
NGC146		Open	Cas	00h 33m 03s	+63° 18.0'	9.1	Circ	18:01	Circ

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC147	C17	E Gal	Cas	00h 33m 12s	+48° 30.0'	9.3	08:27	18:01	03:35
NGC190		Galaxy	Psc	00h 38m 55s	+07° 03.7'	14.0	11:45	18:07	00:30
M110	Sat Of Andromeda Galaxy	Galaxy	And	00h 40m 22s	+41° 41.1'	8.9	09:31	18:09	02:46
NGC210		Galaxy	Cet	00h 40m 35s	-13° 52.3'	10.9	12:45	18:09	23:32
NGC206	V-36	Neb	And	00h 40m 36s	+40° 44.0'		09:37	18:09	02:40
Arp168	M32	Galaxy	And	00h 42m 41s	+40° 51.0'	9.0	09:39	18:11	02:43
M32	Sat Of Andromeda Galaxy	Galaxy	And	00h 42m 42s	+40° 51.9'	9.1	09:38	18:11	02:43
M31	Andromeda Galaxy	Galaxy	And	00h 42m 44s	+41° 16.1'	4.3	09:36	18:11	02:46
NGC246	C56	P Neb	Cet	00h 47m 00s	-11° 53.0'	10.9	12:46	18:15	23:44
NGC254		Galaxy	Scl	00h 47m 28s	-31° 25.2'	11.8	13:53	18:16	22:39
NGC288		Globular	Scl	00h 52m 45s	-26° 35.0'	8.1	13:39	18:21	23:03
NGC281	PacMan Nebula	Open	Cas	00h 52m 54s	+56° 37.4'	7.0	Circ	18:21	Circ
IC59	γ Cassiopeiae Nebula	Neb	Cas	00h 57m 29s	+61° 08.6'		Circ	18:26	Circ
IC63	γ Cassiopeiae Nebula	Neb	Cas	00h 59m 29s	+60° 54.7'		Circ	18:28	Circ
C51	IC1613	IrrGal	Cet	01h 04m 48s	+02° 07.0'	9.3	12:24	18:33	00:42
NGC474		Galaxy	Psc	01h 20m 07s	+03° 24.9'	11.1	12:36	18:48	01:01
NGC485		Galaxy	Psc	01h 21m 28s	+07° 01.0'	14.0	12:27	18:50	01:12
M103	NGC581	Open	Cas	01h 33m 23s	+60° 39.0'	7.0	Circ	19:02	Circ
NGC598	Pinwheel Galaxy	Galaxy	Tri	01h 33m 51s	+30° 39.6'	5.7	11:21	19:02	02:43
NGC604	III-150	Neb	Tri	01h 34m 33s	+30° 47.0'		11:21	19:03	02:44
M74	The Phantom	Galaxy	Psc	01h 36m 42s	+15° 47.0'	9.8	12:17	19:05	01:53
M76	Little Dumbbell Nebula	P Neb	Per	01h 42m 18s	+51° 34.2'	12.0	08:56	19:11	05:25
NGC651	Apple Core Nebula [2]	P Neb	Per	01h 42m 21s	+51° 34.1'	12.2	08:56	19:11	05:25
NGC637		Open	Cas	01h 43m 04s	+64° 02.4'	8.2	Circ	19:11	Circ
NGC654		Open	Cas	01h 44m 00s	+61° 53.0'	6.5	Circ	19:12	Circ
NGC720		Galaxy	Cet	01h 53m 00s	-13° 44.3'	10.2	13:57	19:21	00:45
NGC780		Galaxy	Tri	02h 00m 35s	+28° 13.5'	14.0	11:58	19:29	03:00
NGC784		Galaxy	Tri	02h 01m 17s	+28° 50.2'	11.8	11:56	19:29	03:03
NGC821		Galaxy	Ari	02h 08m 21s	+10° 59.6'	10.8	13:03	19:37	02:10
Baily191	NGC884	Open	Per	02h 22m 18s	+57° 08.1'	4.0	Circ	19:51	Circ
IC1795		Neb	Cas	02h 26m 32s	+62° 02.4'		Circ	19:55	Circ
NGC936		Galaxy	Cet	02h 27m 37s	-01° 09.3'	10.1	13:56	19:56	01:55
NGC943	Arp309	Galaxy	Cet	02h 29m 09s	-10° 49.0'	11.4	14:25	19:57	01:30
NGC956		Open	And	02h 32m 30s	+44° 35.6'	9.0	11:02	20:01	04:59
IC1805	Heart Nebula	Open	Cas	02h 32m 47s	+61° 27.6'	6.5	Circ	20:01	Circ
NGC1052		Galaxy	Cet	02h 41m 05s	-08° 15.3'	10.6	14:30	20:09	01:49
M34	Spiral Cluster	Open	Per	02h 42m 05s	+42° 45.6'	6.0	11:25	20:10	04:55
M77	Cetus A	Galaxy	Cet	02h 42m 41s	-00° 00.8'	9.7	14:08	20:11	02:14

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC1084		Galaxy	Eri	02h 46m 00s	-07° 34.6'	10.6	14:33	20:14	01:56
IC1848	Soul Nebula	Open	Cas	02h 51m 18s	+60° 24.4'	6.5	Circ	20:20	Circ
NGC1156		Galaxy	Ari	02h 59m 42s	+25° 14.2'	11.7	13:08	20:28	03:48
NGC1201		Galaxy	For	03h 04m 08s	-26° 04.1'	10.6	15:49	20:32	01:16
NGC1175		Galaxy	Per	03h 04m 32s	+42° 20.3'	12.8	11:51	20:33	05:15
HR963	Fornacis	Dbl	For	03h 12m 04s	-28° 59.2'	3.9	16:07	20:40	01:13
NGC1316	Fornax A	Galaxy	For	03h 22m 42s	-37° 12.4'	8.9	16:54	20:51	00:48
Barnard202	B202	DkNeb	Ari	03h 25m 38s	+30° 16.0'		13:15	20:54	04:33
Barnard204	B204	DkNeb	Ari	03h 28m 29s	+30° 11.0'		13:18	20:57	04:36
NGC1350		Galaxy	For	03h 31m 08s	-33° 37.7'	10.5	16:46	20:59	01:13
Barnard1	B1	DkNeb	Per	03h 32m 57s	+31° 09.0'		13:18	21:01	04:44
NGC1407		Galaxy	Eri	03h 40m 12s	-18° 34.8'	9.8	15:59	21:08	02:17
IC347		Galaxy	Eri	03h 42m 32s	-04° 17.9'	13.0	15:20	21:11	03:02
NGC1448		Galaxy	Hor	03h 44m 32s	-44° 38.6'	11.0	18:01	21:13	00:25
IC348		Open	Per	03h 44m 34s	+32° 09.7'	7.3	13:25	21:13	05:00
M45	Pleiades	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	14:00	21:16	04:31
Barnard5	B5	DkNeb	Per	03h 47m 53s	+32° 53.0'		13:26	21:16	05:07
NGC1461		Galaxy	Eri	03h 48m 27s	-16° 23.5'	11.7	16:01	21:17	02:32
IC353		Neb	Tau	03h 53m 00s	+25° 48.0'		13:59	21:21	04:43
IC2003		P Neb	Per	03h 56m 22s	+33° 52.5'	13.0	13:30	21:25	05:20
NGC1499	California Nebula	Neb	Per	04h 03m 14s	+36° 22.0'		13:24	21:31	05:39
NGC1515		Galaxy	Dor	04h 04m 03s	-54° 06.0'	11.0	20:12	21:32	22:52
NGC1496		Open	Per	04h 04m 32s	+52° 39.7'	10.0	10:58	21:33	08:07
NGC1502		Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circ	21:36	Circ
IC360		Neb	Tau	04h 09m 00s	+26° 06.0'		14:14	21:37	05:00
NGC1514	Crystal Ball Nebula	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	13:56	21:37	05:19
NGC1513		Open	Per	04h 09m 57s	+49° 30.8'	8.4	11:53	21:38	07:24
IC359		Neb	Tau	04h 12m 28s	+27° 42.1'		14:12	21:41	05:10
NGC1535		P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	16:16	21:42	03:09

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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