

Volume 42.12

December 2022

Desert Sky Observer

Antelope Valley Astronomy Club



Desert Sky Observer

www.avastronomyclub.org

December 2022

Upcoming Events

December 3: Moonwalk 6:00 pm @ PDW

December 10: Christmas Party

@ Gino's Restaurant

Every clear night: Personal Star Party



AVAC Calendar

January 13: Club Meeting and Star Party **6:00pm** till . . .

January 14: Moonwalk 5:30 pm @ PDW

February 4: Moonwalk 6:00pm @ PDW

February 10: Club Meeting

February 18: AV Regional Science Olympiad 8:00 am - 4:30pm



Board Members

President: Phil Wriedt (661) 917-4874

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Vice-President: Gail Lofdahl 661-722-5833

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Equipment & Library:

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Club Historian: vacant

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Webmaster: Steve Trotta (661) 269-5428

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Astronomical League Coordinator:

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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 Reflector -- the publication of the Astronomical League.
- 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/.

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

The AVAC is a Sustaining Member of The Astronomical League and the International Dark-Sky Association



www.avastronomyclub.org

President's Message

By Phil Wriedt

Hi There!

We have a Prime Desert Moon Walk on Saturday December 3rd at 6:30pm; weather permitting, hopefully it won't be rained out. In November we had a great turnout, 51 people braved the cold. Come out, bring a telescope and join us in showing the night sky to the public.

Our Christmas Party is coming up on the 10th of December at Gino's Italian Restaurant, the same place it's been held for the past several years. Rose describes the particulars in detail on the next page.

Our first meeting of the new year, the 13th of January will be a star party! We will be starting at 6:00 pm and going till about 9pm. Jeremy is inviting students from the school district. Bring your telescopes, but afterwards leave them in your car(keep it safe, lock the doors), cause the next day we have a Moonwalk at PDW starting at 6:30 pm.

Starting in January, Jeremy announced that he will be holding a class on The Telescope on the 2nd Tuesday of the month, and on the 4th Tuesday, there will be a class on Astronomy. Both classes will start at 6:30pm at the Sage Planetarium. More information will come by emails and at meetings.

On Saturday, February 18 at 8:00AM we are going to the AV Regional Science Olympiad at the AV College. That's right 8 o'clock in the morning (for an astronomer?). More information will be forthcoming soon.

See you at the Moonwalk on the 3rd and Christmas Party on the 10th.

Keep Looking Up, Phil

On The Cover

Please note: North is 110.1° left of vertical

RA: 1h 36' 41.64" DEC: 15° 46' 57.86"

This image from the NASA/ESA/CSA James Webb Space Telescope shows the heart of M74, otherwise known as the Phantom Galaxy. Webb's sharp vision has revealed delicate filaments of gas and dust in the grandiose spiral arms which wind outwards from the centre of this image. A lack of gas in the nuclear region also provides an unobscured view of the nuclear star cluster at the galaxy's centre. M74 is a particular class of spiral galaxy known as a 'grand design spiral', meaning that its spiral arms are prominent and well-defined, unlike the patchy and ragged structure seen in some spiral galaxies.

The Phantom Galaxy is around 32 million light-years away from Earth in the constellation Pisces, and lies almost face-on to Earth. This, coupled with its well-defined spiral arms, makes it a favourite target for astronomers studying the origin and structure of galactic spirals.

Webb gazed into M74 with its Mid-InfraRed Instrument (MIRI) in order to learn more about the earliest phases of star formation in the local Universe. These observations are part of a larger effort to chart 19 nearby star-forming galaxies in the infrared by the international PHANGS collaboration. Those galaxies have already been observed using the NASA/ESA Hubble Space Telescope and ground-based observatories. The addition of crystal-clear Webb observations at longer wavelengths will allow astronomers to pinpoint star-forming regions in the galaxies, accurately measure the masses and ages of star clusters, and gain insights into the nature of the small grains of dust drifting in interstellar space.

From the Secretary

By Rose Moore

Members:

We have a Prime Desert Moon Walk on Saturday Dec. 3rd at 6:30pm; weather permitting! Members with telescopes are needed. There will be a waxing gibbous Moon, and the planets up will be Mars, Jupiter, Saturn, Uranus and Neptune.

A reminder that we have our Annual Club Christmas Party on Saturday Dec. 10th starting at 6:00pm, for members and their guest(s). Buffet dinner starts at 6:30pm. Dress is casual. We will have a raffle, and our grand prize is a new 8 inch Dobsonian scope. Anyone can donate a raffle prize, it can be gently used or new, and does not have to be astronomy related. You may pay via the PayPal link (<http://www.avastronomyclub.org/christmas>) or mail in a payment by check to P.O. Box 8545, Lancaster, CA 93539. If you are mailing in a payment, please let a Board member know!!

For our first meeting of 2023, we will be having a telescope night! Friday January 13th from 6pm to 9pm, Jeremy will be notifying the Palmdale School District as this event will be open to all the students. Members are encouraged to bring their telescopes to this event. More info to follow.

Jeremy will be starting classes on the 2nd and 4th Tuesday of each month, starting in January through March. The topic for the 2nd Tuesday's class will be Telescopes, and the topic for the 4th Tuesday's class will be Astronomy. Classes will start at 6:30pm at the SAGE. More info to follow.

I hope everyone had a wonderful Thanksgiving! Enjoy the upcoming holidays! Merry Christmas and Happy New Year!

See you at the Christmas Party! Rose

On The Cover ... continued

Hubble observations of M74 have revealed particularly bright areas of star formation known as HII regions. Hubble's sharp vision at ultraviolet and visible wavelengths complements Webb's unparalleled sensitivity at infrared wavelengths, as do observations from ground-based radio telescopes such as the Atacama Large Millimeter/submillimeter Array, ALMA. By combining data from telescopes operating across the electromagnetic spectrum, scientists can gain greater insight into astronomical objects than by using a single observatory — even one as powerful as Webb!

MIRI was contributed by ESA and NASA, with the instrument designed and built by a consortium of nationally funded European Institutes (the MIRI European Consortium) in partnership with JPL and the University of Arizona.

Credit:

ESA/Webb, NASA & CSA, J. Lee and the PHANGS-JWST Team.

Acknowledgement: J. Schmidt

Binoculars: A Great First Telescope

by David Prosper, NASA Night Sky Network

Do you want to peer deeper into the night sky? Are you feeling the urge to buy a telescope? There are so many options for budding astronomers that choosing one can be overwhelming. A first telescope should be easy to use and provide good quality views while being affordable. As it turns out, those requirements make the first telescope of choice for many stargazers something unexpected: a good pair of binoculars!

Binoculars are an excellent first instrument because they are generally easy to use and more versatile than most telescopes. Binoculars can be used for activities like stargazing and birdwatching, and work great in the field at a star party, along the hiking trail, and anywhere else where you can see the sky. Binoculars also travel well, since they easily fit into carry-on luggage – a difficult feat for most telescopes! A good pair of binoculars, ranging in specifications from 7x35 to 10x50, will give you great views of the Moon, large open star clusters like the Pleiades (M45), and, from dark skies, larger bright galaxies like the Andromeda Galaxy (M31) and large nebulae like the Orion Nebula (M42). While you likely won't be able to see Saturn's rings, as you practice your observing skills you may be able to spot Jupiter's moons, along with some globular clusters and fainter nebulae from dark sites, too.

What do the numbers on those binocular specs actually mean? The first number is the magnification, while the second number is the size in millimeters (mm) of the lenses. So, a 7x35 pair of binoculars means that they will magnify 7 times using lenses 35 mm in diameter. It can be tempting to get the biggest binoculars you can find, but try not to get anything much more powerful than a 10x50 pair at first. Larger binoculars with more power often have narrower fields of vision and are heavier; while technically more powerful, they are also more difficult to hold steadily in your hands and “jiggle” quite a bit unless you buy much more expensive binoculars with image stabilization, or mount them to a tripod.

Would it surprise you that amazing views of some astronomical objects can be found not just from giant telescopes, but also from seemingly humble binoculars? Binoculars are able to show a much larger field of view of the sky compared to most telescopes. For example, most telescopes are unable to keep the entirety of the Pleiades or Andromeda Galaxy entirely inside the view of most eyepieces. Binoculars are also a great investment for more advanced observing, as later on they are useful for hunting down objects to then observe in more detail with a telescope.

If you are able to do so, real-world advice and experience is still the best for something you will be spending a lot of time with! Going to an in-person star party hosted by a local club is a great way to get familiar with telescopes and binoculars of all kinds – just ask permission before taking a closer look! You can find clubs and star parties near you on the Night Sky Network's Clubs & Events page at bit.ly/nsnclubsandevents, and inspire your binocular stargazing sessions with NASA's latest discoveries at nasa.gov.



The two most popular types of binocular designs are shown here: roof-prism binoculars (left) and porro-prism binoculars (right). Roof prisms tend to be more compact, lighter, and a bit more portable, while porro-prisms tend to be heavier but often offer wider views and greater magnification. What should you choose? Many birders and frequent fliers often choose roof-prism models for their portability. Many observers who prefer to observe fainter deep-sky objects or who use a tripod with their observing choose larger porro-prism designs. There is no right answer, so if you can, try out both designs and see which works better for you.



A pair of good binoculars can show craters on the Moon around 6 miles (10 km) across and larger. How large is that? It would take you about two hours to hike across a similar-sized crater on Earth. The “Can You See the Flag On the Moon?” handout showcases the levels of detail that different instruments can typically observe on the Moon, available at bit.ly/flagmoon. Moon image courtesy Jay Tanner

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 to find local clubs, events, and more!

Space News

News from around the Net

NASA's Webb Catches Fiery Hourglass As New Star Forms

NASA's James Webb Space Telescope has revealed the once-hidden features of the protostar within the dark cloud L1527, providing insight into the beginnings of a new star. These blazing clouds within the Taurus star-forming region are only visible in infrared light, making it an ideal target for Webb's Near-Infrared Camera (NIRCam). The protostar itself is hidden from view within the "neck" of this hourglass shape. An edge-on protoplanetary disk is seen as a dark line across the middle of the neck. . . (continued at <https://www.sciencedaily.com/releases/2022/11/221117141635.htm>)



Artemis 1 Orion Spacecraft Sees The Moon For 1st Time In Stunning Video

NASA's Orion spacecraft has spotted the destination of its Artemis 1 test flight the moon and captured a stunning video to mark the moment. In a video released Friday (Nov. 18), the half-lit moon is visible in the distance with the Orion spacecraft in the foreground, complete with NASA's "worm" logo, as seen from a camera on the tip of one of the capsule's four solar wings. At the time, Orion was about halfway to the moon, NASA said in a statement. "On the third day of the Artemis I mission, Orion maneuvered its solar arrays and captured the moon with a camera mounted on the end of the array," . . (continued at <https://www.space.com/artemis-1-orion-spacecraft-first-moon-photo-video>)



What Earthly Objects Can Be Seen From Space?

When famed Star Trek actor William Shatner embarked on a space tourism flight last year, the view brought him to tears. He later described crying while looking back at Earth, as well as a profound sense of grief — as if he had just learned about the death of a loved one. Scientists call this feeling the "overview effect." It happens to astronauts when they look back at Earth and feel an overwhelming connection with the planet and its people. What a space traveler sees, of course, is all dependent on how high they fly. Whereas Shatner and other space tourists soared to 62 miles (100 kilometers) above sea level, astronauts in . . . (continued at <https://astronomy.com/news/2022/11/what-earthly-objects-can-be-seen-from-space>)



BlueWalker 3 Satellite Unfolds, Brightening 40-Fold

The unfolding of the BlueWalker 3's giant flat-panel antenna array resulted in a satellite 40 times as bright, outshining most stars. The prototype of a new constellation of very bright Earth-orbiting satellites, named BlueWalker 3, was launched on September 11th, and as of a few days ago, it has brightened considerably. The AST SpaceMobile company behind the launch plans to orbit at least 100 more satellites like BlueWalker 3 by the end of 2024. . . (continued at <https://skyandtelescope.org/astronomy-news/bluewalker-3-satellite-unfolds-brightening-40-fold/>)



Was Interstellar Object 'Oumuamua A Chunk Of Exo-Pluto?

Humans have observed two interstellar objects to date, and have struggled to understand their origins and nature. At the Exoplanets in Our Backyard 2 workshop held in Albuquerque, New Mexico, Steve Desch (Arizona State University) presented a plausible scenario that accounts for all aspects of the first known interstellar object, 1I/'Oumuamua. To recap, 'Oumuamua was first spotted by the Pan-STARRS telescope in Hawai'i on October 19, 2017, already past perihelion and on its way back out of the solar system. Its strong brightness variations hinted at a non-spherical shape. It also slowed more than expected . . (continued at <https://skyandtelescope.org/astronomy-news/was-interstellar-object-oumuamua-a-chunk-of-exo-pluto/>)



Space News

News from around the Net

Webb Space Telescope Spots Early Galaxies Hidden From Hubble

NASA's Webb Space Telescope is finding bright, early galaxies that until now were hidden from view, including one that may have formed a mere 350 million years after the cosmic-creating Big Bang. NASA's Webb Space Telescope is finding bright, early galaxies that until now were hidden from view, including one that may have formed a mere 350 million years after the cosmic-creating Big Bang. Astronomers said Thursday that if the results are verified, this newly discovered throng of stars would beat the most distant galaxy identified by the Hubble Space Telescope, . . . (continued at <https://phys.org/news/2022-11-webb-space-telescope-early-galaxies.html>)



WALLABY Builds An Intergalactic Map In The Outback

Hundreds of galaxies have been surveyed in Phase 1 of WALLABY, covering 180 square degrees of the observable sky -- the equivalent area of over 700 full moons. Over the course of the survey a quarter of a million galaxies are expected to be catalogued, helping researchers measure the dark-matter distribution, internal motion of galaxies, and how these systems evolve and interact. (continued at <https://www.sciencedaily.com/releases/2022/11/221116085948.htm>)



X-Rays Offer View Inside The Black Hole-Powered Plasma Guns

At the heart of most large galaxies is a potential plasma gun. When such a galaxy's central supermassive black hole feeds, it fires energetic particles out along its poles, and as those particles flit around magnetic fields, they emit light across the electromagnetic spectrum. That light becomes especially bright when we're looking down the barrel of the gun, as in the case of blazars. Astronomers think magnetic fields must be the gunpowder that fires up these particles, but they've long debated how exactly that acceleration happens. Now, a new eye in the sky is helping them get a closer look. NASA's Imaging X-ray Polarimetry Explorer (IXPE), which launched late last year, . . . (continued at <https://skyandtelescope.org/astronomy-news/x-rays-offer-view-inside-the-black-hole-powered-plasma-guns/>)



Sneak Peek At Two Promising Comets

Every comet bright enough to see in one of my too-many telescopes is like a child I have the privilege of watching grow up. Some start their apparitions at a crawl, barely budging from night to night. A month later, they're clipping along at 5° or more a day. While astronomers are good at predicting cometary behavior, surprises happen. Comets crumble, undergo explosive outbursts, fail to brighten, and occasionally "birth" baby comets. Constant change combined with a bent toward capriciousness make these fuzzy solar system-trotters irresistible targets for amateurs. . . . (continued at <https://skyandtelescope.org/astronomy-news/sneak-peek-at-two-promising-ztf-comets/>)



The Tilt In Our Stars: The Shape Of The Milky Way's Halo Of Stars Is Realized

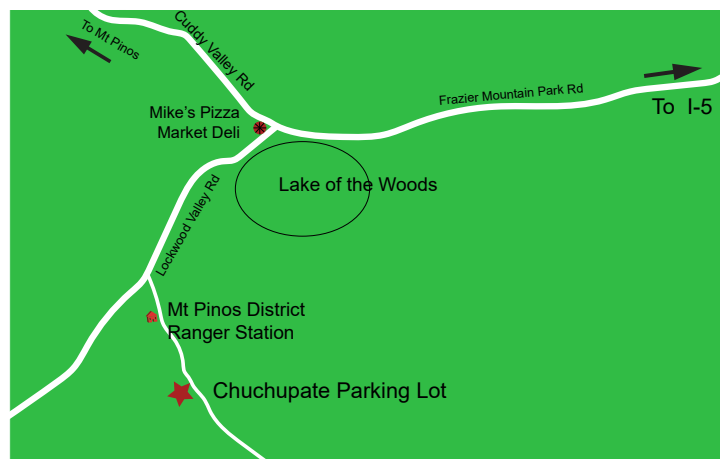
A new study has revealed the true shape of the diffuse cloud of stars surrounding the disk of our galaxy. For decades, astronomers have thought that this cloud of stars -- called the stellar halo -- was largely spherical, like a beach ball. Now a new model based on modern observations shows the stellar halo is oblong and tilted, much like a football that has just been kicked. The findings -- published this month The Astronomical Journal -- offer insights into a host of astrophysical subject areas . . . (continued at <https://www.sciencedaily.com/releases/2022/11/221118144107.htm>)



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.



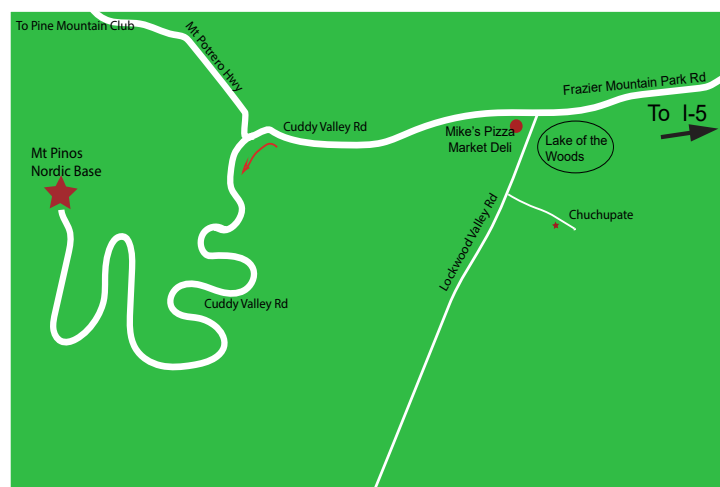
The Red Cliffs Natural Area is part of **Red Rock Canyon State Park** is a day use area and is not for use by the public after dark. The Club gets a special permit for a star party and pays a fee.

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.

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.



Planet Summary

The **Sun** starts December on the western edge of Ophiuchus and lands near the handle of Sagittarius at the end of the year.

Mercury emerges from the glare of the Sun at -.5 during the second week of the month seemingly being chased by Venus. By the 28th Mercury begins its next retrograde motion

Venus is slowly appearing in the evening twilight. Joining with Mercury at the end of the month. On the 24th the 1% Moon slips by 4° south.

Mars spends the month traveling in retrograde eastern Taurus. Starting the month at mag -1.8 brightening to -1.3 by months end. The full Moon occults Mars on the 7th between 18:30 and 19:30.

Jupiter spends the month moving across the southern corner of Pisces. On the 24th Jupiter reverses itself and resumes its eastward march. The 67% waxing Moon passes by on the 1st, 2.5° to the south.

Saturn ends the year just 10° east of where it started the year, among the stars of Capricorn. A 15% waxing Moon passes 4° to the south on the 24th/25th.

Uranus is west in retrograde in southeastern Aries at mag 5.7. On the 5th the 94% Moon occults Uranus between 09:40 and 10:15am.

Neptune spends December slowly moving east at the northeastern edge of Aquarius at mag 7.9.

Pluto spends the month on the eastern edge of Sagittarius slowing moving east at mag 14.4.

Asteroids

Ceres (mag 8.5) starts the month on the eastern edge Leo and moves southeast ending the month in northwestern Virgo.

Pallas (mag 7.6) starts the month near the tail of Canis Major and by the end of the month is under the back foot.

Juno (mag 9.3) spends the month in Aquarius moving east. On the 28th the 42% waxing Moon passes half way between Jupiter and Juno.

Vesta (mag 8) spends the month chasing Juno across Aquarius ending near the center at mag 8.3.

Moon Phases



First Qtr
Dec 29

Full
Dec 7

Third Qtr
Dec 16

New
Dec 23

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
12/1/2022	13:15	00:11	06:41	16:41
12/5/2022	15:07	04:22	06:45	16:41
12/10/2022	18:49	09:11	06:48	16:42
12/15/2022	23:39	12:00	06:52	16:43
12/20/2022	03:52	14:24	06:55	16:45
12/25/2022	09:27	19:36	06:57	16:48
12/30/2022	12:13	00:12	06:59	16:51

Planet Data*

December 1

	Rise	Transit	Set	Mag	Phase%
Mercury	07:49	12:36	17:24	-0.58	93.7
Venus	07:31	12:25	17:18	-3.91	98.6
Mars	17:00	00:22	07:39	-1.82	99.7
Jupiter	13:10	19:07	01:08	-2.62	99.1
Saturn	11:24	16:40	21:56	0.76	99.7

December 15

	Rise	Transit	Set	Mag	Phase%
Mercury	08:23	13:12	18:00	-0.58	77.4
Venus	07:55	12:46	17:37	-3.91	97.5
Mars	15:42	22:59	06:20	-1.71	99.7
Jupiter	12:17	18:15	00:16	-2.54	99.0
Saturn	10:32	15:49	21:06	0.79	99.8

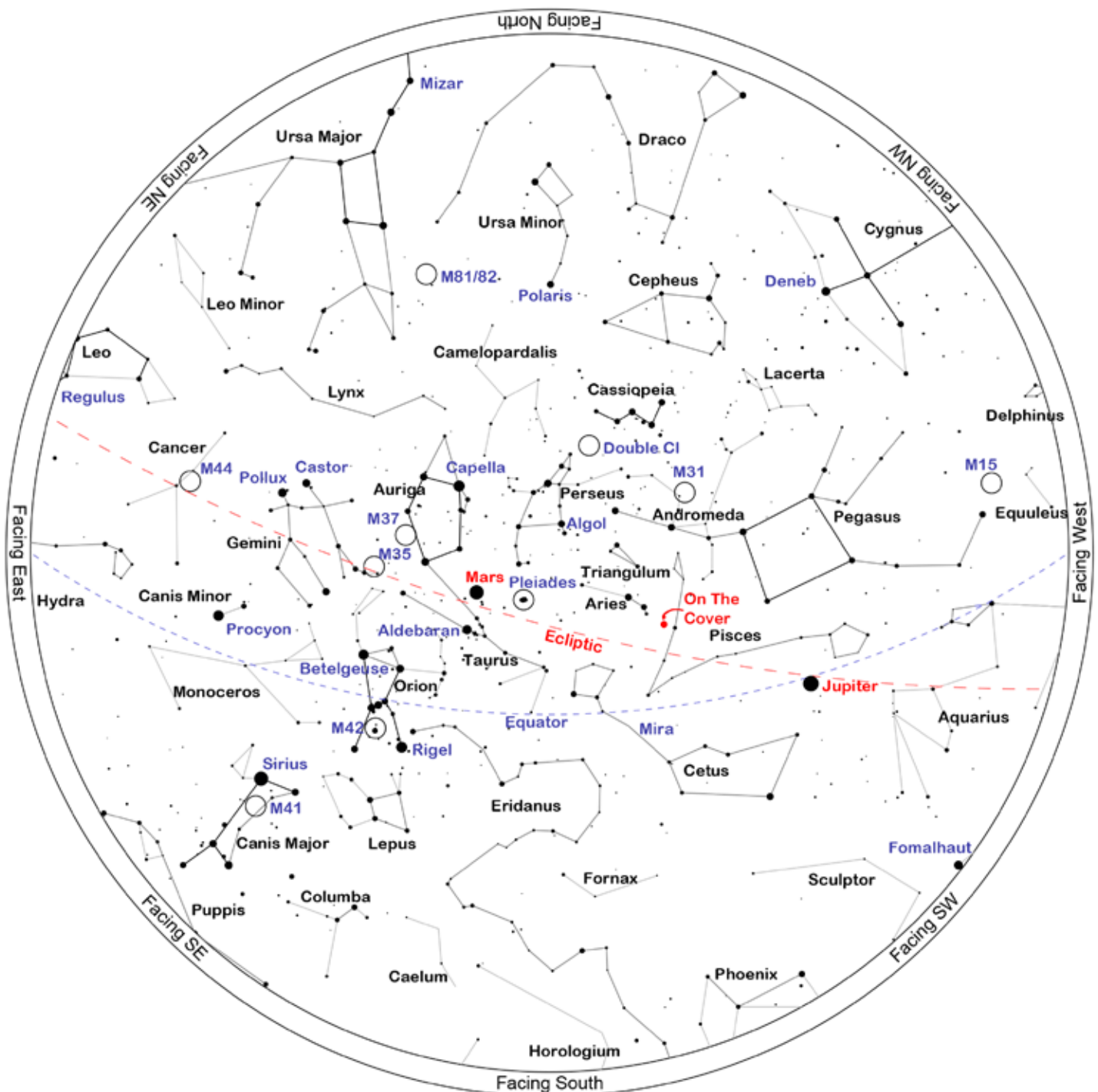
December 30

	Rise	Transit	Set	Mag	Phase%
Mercury	07:58	12:59	18:01	-0.72	23.1
Venus	08:11	13:09	18:06	-4.30	96.0
Mars	14:27	21:42	05:03	1.54	97.5
Jupiter	11:21	17:21	23:20	-2.43	99.0
Saturn	09:37	14:55	20:14	0.81	99.8

*All time mentioned are local and approximate.

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

Sky Chart



Location: Palmdale, CA 93551

Latitude: 34° 36' N, longitude: 118° 11' W

Time: 2022 December 24, 21:00 (UTC -08:00)

Powered by: Heavens-Above.com

Desert Sky Observer

www.avastronomyclub.org

December 2022

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 24, 2022. The list is sorted by the transit time of the object.

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M52	The Scorpion	Open	Cas	23h 24m 48s	+61° 35.6'	8.0	Circ	17:07	Circ
NGC7662	Blue Snowball	P Neb	And	23h 25m 54s	+42° 33.0'	8.3	08:27	17:08	01:48
NGC7686		Open	And	23h 30m 07s	+49° 08.0'	5.6	07:36	17:12	02:48
IC5332		Galaxy	Scl	23h 34m 27s	-36° 06.0'	10.6	13:12	17:16	21:21
NGC7785		Galaxy	Psc	23h 55m 19s	+05° 54.9'	11.6	11:18	17:37	23:56
HR9071	HD224572	Triple	Cas	23h 59m 01s	+55° 45.3'	4.9	Circ	17:41	Circ
NGC7822		Neb	Cep	00h 03m 36s	+67° 09.0'		Circ	17:45	Circ
NGC55	C72	S Gal	Scl	00h 14m 54s	-39° 11.0'	7.9	14:08	17:57	21:46
NGC129		Open	Cas	00h 30m 00s	+60° 13.1'	6.5	Circ	18:12	Circ
NGC133		Open	Cas	00h 31m 19s	+63° 21.0'	9.0	Circ	18:13	Circ
NGC146		Open	Cas	00h 33m 03s	+63° 18.0'	9.1	Circ	18:15	Circ
NGC147	C17	E Gal	Cas	00h 33m 12s	+48° 30.0'	9.3	08:46	18:15	03:44
NGC190		Galaxy	Psc	00h 38m 55s	+07° 03.7'	14.0	11:59	18:21	00:43
M110	Satellite Of Andromeda Galaxy	Galaxy	And	00h 40m 22s	+41° 41.1'	8.9	09:48	18:22	02:57
NGC210		Galaxy	Cet	00h 40m 35s	-13° 52.3'	10.9	12:58	18:22	23:46
NGC206	V-36	Neb	And	00h 40m 36s	+40° 44.0'		09:54	18:22	02:51
Arp168	M32	Galaxy	And	00h 42m 41s	+40° 51.0'	9.0	09:55	18:25	02:54
M32	Satellite Of Andromeda Galaxy	Galaxy	And	00h 42m 42s	+40° 51.9'	9.1	09:55	18:25	02:54
M31	Andromeda Galaxy	Galaxy	And	00h 42m 44s	+41° 16.1'	4.3	09:53	18:25	02:57
NGC246	C56	P Neb	Cet	00h 47m 00s	-11° 53.0'	10.9	12:59	18:29	23:59
NGC254		Galaxy	Scl	00h 47m 28s	-31° 25.2'	11.8	14:04	18:29	22:54
NGC288		Globular	Scl	00h 52m 45s	-26° 35.0'	8.1	13:51	18:35	23:18
NGC281	PacMan Nebula	Open	Cas	00h 52m 54s	+56° 37.4'	7.0	Circ	18:35	Circ
IC59	Gamma Cassiopeiae Nebula	Neb	Cas	00h 57m 29s	+61° 08.6'		Circ	18:39	Circ
IC63	Gamma Cassiopeiae Nebula	Neb	Cas	00h 59m 29s	+60° 54.7'		Circ	18:41	Circ
C51	IC1613	IrrGal	Cet	01h 04m 48s	+02° 07.0'	9.3	12:38	18:47	00:55
NGC474		Galaxy	Psc	01h 20m 07s	+03° 24.9'	11.1	12:50	19:02	01:14
NGC485		Galaxy	Psc	01h 21m 28s	+07° 01.0'	14.0	12:41	19:03	01:25
M103	NGC581	Open	Cas	01h 33m 23s	+60° 39.0'	7.0	Circ	19:15	Circ
NGC598	Pinwheel Galaxy,	Galaxy	Tri	01h 33m 51s	+30° 39.6'	5.7	11:37	19:16	02:55
NGC604	III-150	Neb	Tri	01h 34m 33s	+30° 47.0'		11:37	19:16	02:56
M74	The Phantom	Galaxy	Psc	01h 36m 42s	+15° 47.0'	9.8	12:31	19:19	02:06
M76	Little Dumbbell Nebula	P Neb	Per	01h 42m 18s	+51° 34.2'	12.0	09:17	19:24	05:31
NGC651	Apple Core Nebula	P Neb	Per	01h 42m 21s	+51° 34.1'	12.2	09:17	19:24	05:31
NGC637		Open	Cas	01h 43m 04s	+64° 02.4'	8.2	Circ	19:25	Circ

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ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC654		Open	Cas	01h 44m 00s	+61° 53.0'	6.5	Circ	19:26	Circ
NGC720		Galaxy	Cet	01h 53m 00s	-13° 44.3'	10.2	14:10	19:35	00:59
NGC780		Galaxy	Tri	02h 00m 35s	+28° 13.5'	14.0	12:13	19:42	03:12
NGC784		Galaxy	Tri	02h 01m 17s	+28° 50.2'	11.8	12:11	19:43	03:15
NGC821		Galaxy	Ari	02h 08m 21s	+10° 59.6'	10.8	13:17	19:50	02:24
Baily191	NGC884,	Open	Per	02h 22m 18s	+57° 08.1'	4.0	Circ	20:04	Circ
IC1795		Neb	Cas	02h 26m 32s	+62° 02.4'		Circ	20:08	Circ
NGC936		Galaxy	Cet	02h 27m 37s	-01° 09.3'	10.1	14:10	20:09	02:09
NGC943	Arp309	Galaxy	Cet	02h 29m 09s	-10° 49.0'	11.4	14:38	20:11	01:44
NGC956		Open	And	02h 32m 30s	+44° 35.6'	9.0	11:20	20:14	05:09
IC1805	Heart Nebula	Open	Cas	02h 32m 47s	+61° 27.6'	6.5	Circ	20:15	Circ
NGC1052		Galaxy	Cet	02h 41m 05s	-08° 15.3'	10.6	14:43	20:23	02:03
M34	Spiral Cluster	Open	Per	02h 42m 05s	+42° 45.6'	6.0	11:42	20:24	05:06
M77	Cetus A	Galaxy	Cet	02h 42m 41s	-00° 00.8'	9.7	14:22	20:25	02:27
NGC1084		Galaxy	Eri	02h 46m 00s	-07° 34.6'	10.6	14:46	20:28	02:10
IC1848	Soul Nebula	Open	Cas	02h 51m 18s	+60° 24.4'	6.5	Circ	20:33	Circ
NGC1156		Galaxy	Ari	02h 59m 42s	+25° 14.2'	11.7	13:23	20:42	04:00
NGC1201		Galaxy	For	03h 04m 08s	-26° 04.1'	10.6	16:01	20:46	01:31
NGC1175		Galaxy	Per	03h 04m 32s	+42° 20.3'	12.8	12:08	20:46	05:25
HR963	Fornacis	Dbl	For	03h 12m 04s	-28° 59.2'	3.9	16:20	20:54	01:28
NGC1316	Fornax A	Galaxy	For	03h 22m 42s	-37° 12.4'	8.9	17:06	21:05	01:04
Barnard202	B202	DkNeb	Ari	03h 25m 38s	+30° 16.0'		13:30	21:07	04:45
Barnard204	B204	DkNeb	Ari	03h 28m 29s	+30° 11.0'		13:33	21:10	04:47
NGC1350		Galaxy	For	03h 31m 08s	-33° 37.7'	10.5	16:57	21:13	01:29
Barnard1	B1	DkNeb	Per	03h 32m 57s	+31° 09.0'		13:34	21:15	04:56
Barnard2	B2	DkNeb	Per	03h 33m 31s	+32° 19.0'		13:29	21:15	05:01
Barnard3	B3	DkNeb	Per	03h 40m 01s	+31° 58.0'		13:37	21:22	05:06
NGC1407		Galaxy	Eri	03h 40m 12s	-18° 34.8'	9.8	16:12	21:22	02:32
IC347		Galaxy	Eri	03h 42m 32s	-04° 17.9'	13.0	15:33	21:24	03:15
NGC1448		Galaxy	Hor	03h 44m 32s	-44° 38.6'	11.0	18:11	21:26	00:42
IC348		Open	Per	03h 44m 34s	+32° 09.7'	7.3	13:41	21:26	05:12
M45	Pleiades, Subaru, Seven Sisters	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	14:15	21:29	04:44
Barnard5	B5	DkNeb	Per	03h 47m 53s	+32° 53.0'		13:41	21:30	05:18
NGC1461		Galaxy	Eri	03h 48m 27s	-16° 23.5'	11.7	16:14	21:30	02:47
IC353		Neb	Tau	03h 53m 00s	+25° 48.0'		14:14	21:35	04:55
IC2003		P Neb	Per	03h 56m 22s	+33° 52.5'	13.0	13:45	21:38	05:31
NGC1499	California Nebula	Neb	Per	04h 03m 14s	+36° 22.0'		13:40	21:45	05:50

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ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC1515		Galaxy	Dor	04h 04m 03s	-54° 06.0'	11.0	20:16	21:46	23:16
NGC1496		Open	Per	04h 04m 32s	+52° 39.7'	10.0	11:21	21:46	08:12
NGC1502		Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circ	21:50	Circ
IC360		Neb	Tau	04h 09m 00s	+26° 06.0'		14:29	21:51	05:12
NGC1514	Crystal Ball Nebula	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	14:12	21:51	05:31
NGC1513		Open	Per	04h 09m 57s	+49° 30.8'	8.4	12:12	21:52	07:32
IC359		Neb	Tau	04h 12m 28s	+27° 42.1'		14:27	21:54	05:22
NGC1535		P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	16:29	21:56	03:23
Barnard10	B10	DkNeb	Tau	04h 18m 41s	+28° 16.0'		14:31	22:01	05:30
NGC1545		Open	Per	04h 20m 57s	+50° 15.2'	6.2	12:14	22:03	07:52
NGC1569		Galaxy	Cam	04h 30m 49s	+64° 50.8'	11.2	Circ	22:13	Circ
Barnard18	B18	DkNeb	Tau	04h 31m 13s	+24° 21.0'		14:58	22:13	05:28
NGC1582		Open	Per	04h 31m 53s	+43° 49.0'	7.0	13:25	22:14	07:03
NGC1560		Galaxy	Cam	04h 32m 48s	+71° 52.7'	11.5	Circ	22:15	Circ
Barnard19	B19	DkNeb	Tau	04h 33m 00s	+26° 16.0'		14:53	22:15	05:37
Barnard20	B20	DkNeb	Per	04h 37m 04s	+50° 58.0'		12:21	22:19	08:17
Barnard22	B22	DkNeb	Tau	04h 38m 00s	+26° 03.0'		14:59	22:20	05:41
Barnard14	B14	DkNeb	Tau	04h 39m 59s	+25° 44.0'		15:02	22:22	05:42
IC2087		Neb	Tau	04h 40m 00s	+25° 44.5'		15:02	22:22	05:42
Barnard23	B23	DkNeb	Tau	04h 40m 33s	+29° 52.0'		14:47	22:22	05:58
NGC1624		Open	Per	04h 40m 36s	+50° 27.6'	10.4	12:31	22:22	08:14
NGC1640		Galaxy	Eri	04h 42m 14s	-20° 26.0'	11.7	17:20	22:24	03:28
NGC1647		Open	Tau	04h 45m 55s	+19° 06.8'	6.4	15:30	22:28	05:26
IC2118	Witch Head Nebula	Neb	Eri	05h 04m 54s	-07° 15.0'		17:04	22:47	04:30
NGC1851	C73	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	19:12	22:56	02:40
IC405	Flaming Star Nebula	Neb	Aur	05h 16m 29s	+34° 21.3'		15:03	22:58	06:54
M79	NGC1904	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	18:16	23:06	03:57
M38	Starfish Cluster	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	15:08	23:11	07:13
M1	Crab Nebula, Taurus A	SNR	Tau	05h 34m 32s	+22° 00.8'	8.4	16:09	23:16	06:24
M42	Great Orion Nebula, Orion A, Trapezium	Open+D Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	17:29	23:17	05:05
M43	De Mairan's Nebula	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	17:29	23:17	05:06
M36	Pinwheel Cluster	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	15:24	23:18	07:12
M78	NGC2068	D Neb	Ori	05h 46m 45s	+00° 04.8'	8.0	17:26	23:29	05:32
M37	Auriga Salt-and-pepper Cluster	Open	Aur	05h 52m 18s	+32° 33.2'	6.0	15:47	23:34	07:21
M35	NGC2168	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	16:36	23:51	07:06
M41	Little Beehive	Open	CMa	06h 46m 01s	-20° 45.3'	5.0	19:25	00:28	05:31
M50	Heart-shaped Cluster	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	19:05	00:45	06:24

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ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M47	NGC2422	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	19:56	01:18	06:41
M46	NGC2437	Open	Pup	07h 41m 46s	-14° 48.6'	6.5	20:02	01:24	06:45
M93	NGC2447	Open	Pup	07h 44m 30s	-23° 51.4'	6.5	20:34	01:26	06:19
M48	NGC2548	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	20:09	01:56	07:43
M44	Beehive Cluster	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	19:23	02:22	09:22
M67	King Cobra	Open	Cnc	08h 51m 18s	+11° 48.0'	7.5	19:57	02:33	09:09
M81	Bode's Galaxy	Galaxy	UMa	09h 55m 33s	+69° 03.9'	7.8	Circ	03:37	Circ
M82	Cigar Galaxy,	Galaxy	UMa	09h 55m 53s	+69° 40.8'	9.2	Circ	03:38	Circ
M95	NGC3351	Galaxy	Leo	10h 43m 58s	+11° 42.2'	10.6	21:50	04:26	11:01
M96	NGC3368,	Galaxy	Leo	10h 46m 46s	+11° 49.2'	10.1	21:53	04:29	11:04
M105	NGC3379	Galaxy	Leo	10h 47m 50s	+12° 34.9'	10.5	21:52	04:30	11:08
M108	NGC3556,UGC6225	Galaxy	UMa	11h 11m 31s	+55° 40.4'	10.6	Circ	04:53	Circ
M97	Owl Nebula	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	17:12	04:57	16:41
M65	Leo Triplet	Galaxy	Leo	11h 18m 56s	+13° 05.5'	10.1	22:21	05:01	11:40
M66	Leo Triplet	Galaxy	Leo	11h 20m 15s	+12° 59.4'	9.7	22:23	05:02	11:41
M109	NGC3992	Galaxy	UMa	11h 57m 36s	+53° 22.4'	10.6	19:00	05:39	16:19
M98	NGC4192	Galaxy	Com	12h 13m 48s	+14° 54.0'	10.9	23:11	05:56	12:40
M99	Virgo Cluster Pinwheel	Galaxy	Com	12h 18m 50s	+14° 25.0'	10.4	23:17	06:01	12:44
M106	NGC4258	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	20:44	06:01	15:18
M61	Swelling Spiral	Galaxy	Vir	12h 21m 55s	+04° 28.3'	10.1	23:49	06:04	12:19
M40	Winnecke 4	Dbl+Asterism	UMa	12h 22m 12s	+58° 05.0'	8.7	Circ	06:04	Circ
M100	Mirror of M99	Galaxy	Com	12h 22m 55s	+15° 49.3'	10.1	23:17	06:05	12:52
M84	NGC4374	Galaxy	Vir	12h 25m 04s	+12° 53.2'	10.2	23:28	06:07	12:46
M85	NGC4382	Galaxy	Com	12h 25m 24s	+18° 11.4'	10.0	23:12	06:07	13:02
M86	NGC4406	Galaxy	Vir	12h 26m 12s	+12° 56.7'	9.9	23:29	06:08	12:47
M49	NGC44729	Galaxy	Vir	12h 29m 47s	+08° 00.0'	9.3	23:47	06:12	12:36
M87	Smoking Gun	Galaxy	Vir	12h 30m 49s	+12° 23.4'	9.6	23:35	06:13	12:50
M88	NGC4501	Galaxy	Com	12h 31m 59s	+14° 25.2'	10.2	23:30	06:14	12:57

And - Andromeda
Ant - Antlia
Aps - Apus
Aql - Aquila
Aqr - Aquarius
Ara - Ara
Ari - Aries
Aur - Auriga
Boo - Bootes
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Crt - Crater
Cru - Crux
Crv - Corvus
CVn - Canes Venatici

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Oph - Ophiuchus
Ori - Orion

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