Volume 41.12 December 2021

Desert Sky Observer

Antelope Valley Astronomy Club

Upcoming Events

December 4: Christmas Party
December 11: Moon Walk 5:30 pm @ PDW

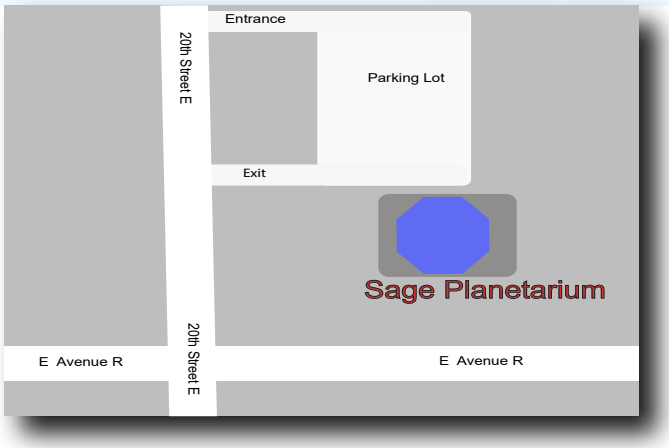
Every clear night: Personal Star Party

January 8: Moon Walk 5:30 pm @ PDW
January 14: Club Meeting

February 11: Club Meeting
February 19: Moon Walk 6:30 pm @ PDW

March 11: Club Meeting
March 26: Moon Walk 7:30 pm @PDW

AVAC Calendar



Board Members

President: Darrell Bennett (661) 220-0122
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

Appointed Positions

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

Equipment & Library:
John Van Evera 661-754-1819
library@avastronomyclub.org

Club Historian: vacant
history@avastronomyclub.org

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

Astronomical League Coordinator:
Frank Moore (661) 972-4775
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 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/.

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

President's Message

By Darrell Bennett

Well Hello Everyone,

I hope everyone had a Great Thanksgiving. We sure did, and it was good to be with family and friends.

On November 13th we were at Prime Desert Woodlands for our monthly Moon Walk. The weather was great, no clouds or wind. Rod had his scope and camera on deep sky objects while Phil was jumping back and forth between Jupiter and Saturn. I pointed at the Moon, and at 203x I could look down inside the craters and the mountain shadows. There was a lot of ooos and aaahs, plus a lot of Thank You's too. Our next Prime Desert Woodlands Moon Walk is on December 11 at 5:30 pm.

Well this is my last article of my Club presidency. Phil takes over on January 1st. Unlike all of my past predecessors, I will not disappear, and will continue to help and support the Club. We should all stand by and help Phil with the Club activities.

I hope to see a lot of you at this year's Christmas Party.

Until then keep looking up.

On The Cover

The centre of this image from the NASA/ESA Hubble Space Telescope is framed by the tell-tale arcs that result from strong gravitational lensing, a striking astronomical phenomenon which can warp, magnify, or even duplicate the appearance of distant galaxies.

Gravitational lensing occurs when light from a distant galaxy is subtly distorted by the gravitational pull of an intervening astronomical object. In this case, the relatively nearby galaxy cluster MACSJ0138.0-2155 has lensed a significantly more distant quiescent galaxy — a slumbering giant known as MRG-M0138 which has run out of the gas required to form new stars and is located 10 billion light years away. Astronomers can use gravitational lensing as a natural magnifying glass, allowing them to inspect objects like distant quiescent galaxies which would usually be too difficult for even Hubble to resolve.

This image was made using observations from eight different infrared filters spread across two of Hubble's most advanced astronomical instruments: the Advanced Camera for Surveys and the Wide Field Camera 3. These instruments were installed by astronauts during the final two servicing missions to Hubble, and provide astronomers with superbly detailed observations across a large area of sky and a wide range of wavelengths.

Credit: ESA/Hubble & NASA, A. Newman, M. Akhshik, K. Whitaker

From the Secretary

By Rose Moore

Thanks to all who came out to our November meeting and were able to listen to the Zoom presentation by Charity Woodrum on the James Webb Telescope! As many of you may know, the James Webb telescope had a bit of a mishap which caused a vibration through the telescope, but now after being checked over thoroughly, will be ready for launch on Dec. 22nd!

For those members who are attending the Christmas Party, please watch out for emails for any further information on the event.

We have one event for December, and that is a Prime Desert Moon Walk on Saturday Dec. 11th at 5:30pm. We'll need members with telescopes, or you may come out and take the astronomy walk and talk with Jeremy; weather permitting. Set up time is about 1 hr prior to the event.

Our first meeting of 2022 will be on Friday Jan. 14th at 7pm. We are trying to line up speakers for our meetings, and will keep all of you posted.

May you all have a wonderful holiday season!! Have a very Merry Christmas and a Happy and safe New Year!! See you all next year!!

Rose

Member Scope For Sale

Member Duane Lewis is selling his 9.25 inch Celestron CGEM OTA with the tripod, CGE mount, counterweights, one 1.25" 20mm Plossl eyepiece, a 1.25"diagonal and a 2" diagonal, telrad mount, and a Denkmeir (unknown model) binocular viewer. The OTA was tuned up by member Don Bryden before he moved. It has not been used since. Price is $1200. Duane is unable to have this set up for viewing because of lack of space. So arrangements will have to be made for viewing the scope and accessories. For more info please contact Duane by email only: gurba1826@gmail.com -- or contact Rose by email: rmorion@bak.rr.com

The James Webb Space Telescope: Ready for Launch!
By David Prosper, NASA Night Sky Network

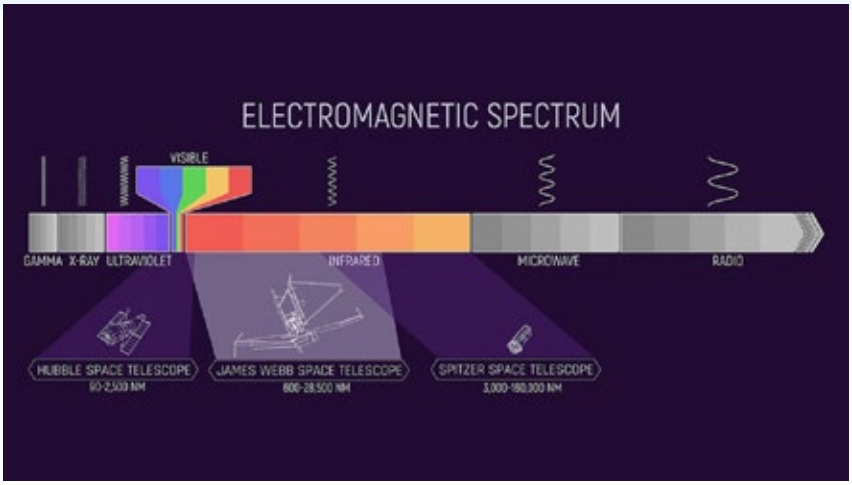
NASA's James Webb Space Telescope is ready for lift-off! As of this writing (November 15), the much-anticipated next-generation space telescope is being carefully prepared for launch on December 18, 2021, and will begin its mission to investigate some of the deepest mysteries of our universe.

The development of the Webb began earlier than you might expect – the concept that would develop into Webb was proposed even before the launch of the Hubble in the late 1980s! Since then, its design underwent many refinements, and the telescope experienced a series of delays during construction and testing. While frustrating, the team needs to ensure that this extremely complex and advanced scientific instrument is successfully launched and deployed. The Webb team can't take any chances; unlike the Hubble, orbiting at an astronaut-serviceable 340 miles (347 km) above Earth, the Webb will orbit about one million miles away (or 1.6 million km), at Lagrange Point 2. Lagrange Points are special positions where the gravitational influence between two different bodies, like the Sun and Earth, "balance out," allowing objects like space telescopes to be placed into stable long-term orbits, requiring only minor adjustments - saving Webb a good deal of fuel.

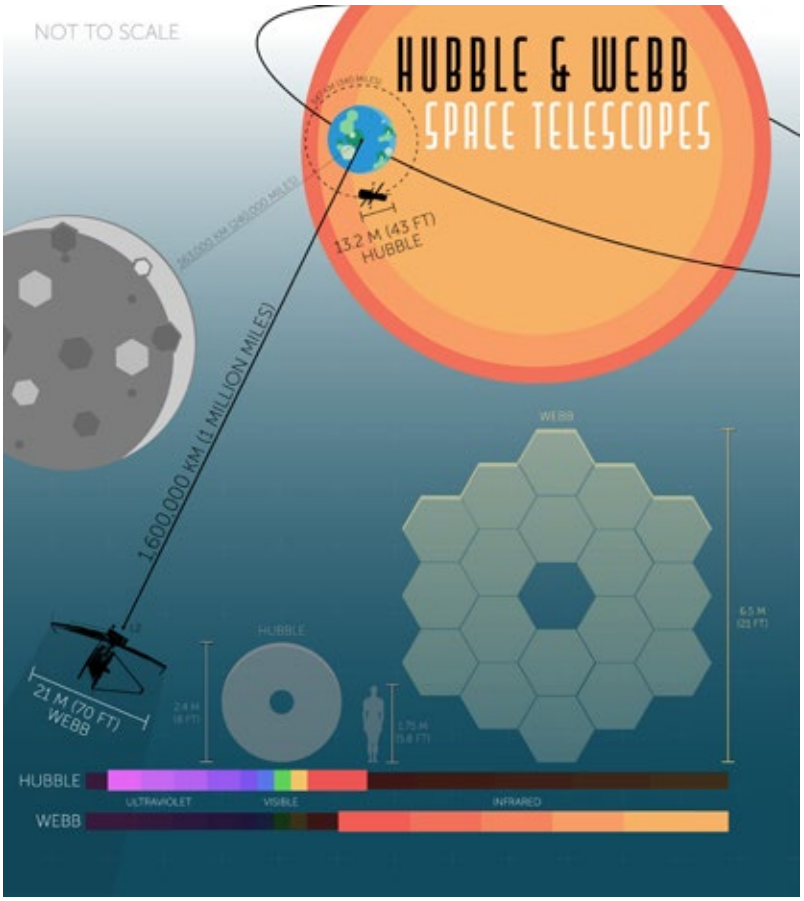
Since this position is also several times further than the Moon, Webb's sunshield will safely cover the Moon, Earth, and Sun and block any potential interference from their own infrared radiation. Even the seemingly small amount of heat from the surfaces of the Earth and Moon would interfere with Webb's extraordinarily sensitive infrared observations of our universe if left unblocked. More detailed information about Webb's orbit can be found at bit.ly/webborbitinfo, and a video showing its movement at bit.ly/webborbitvideo.

Once in its final position, its sunshield and mirror fully deployed and instruments checked out, Webb will begin observing! Webb's 21-foot segmented mirror will be trained on targets as fine and varied as planets, moons, and distant objects in our outer Solar System, active centers of galaxies, and some of the most distant stars and galaxies in our universe: objects that may be some of the first luminous objects formed after the Big Bang! Webb will join with other observatories to study black holes - including the one lurking in the center of our galaxy, and will study solar systems around other stars, including planetary atmospheres, to investigate their potential for hosting life.

Wondering how Webb's infrared observations can reveal what visible light cannot? The "Universe in a Different Light" Night Sky Network activity can help - find it at bit.ly/different-light-nsn. Find the latest news from NASA and Webb team as it begins its mission by following #UnfoldTheUniverse on social media, and on the web at nasa.gov/webb.



Webb will observe a wide band of the infrared spectrum, including parts observed by the Hubble - which also bserves in a bit of ultraviolet light as well as visible - and the recently retired Spitzer Space Telescope. Webb will even observe parts of the infrared spectrum not seen by either of these missions! Credits: NASA and J.Olmstead (STScI)



Webb will follow up on many of Hubble's observations and continue its mission to study the most distant galaxies and stars it can - and as you can see in this comparison, its mirror and orbit are both huge in comparison, in order to continue these studies in an even deeper fashion! Credits: NASA, J. Olmsted (STScI)

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 Dart Mission Launches For Head-On Collision With An Asteroid

Last night, a spacecraft built during the hardships of the COVID pandemic successfully departed Earth on a one-way trip to an asteroid. The Double Asteroid Redirection Test, or DART, launched at 06:21:02 UTC November 23 and will crash into 65803 Dimorphos, the moon of asteroid Didymos, in September or October 2022. This isn't an asteroid science mission — it's the first ever planetary defense mission. . . . (continued at https://skyandtelescope.org/astronomy-news/nasas-dart-mission-launches-for-head-on-collision-with-an-asteroid/)

Chilean Rocks Aid The Search For Life On Mars

Even if life once existed on Mars, we're probably not going to find any signs as obvious as dinosaur bones or fossilized shells. The red planet's extreme radiation and hostile climate likely would have destroyed all traces of life discernible by galactic paleontologists -- but microbiologists could fare better. . . . .(continued at https://astronomy.com/news/2021/11/chilean-rocks-aid-the-search-for-life-on-mars)

Hubble Spots A Swift Stellar Jet In Running Man Nebula

A jet from a newly formed star flares into the shining depths of reflection nebula NGC 1977 in this Hubble image. The jet (the orange object at the bottom center of the image) is being emitted by the young star Parengo 2042, which is embedded in a disk of debris that could give rise to planets. . . . (continued at https://phys.org/news/2021-11-hubble-swift-stellar-jet-nebula.html)

Can This Near-Earth Asteroid Help Us Understand The First Interstellar Visitor?

When interstellar object 1I/'Oumuamua was first spotted tumbling through the solar system in 2017, we'd never seen anything like it. Among many unexplained oddities was its shape: With an aspect ratio of 6:6:1, it's basically an otherworldly pancake — unlike anything we'd seen in the solar system. But it might not be in a class all on its own after all. . . .(continued at https://skyandtelescope.org/astronomy-news/can-this-near-earth-asteroid-help-us-understand-the-first-interstellar-visitor/)

Testing Confirms Webb Telescope On Track For Targeted Dec. 22 Launch

Engineering teams have completed additional testing confirming NASA's James Webb Space Telescope is ready for flight, and launch preparations are resuming toward Webb's target launch date of Wednesday, Dec. 22, at 7:20 a.m. EST. Additional testing was conducted this week to ensure the observatory's health following an incident that occurred when the release of a clamp band caused a vibration throughout the observatory.. . . (continued at https://blogs.nasa.gov/webb/2021/11/24/testing-confirms-webb-telescope-on-track-for-targeted-dec-22-launch/)

Hubble Telescope's Annual 'Grand Tour' Tracks Changes In Outer Solar System

Each year, NASA's most venerable space telescope photographs the outer planets of the solar system. And so this autumn, as usual, the Hubble Space Telescope turned to each planet in turn. The tradition allows astronomers to monitor how the atmospheres of these worlds — Jupiter, Saturn, Uranus and Neptune — change over time. But the photos are, of course, also stunning. NASA released images from this year's "grand tour" on Nov. 18. . . . (continued at https://www.space.com/hubble-grand-tour-outer-planet-atmospheres-photos)

Space News

News from around the Net

Comet A1 Leonard Brightens In December

The days following New Year's 2021 saw a comet discovery with potential. On the night of January 3rd, exactly one year to the day prior to perihelion, astronomer Gregory J. Leonard working at the Mount Lemmon Observatory near Tucson Arizona discovered the first long-period comet of the year, C/2021 A1 Leonard. . . . (continued at https://www.universetoday.com/153319/comet-a1-leonard-brightens-in-december/#more-153319)

Once New Horizons Was Out Beyond Pluto, It Could Finally Measure The Brightness Of The Milky Way

The New Horizons spacecraft has been speeding away from Earth since it launched in 2006. Scientists using the Alice UV imaging spectrograph on board New Horizons, have been patiently but sporadically gathering data during those 15 years, but also waiting to get far enough away from the Sun to make a specific measurement: the brightness of the Lyman-alpha background of the Milky Way. Until now, this had never been measured accurately. . . . (continued at https://www.universetoday.com/153394/once-new-horizons-was-out-beyond-pluto-it-could-finally-measure-the-brightness-of-the-milky-way/#more-153394)

One In Five Galaxies In The Early Universe Could Still Be Hidden Behind Cosmic Dust

Researchers at the University of Copenhagen's Niels Bohr Institute have just discovered two previously invisible galaxies 29 billion light-years away from Earth. The two galaxies have been invisible to the optical lens of the Hubble Space Telescope, hidden behind a thick layer of cosmic dust that surrounds them. But with the help of the giant ALMA radio telescopes (Atacama Large Milimeter Array) in Chile's Atacama Desert, which can capture radio waves emitted from the coldest, darkest depths of the universe, the two invisible galaxies suddenly appeared.. . .continued at https://www.sciencedaily.com/releases/2021/11/211122135507.htm)

Engineers Test Workarounds To Recover From Hubble Synchronisation Glitch

NASA is continuing work to resolve an issue that has suspended science operations on the Hubble Space Telescope. The science instruments entered a safe mode configuration on Oct. 25 after detecting a loss of specific data synchronisation messages. The Hubble team is focusing its efforts to isolate the problem on hardware that commands the instruments and is part of the Science Instrument Command and Data Handling Unit.. . . (continued at https://astronomynow.com/2021/11/05/engineers-test-workarounds-to-recover-from-hubble-synchronisation-glitch/)

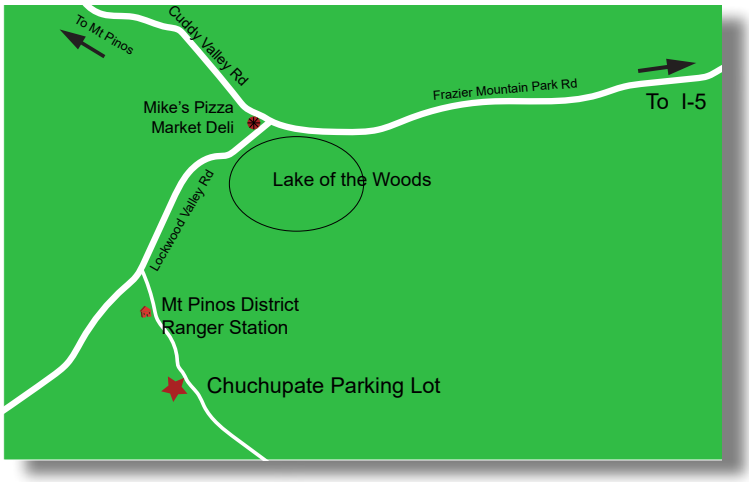
How To Observe And Photograph Lunar Ray Ejecta Systems

The face of the Moon records hundreds of millions of years' worth of asteroid and comet impacts. Its disc is peppered with countless craters and large basins, where immense collisions punched deep into the lunar crust. But scattered across the Moon's pockmarked highlands and the smooth basalt lunar seas, emanating from some craters are also striking, bright features. They are cosmic splashes of rock and dust that give a hint of the dynamic and tumultuous past of our nearest neighbour. . . . (continued at https://www.skyatnightmagazine.com/advice/skills/moon-ray-ejecta-systems/)

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).

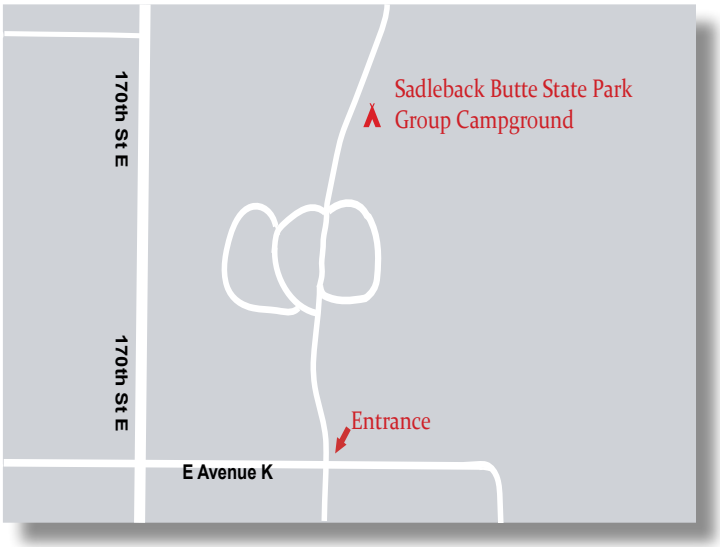
To get there, take the Frazier Mountain Park RD east about 7 miles from I-5, to Lake Of The Woods, Turn left on Lockwood Valley Rd. (If you see Mike's Pizza on your left you missed the turn) In less than a mile there is a road to the left, go past the ranger station, the parking lot is on the right.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

Saddleback Butte State Park is east of 170th Street East between Avenue I and Avenue K. Elevation 3651 feet. Temperatures in summer average 95° with a high of 115,° winter average lows are 33° with occasional snow. There are 37 individual campsites and one group campsite. When the club has a star party there the group campsite is used. Individual campsites cost $20 per night. Enter off Avenue K.



Planet Summary

The **Sun** starts December in southern Ophiuchus and crosses into Sagittarius by the end the month.

A **Solar Eclipse** will happen on December 4. If your in eastern Antarctica you'll see it.

Mercury starts the month too close to the Sun to be seen, slowly emerging in the evening twilight. By the 25th both inner planets will be within a standard binocular field. At sunset on the 29th Pluto will be ½°east, while Venus will be 4 ½° north.

Venus will remain in the evening twilight through the end of the year. On the 6th the 11% waxing Moon passes 2½° to the south. On the 10/11th Pluto is in conjunction with its closest approach 4 ½' east (at 2 o'clock in the morning). In a few days Venus makes a right turn and plunges toward the Sun only to be seen again in the morning twilight till December 2022

Mars is slowly separating itself from the Sun emerging in the bright morning twilight. On the 2nd the 2% waning Moon occults Mars, 2 hours after sunset. On the 31st the 5% waning Moon slides by 2° south at 2 pm in the afternoon.

Jupiter continues its eastward motion in Aquarius. It's low in the southwest sky during the early evening. The 30% Moon passes 6° to the south on the 8th.

Saturn spends the month moving east toward Jupiter though among the stars of Capricorn. On the 7th the 20% waxing Moon passes 5° to the south. By the end of the month it will it will hard to see in the evening twilight.

Uranus continues moving west in central Aries at mag 5.7. On the 15th the 87% waxing Moon passes 1½° to the south.

Neptune will spend the month slowly moving east in northeast Aquarius at mag 7.8. On the 11th the 53% waxing Moon passes 4° to the south.

Pluto spends the month slowing moving east in Sagittarius at mag 14.3.

*All time mentioned are local and approximate.

Moon Phases

First Qtr	Full	Third Qtr	New
Dec 10	Dec 18	Dec 26	Dec 3

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
12/1/2021	03:30	14:55	06:41	16:41
12/5/2021	08:27	18:12	06:45	16:41
12/10/2021	12:20	23:50	06:49	16:42
12/15/2021	14:35	03:42	06:52	16:43
12/20/2021	18:05	08:21	06:55	16:45
12/25/2021	23:04	11:25	06:57	16:48
12/30/2021	03:30	14:04	06:58	16:51

Planet Data*

December 1

	Rise	Transit	Set	Mag	Phase%
Mercury	06:52	11:48	16:43	-1.11	99.8
Venus	09:53	14:42	19:31	-4.66	27.7
Mars	05:17	10:28	15:38	1.62	99.0
Jupiter	11:39	17:01	22:23	-2.34	99.0
Saturn	10:48	15:55	21:03	0.69	99.8

December 15

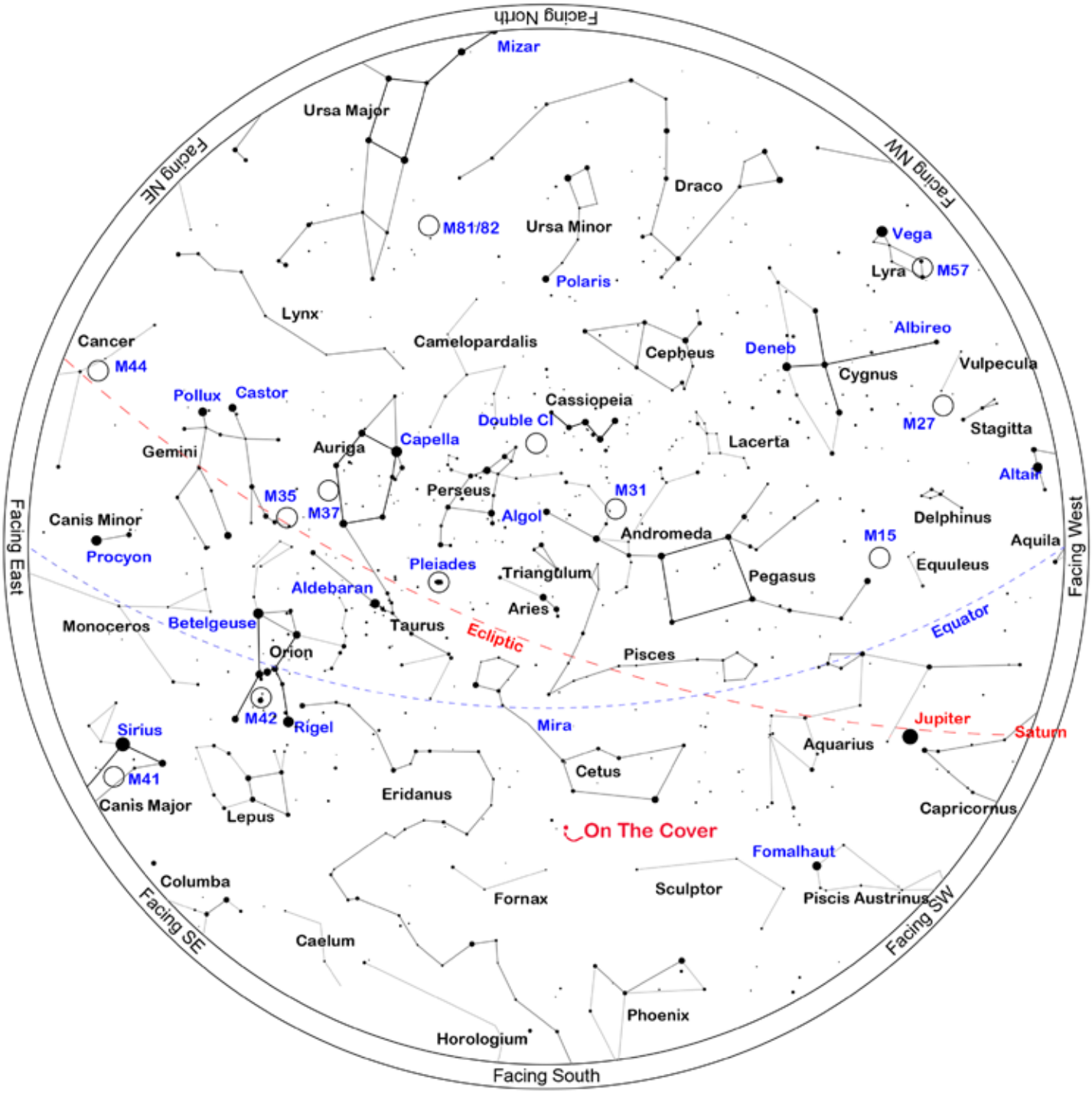
	Rise	Transit	Set	Mag	Phase%
Mercury	07:42	12:29	17:16	-0.77	96.3
Venus	09:09	14:07	19:06	-4.63	15.2
Mars	05:09	10:12	15:15	1.58	98.5
Jupiter	10:50	16:14	21:39	-2.26	99.2
Saturn	09:57	15:05	20:14	0.71	99.8

December 30

	Rise	Transit	Set	Mag	Phase%
Mercury	08:15	13:11	18:07	-0.72	79.8
Venus	07:48	12:56	18:03	-4.30	2.8
Mars	05:09	09:58	14:55	1.54	97.8
Jupiter	10:50	15:26	20:53	-2.18	99.4
Saturn	09:02	14:13	19:23	0.71	99.9

*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: 2021 December 4, 21:00 (UTC -08:00)

Powered by: Heavens-Above.com

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 4, 2021. The list is sorted by the transit time of the object.

ID	Common Name	Type		RA	Dec	Mag	Rise	Transit	Set
NGC6760		Globular	Aql	19h 11m 12s	+01° 01.8'	9.1	08:05	14:10	20:16
Abell56		P Neb	Aql	19h 13m 07s	+02° 52.8'	12.4	08:02	14:12	20:23
NGC6772		P Neb	Aql	19h 14m 36s	-02° 42.4'	14.0	08:18	14:14	20:09
Barnard138	B138	DkNeb	Aql	19h 16m 00s	+00° 13.0'		08:12	14:15	20:18
M56	NGC6779	Globular	Lyr	19h 16m 36s	+30° 11.0'	9.5	06:37	14:16	21:54
NGC6778		P Neb	Aql	19h 18m 25s	-01° 35.7'	13.0	08:19	14:18	20:16
Abell61		P Neb	Cyg	19h 19m 10s	+46° 14.5'	13.0	05:08	14:18	23:29
Barnard140	B140	DkNeb	Aql	19h 19m 49s	+05° 13.0'		08:02	14:19	20:36
NGC6790		P Neb	Aql	19h 22m 57s	+01° 30.8'	10.0	08:15	14:22	20:29
NGC6803		P Neb	Aql	19h 31m 16s	+10° 03.3'	11.0	07:59	14:30	21:01
NGC6804		P Neb	Aql	19h 31m 35s	+09° 13.5'	12.0	08:02	14:31	20:59
Abell62		P Neb	Aql	19h 33m 18s	+10° 37.0'	13.0	08:00	14:32	21:05
NGC6807		P Neb	Aql	19h 34m 34s	+05° 41.0'	14.0	08:15	14:34	20:52
M55	NGC6809	Globular	Sgr	19h 40m 00s	-30° 57.7'	7.0	10:14	14:39	19:05
NGC6813		Neb	Vul	19h 40m 22s	+27° 18.5'		07:12	14:40	22:07
NGC6820		Neb	Vul	19h 42m 28s	+23° 05.2'		07:30	14:42	21:53
Barnard338	B338	DkNeb	Aql	19h 43m 02s	+07° 27.0'		08:19	14:42	21:06
NGC6818	Little Gem	P Neb	Sgr	19h 43m 58s	-14° 09.1'	10.0	09:20	14:43	20:06
NGC6826	Blinking Planetary	P Neb	Cyg	19h 44m 48s	+50° 31.0'	8.8	04:47	14:44	00:40
Abell65		P Neb	Sgr	19h 46m 34s	-23° 08.2'	13.1	09:51	14:46	19:40
NGC6838		Globular	Sge	19h 53m 46s	+18° 46.6'	8.3	07:56	14:53	21:50
NGC6842		P Neb	Vul	19h 55m 02s	+29° 17.3'	14.0	07:19	14:54	22:29
HR7619	Psi Cyg,	Mult	Cyg	19h 55m 38s	+52° 26.3'	4.9	04:28	14:55	01:22
Abell66		P Neb	Sgr	19h 57m 32s	-21° 36.6'	14.1	09:57	14:57	19:56
Barnard144	Fish on the platter	DkNeb	Cyg	19h 58m 00s	+35° 20.0'		06:56	14:57	22:58
NGC6853	Apple Core Nebula, Dumbbell Nebula	P Neb	Vul	19h 59m 36s	+22° 43.2'	8.1	07:48	14:59	22:09
NGC6857		Neb	Cyg	20h 02m 48s	+33° 31.4'	11.4	07:09	15:02	22:55
IC4954		Neb	Vul	20h 04m 45s	+29° 15.1'		07:29	15:04	22:38
M75	NGC6864	Globular	Sgr	20h 06m 05s	-21° 55.3'	9.5	10:07	15:05	20:04
Barnard342		DkNeb	Cyg	20h 09m 30s	+41° 12.0'		06:35	15:09	23:42
NGC6885	Vulpeculae Cluster	Open	Vul	20h 12m 00s	+26° 29.0'	5.9	07:47	15:11	22:35
NGC6891		P Neb	Del	20h 15m 09s	+12° 42.2'	12.0	08:36	15:14	21:53
NGC6894		P Neb	Cyg	20h 16m 24s	+30° 33.9'	14.0	07:36	15:16	22:55
IC4997		P Neb	Sge	20h 20m 09s	+16° 43.9'	12.0	08:28	15:19	22:10
Barnard345		DkNeb	Cyg	20h 21m 00s	+46° 33.0'		06:07	15:20	00:34
NGC6913	Cooling Tower	Open	Cyg	20h 23m 57s	+38° 30.5'	6.6	07:05	15:23	23:41

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
Abell70		P Neb	Aql	20h 31m 33s	-07° 05.3'	14.3	09:48	15:31	21:14
Barnard348	B348	DkNeb	Cyg	20h 34m 00s	+42° 05.0'		06:54	15:33	00:13
NGC6940		Open	Vul	20h 34m 26s	+28° 17.0'	6.3	08:03	15:34	23:04
NGC6960	Filamentary Nebula, Lace-work Nebula.	Neb	Cyg	20h 45m 58s	+30° 35.6'		08:05	15:45	23:25
IC5068		Neb	Cyg	20h 50m 29s	+42° 28.6'		07:08	15:50	00:32
NGC6979		Neb	Cyg	20h 51m 00s	+32° 09.0'	11.0	08:03	15:50	23:37
IC5070	Pelican Nebula	Neb	Cyg	20h 51m 00s	+44° 24.1'		06:54	15:50	00:46
NGC6981		Globular	Aqr	20h 53m 28s	-12° 32.2'	9.4	10:25	15:53	21:20
IC5076		Neb	Cyg	20h 55m 33s	+47° 23.7'		06:33	15:55	01:16
IC1340		Neb	Cyg	20h 56m 08s	+31° 02.8'		08:13	15:55	23:37
NGC6992	Cirrus Nebula	Neb	Cyg	20h 56m 19s	+31° 44.6'		08:11	15:55	23:40
NGC6996		Open	Cyg	20h 56m 30s	+44° 38.0'	10.0	06:58	15:56	00:53
NGC6997		Open	Cyg	20h 56m 39s	+44° 37.9'	10.0	06:58	15:56	00:53
Barnard352		DkNeb	Cyg	20h 57m 10s	+45° 53.0'		06:49	15:56	01:04
Barnard354		DkNeb	Cep	20h 58m 00s	+58° 09.0'		Circu	15:57	Circu
NGC7000	Gulf of Mexico	BrNeb	Cyg	20h 58m 48s	+44° 20.0'		07:03	15:58	00:53
M73	NGC6994	Open+Asterism	Aqr	20h 58m 56s	-12° 38.1'	9.0	10:31	15:58	21:25
NGC7006		Globular	Del	21h 01m 30s	+16° 11.0'	10.6	09:11	16:01	22:50
NGC7009	Saturn Nebula	P Neb	Aqr	21h 04m 12s	-11° 22.0'	8.0	10:32	16:03	21:34
NGC7027		P Neb	Cyg	21h 07m 02s	+42° 14.1'	10.0	07:26	16:06	00:47
Barnard151		DkNeb	Cep	21h 08m 13s	+56° 19.0'		Circu	16:07	Circu
IC1369		Open	Cyg	21h 12m 09s	+47° 46.1'	6.8	06:46	16:11	01:36
Barnard153		DkNeb	Cep	21h 21m 03s	+56° 26.0'		Circu	16:20	Circu
NGC7076		Neb	Cep	21h 26m 24s	+62° 53.5'		Circu	16:26	Circu
NGC7078	Great Pegasus Cluster	Globular	Peg	21h 29m 58s	+12° 10.0'	6.4	09:52	16:29	23:06
M39	NGC7092	Open	Cyg	21h 31m 42s	+48° 25.0'	5.5	06:59	16:31	02:02
M2	NGC7089	Globular	Aqr	21h 33m 27s	-00° 49.3'	7.5	10:32	16:33	22:33
NGC7090		Galaxy	Ind	21h 36m 28s	-54° 33.4'	11.0	15:23	16:36	17:48
IC1396	Elephant Trunk	Open	Cep	21h 38m 58s	+57° 29.3'	3.5	Circu	16:38	Circu
NGC7099		Globular	Cap	21h 40m 22s	-23° 10.7'	7.5	11:45	16:40	21:34
NGC7128		Open	Cyg	21h 43m 57s	+53° 42.9'	9.7	05:46	16:43	03:40
NGC7142		Open	Cep	21h 45m 09s	+65° 46.5'	9.3	Circu	16:44	Circu
NGC7139		P Neb	Cep	21h 46m 08s	+63° 47.5'	13.3	Circu	16:45	Circu
Barnard166		DkNeb	Cep	21h 51m 05s	+60° 05.0'		Circu	16:50	Circu
Barnard168		DkNeb	Cyg	21h 53m 20s	+47° 16.0'		07:32	16:52	02:13
IC5146	Cocoon Nebula	Open	Cyg	21h 53m 29s	+47° 16.0'	7.2	07:33	16:53	02:13
IC1434		Open	Lac	22h 10m 42s	+52° 51.0'	9.0	06:34	17:10	03:45
NGC7245		Open	Lac	22h 15m 11s	+54° 20.6'	9.2	05:55	17:14	04:34
NGC7232		Galaxy	Gru	22h 15m 38s	-45° 51.0'	13.0	14:11	17:15	20:19

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC7261		Open	Cep	22h 20m 06s	+58° 03.0'	8.4	Circu	17:19	Circu
NGC7293	Helix Nebula	P Neb	Aqr	22h 29m 36s	-20° 48.0'	7.3	12:27	17:29	22:31
NGC7380		Open	Cep	22h 47m 21s	+58° 07.9'	7.2	Circu	17:46	Circu
C9	Cave Nebula	BrNeb	Cep	22h 56m 48s	+62° 37.0'		Circu	17:56	Circu
IC1470		Neb	Cep	23h 05m 10s	+60° 14.6'		Circu	18:04	Circu
NGC7492		Globular	Aqr	23h 08m 27s	-15° 36.6'	11.5	12:49	18:08	23:26
HR8872	Omi Cep	Triple	Cep	23h 18m 38s	+68° 06.6'	4.8	Circu	18:18	Circu
IC5308		Galaxy	Gru	23h 19m 21s	-42° 15.4'	12.0	14:49	18:18	21:48
M52	The Scorpion	Open	Cas	23h 24m 48s	+61° 35.6'	8.0	Circu	18:24	Circu
NGC7662	Blue Snowball	P Neb	And	23h 25m 54s	+42° 33.0'	8.3	09:43	18:25	03:08
NGC7686		Open	And	23h 30m 07s	+49° 08.0'	5.6	08:50	18:29	04:09
IC5332		Galaxy	Scl	23h 34m 27s	-36° 06.0'	10.6	14:31	18:34	22:36
NGC7785		Galaxy	Psc	23h 55m 19s	+05° 54.9'	11.6	12:35	18:54	01:14
HR9071	Sig Cas	Triple	Cas	23h 59m 01s	+55° 45.3'	4.9	Circu	18:58	Circu
NGC7822		Neb	Cep	00h 03m 36s	+67° 09.0'		Circu	19:03	Circu
NGC55		S Gal	Scl	00h 14m 54s	-39° 11.0'	7.9	15:27	19:14	23:01
NGC129		Open	Cas	00h 30m 00s	+60° 13.1'	6.5	Circu	19:29	Circu
NGC133		Open	Cas	00h 31m 19s	+63° 21.0'	9.0	Circu	19:30	Circu
NGC146		Open	Cas	00h 33m 03s	+63° 18.0'	9.1	Circu	19:32	Circu
NGC147		E Gal	Cas	00h 33m 12s	+48° 30.0'	9.3	10:00	19:32	05:05
NGC190		Galaxy	Psc	00h 38m 55s	+07° 03.7'	14.0	13:16	19:38	02:01
M110	Satellite Of Andromeda Galaxy	Galaxy	And	00h 40m 22s	+41° 41.1'	8.9	11:03	19:40	04:16
NGC210		Galaxy	Cet	00h 40m 35s	-13° 52.3'	10.9	14:16	19:40	01:03
NGC206		Neb	And	00h 40m 36s	+40° 44.0'		11:09	19:40	04:11
Arp168	M32	Galaxy	And	00h 42m 41s	+40° 51.0'	9.0	11:10	19:42	04:13
M32	Satellite Of Andromeda Galaxy	Galaxy	And	00h 42m 42s	+40° 51.9'	9.1	11:10	19:42	04:13
M31	Andromeda Galaxy	Galaxy	And	00h 42m 44s	+41° 16.1'	4.3	11:08	19:42	04:16
NGC246	C56	P Neb	Cet	00h 47m 00s	-11° 53.0'	10.9	14:17	19:46	01:16
NGC254		Galaxy	Scl	00h 47m 28s	-31° 25.2'	11.8	15:23	19:47	00:10
NGC288		Globular	Scl	00h 52m 45s	-26° 35.0'	8.1	15:10	19:52	00:34
NGC281	PacMan Nebula	Open	Cas	00h 52m 54s	+56° 37.4'	7.0	Circu	19:52	Circu
IC59	Gamma Cassiopeiae Nebula	Neb	Cas	00h 57m 29s	+61° 08.6'		Circu	19:57	Circu
IC63	Gamma Cassiopeiae Nebula	Neb	Cas	00h 59m 29s	+60° 54.7'		Circu	19:59	Circu
C51	IC1613	IrrGal	Cet	01h 04m 48s	+02° 07.0'	9.3	13:55	20:04	02:13
NGC474		Galaxy	Psc	01h 20m 07s	+03° 24.9'	11.1	14:07	20:19	02:31

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC485		Galaxy	Psc	01h 21m 28s	+07° 01.0'	14.0	13:58	20:21	02:43
M103	NGC581	Open	Cas	01h 33m 23s	+60° 39.0'	7.0	Circu	20:33	Circu
NGC598	Pinwheel Galaxy, Triangulum Galaxy	Galaxy	Tri	01h 33m 51s	+30° 39.6'	5.7	12:53	20:33	04:13
NGC604		Neb	Tri	01h 34m 33s	+30° 47.0'		12:53	20:34	04:15
M74	The Phantom	Galaxy	Psc	01h 36m 42s	+15° 47.0'	9.8	13:48	20:36	03:24
M76	Little Dumbbell Nebula	P Neb	Per	01h 42m 18s	+51° 34.2'	12.0	10:29	20:41	06:53
NGC651	Apple Core Nebula	P Neb	Per	01h 42m 21s	+51° 34.1'	12.2	10:30	20:41	06:53
NGC637		Open	Cas	01h 43m 04s	+64° 02.4'	8.2	Circu	20:42	Circu
NGC654		Open	Cas	01h 44m 00s	+61° 53.0'	6.5	Circu	20:43	Circu
NGC720		Galaxy	Cet	01h 53m 00s	-13° 44.3'	10.2	15:28	20:52	02:16
NGC780		Galaxy	Tri	02h 00m 35s	+28° 13.5'	14.0	13:29	21:00	04:30
NGC784		Galaxy	Tri	02h 01m 17s	+28° 50.2'	11.8	13:27	21:00	04:33
NGC821		Galaxy	Ari	02h 08m 21s	+10° 59.6'	10.8	14:34	21:07	03:41
Baily191	NGC884,	Open	Per	02h 22m 18s	+57° 08.1'	4.0	Circu	21:21	Circu
IC1795		Neb	Cas	02h 26m 32s	+62° 02.4'		Circu	21:26	Circu
NGC936		Galaxy	Cet	02h 27m 37s	-01° 09.3'	10.1	15:27	21:27	03:26
NGC943	Arp309	Galaxy	Cet	02h 29m 09s	-10° 49.0'	11.4	15:56	21:28	03:01
NGC956		Open	And	02h 32m 30s	+44° 35.6'	9.0	12:34	21:32	06:29
IC1805	Heart Nebula	Open	Cas	02h 32m 47s	+61° 27.6'	6.5	Circu	21:32	Circu
NGC1052		Galaxy	Cet	02h 41m 05s	-08° 15.3'	10.6	16:00	21:40	03:20
M34	Spiral Cluster	Open	Per	02h 42m 05s	+42° 45.6'	6.0	12:57	21:41	06:25
M77	Cetus A	Galaxy	Cet	02h 42m 41s	-00° 00.8'	9.7	15:39	21:42	03:45
NGC1084		Galaxy	Eri	02h 46m 00s	-07° 34.6'	10.6	16:03	21:45	03:27
IC1848	Soul Nebula	Open	Cas	02h 51m 18s	+60° 24.4'	6.5	Circu	21:50	Circu
NGC1156		Galaxy	Ari	02h 59m 42s	+25° 14.2'	11.7	14:40	21:59	05:18
NGC1201		Galaxy	For	03h 04m 08s	-26° 04.1'	10.6	17:19	22:03	02:47
NGC1175		Galaxy	Per	03h 04m 32s	+42° 20.3'	12.8	13:23	22:04	06:45
HR963	HD20010	Dbl	For	03h 12m 04s	-28° 59.2'	3.9	17:38	22:11	02:44
NGC1316	Fornax A	Galaxy	For	03h 22m 42s	-37° 12.4'	8.9	18:24	22:22	02:19

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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