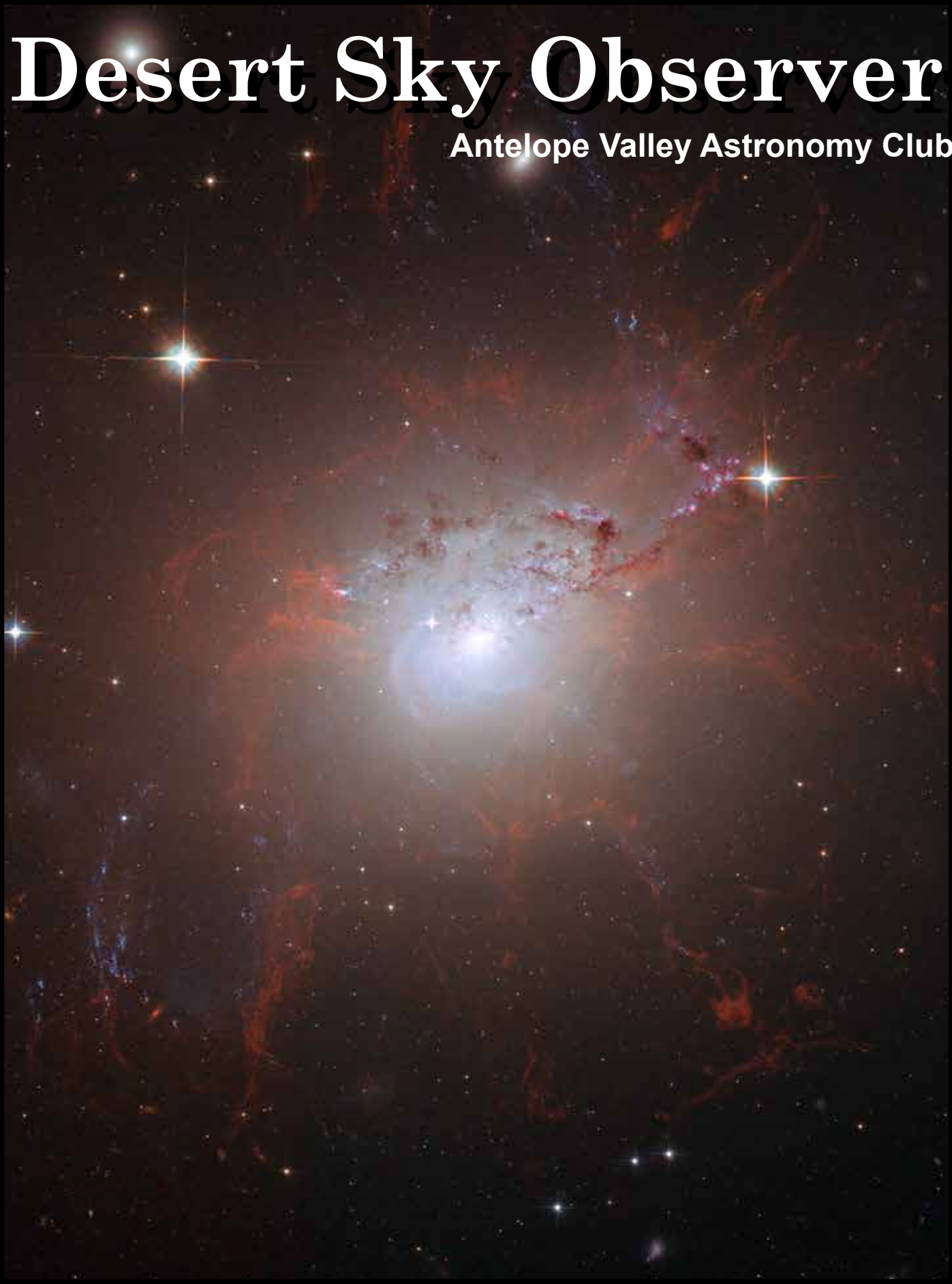
Volume 42.1 January 2022

Desert Sky Observer

Antelope Valley Astronomy Club



Upcoming Events

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

Every clear night: Personal Star Party

February 11: Club Meeting
February 19: Moonwalk 6:30 pm @PDW

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

AVAC Calendar

April 2: Messier Marathon@ Saddleback Butte SP
April 8: Club Meeting

Board Members

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

Vice-President: Gail Lofdahl
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

www.avastronomyclub.org
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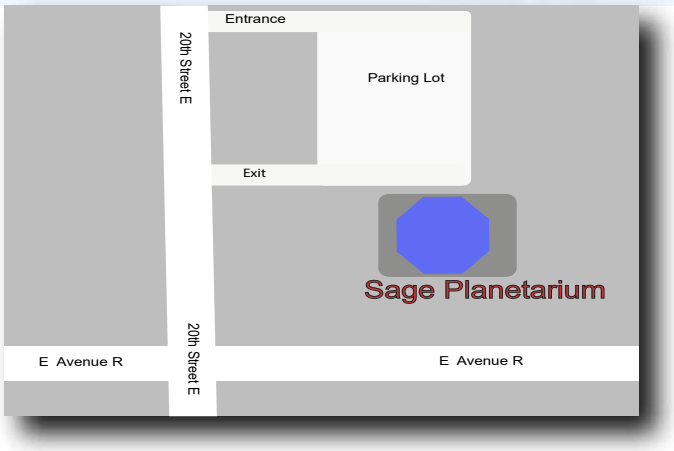


Monthly Meetings

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/.

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 Phil Wriedt

Happy New Year,

I want to take some time right up front to thank Darrell and Matt for leading the Club for the past 3 years. The past year and a half have been absolutely horrendous: no meetings, no Moon Walks, few star parties, closed State and National parks (forest fires) and a canceled 2020 Christmas party. We did however, have a great turnout for the 2021 Christmas party at Gino's, we got to see old faces and meet some new ones. Hopefully we can continue to have such turnouts at our meetings and star parties.

I want to welcome the new members who joined us in the past two months: Jack and family, Paul, Jessie and family, Omar, Roger, March, and Ron.

Our first meeting of the new year will be on January 14 at the Sage Planetarium. We all have to wear masks, that's part of the rules set out by Palmdale School District. Don't make Jeremy the bad guy having to enforce this mandate.

There were 71 persons who joined Jeremy on the Moon Walk at the Prime Desert Woodlands on the 11th December. There were more people who were there for Lancaster's light show and then stuck around for a chance to look through Darrell's and Rod's telescopes. Our next Moon Walk is on January 8th, sunset at 4:58pm. Please, show up with your telescope and hopefully the weather will cooperate and we will have a great turnout, wow the public, and answer questions on operating their new telescopes.

Our first star party of the year will be a Messier Marathon at Saddleback State Park (see page 10 for a map) on Saturday April 2. Mark your calendars now!

Until then, Keep Looking Up

Phil

On The Cover

This stunning image of NGC 1275 was taken using the NASA/ESA Hubble Space Telescope's Advanced Camera for Surveys in July and August 2006. It provides amazing detail and resolution of the fragile filamentary structures, which show up as a reddish lacy structure surrounding the central bright galaxy NGC 1275. These filaments are cool despite being surrounded by gas that is around 55 million degrees Celsius hot. They are suspended in a magnetic field which maintains their structure and demonstrates how energy from the central black hole is transferred to the surrounding gas.

By observing the filamentary structure, astronomers were, for the first time, able to estimate the magnetic field's strength. Using this information they demonstrated how the extragalactic magnetic fields have maintained the structure of the filaments against collapse caused by either gravitational forces or the violence of the surrounding cluster during their 100-million-year lifetime.

Continued on page 4

From the Secretary

By Rose Moore

Members:

I hope all of you had a wonderful holiday week! Welcome to 2022!

I am hoping that with another virus variant around, it will not close down or hamper some of our club activities. Please remember that you are required to wear a mask in the SAGE Planetarium for our meetings. The Palmdale School district allows Jeremy and our club to hold the meetings in the planetarium as long as we comply with their (and the state's) health requirements.

For those who missed the live coverage of the James Webb Telescope, there are many videos out there to watch. It was pretty exciting, even at 4:20 am!!

Our first meeting of 2022 is on Friday January 14th at 7pm. We are unsure at this time if we will have a speaker or a Zoom presentation. We will keep you posted!

We have a Prime Desert Moon Walk for Saturday January 8th at 5:30pm. Weather permitting. We will need members with telescopes, or you may come out and take the walk with Jeremy and the public.

Have any of you seen Comet Leonard? We have been unable to see it up here in Tehachapi due to the weather. If anyone has seen it and would like to post an article on their experience or pictures, please email Phil!

Stay warm! Clear skies! Rose

On The Cover ... continued

This is the first time astronomers have been able to differentiate the individual threads making up such filaments to this degree. Astonishingly, they distinguished threads a mere 200 light-years across. By contrast, the filaments seen here can be a gaping 200 000 light-years long. The entire image is approximately 260 000 light-years across.

Also seen in the image are impressive lanes of dust from a separate spiral galaxy. It lies partly in front of the giant elliptical central cluster galaxy and has been completed disrupted by the tidal gravitational forces within the galaxy cluster. Several striking filaments of blue newborn stars are seen crossing the image.

Credit: NASA, ESA and Andy Fabian (University of Cambridge, UK

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

AVAC Membership Renewal

It is that time year again, time to renew your AVAC Membership and HOORAY!!!, we are back in the Sage Planetarium for our monthly meetings. We have had in person meetings for the last few months now and it has been great. However if you haven't had a chance to make it out to one of these meetings I wholeheartedly encourage you to attend. The Sage Planetarium is one of the club's most rewarding benefits.

It is very gratifying to see the early membership renewals. In these times of financial uncertainty our members are more than ever the lifeblood for the AVAC. That said, please worry not, financially the club is still solvent and we are able to meet all our obligations while providing for future club events and guess speakers etc.

Please remember that our meetings are open to the public and all will be welcome. So, if for any reason you are unable to renew your membership you are still welcome to attend and we look forward to seeing you all again.

For administrative reasons we encourage members to renew their membership in January. For myself the easiest way to renew my membership was through the AVAC website via our PayPal account. However you can renew at our monthly club meetings with good old cash or by check.

For those unable to attend our monthly meeting you can renew your membership through the mail by sending a check to the club's Post Office Box:

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

For members less familiar with the club's website, it is actually fairly simple:

- Google Antelope Valley Astronomy Club and then open on the link.
- Click on MEMBER and then click on LOGIN.
- The default Member Name will be your Membership Number.
- If you had Signed Up on line you would have created a Password, but if you have forgotten it, use the Forgot Password link.
- Once you have Logged In, under Member click on Profile.
- Under Profile click on Membership.
- Under Your Current Membership click on Renew Now.
- You will have the choice of paying with a PayPal account or with a Credit Card.
- If you choose Credit Card PayPal will allow you to pay as a Guess

Thank you,
Rod Girard AVAC Treasurer

Hunting the Hunter: Observing Orion

by David Prosper , NASA Night Sky Network

If you are outside on a clear January night, it's hard not to notice one distinctive star pattern above all: Orion! While we've covered Orion in earlier articles, we've never discussed observing the constellation as a whole. Perhaps you've received a new telescope, camera, or binoculars, and are eager to test it out. Orion, being large, prominent, and full of interesting, bright objects, is a perfect constellation to test out your new equipment and practice your observing skills - for beginners and seasoned stargazers alike.

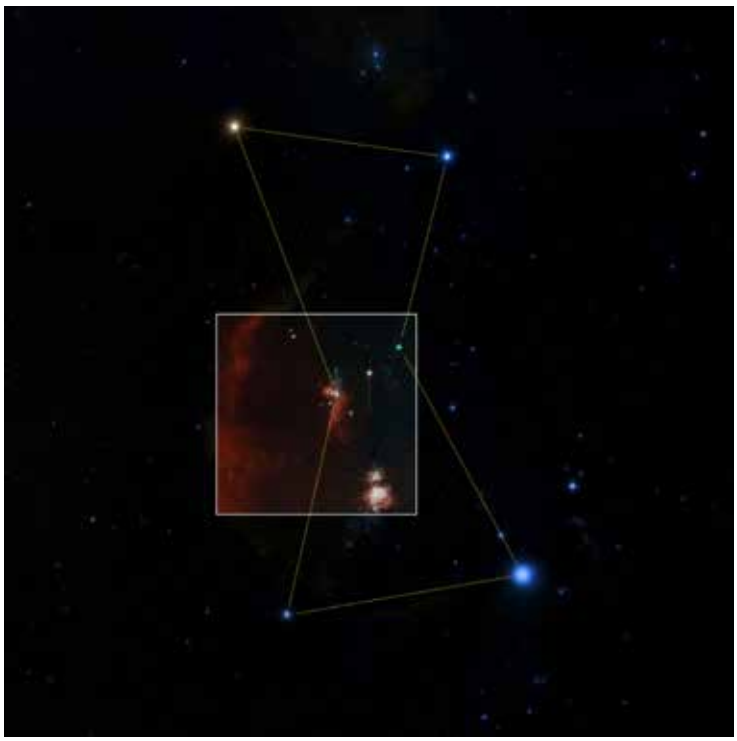
In Greek mythology, Orion is a strong hunter, with numerous legends about his adventures. Being such a striking group of stars, cultures from all around the world have many myths about this star pattern. There are so many that we can't list them all here, but you can find a wonderful interactive chart detailing many cultures' legends on the Figures in the Sky website at figuresinthesky.visualcinnamon.com .

What sights can you see in Orion? Look above the variable orange-red supergiant "shoulder star" Betelgeuse to find the stars making up Orion's "club," then move across from Betelgeuse towards the bright star Bellatrix (Orion's other "shoulder") and the stars of his bow and arrow - both essential tools for the Hunter. Many interesting sights lie near Orion's "belt" and "sword." Orion's belt is made up of three bright giant stars forming an evenly spaced line: Alnitak, Alnilam, and Mintaka. Move from the belt stars towards the stars Rigel and Saiph (Orion's "feet" or "knees") to arrive at Orion's distinctive Sword, parts of which may appear fuzzy to your unaided eyes. Binoculars reveal that fuzz to be the famed Orion Nebula (M42), perched right next to the star Hatysa! Diving in deeper with a telescope will show star clusters and more cloud detail around the Nebula, and additional magnification brings out further detail inside the nebula itself, including the "baby stars" of the Trapezium and the next-door neighbor nebula M43. Want to dive deeper? Dark skies and a telescope will help to bring out the reflection nebula M78, the Flame Nebula (NGC 2024), along with many star clusters and traces of dark nebula throughout the constellation. Very careful observers under dark clear skies may be able to spot the dark nebula known as the Horsehead, tracing an equine outline below both the Belt and the Flame Nebula. Warning: the Horsehead can be a difficult challenge for many stargazers, but very rewarding.

This is just a taste of the riches found within Orion's star fields and dust clouds; you can study Orion for a lifetime and never feel done with your observations. To be fair, that applies for the sky as a whole, but Orion has a special place for many. New telescopes often focus on one of Orion's treasures for their first test images. You can discover more of NASA's research into Orion's stars - as well as the rest of the cosmos - online at nasa.gov.

Northern Hemisphere observers can find Orion during January evenings in the east/southeast skies. Can you spot the Orion nebula with your naked eye, in Orion's sword? How does it look via binoculars or a telescope? What other details can you discern? Please note that some deep sky objects aren't listed here for clarity's sake. For example, M43, a nebula located directly above M42 and separated by a dark dust lane, is not shown. Orion's Belt and Sword are crowded, since they star-forming regions! You can read more in our November 2019 article Orion: Window Into a Stellar Nursery, at bit.ly/orionlight .

Image created with assistance from Stellarium.



The inset image is the "first light" photo from the Zwicky Transient Facility, a large survey telescope designed to detect changes in the entire night sky by detecting "transient objects" like comets, supernovae, gamma ray bursts, and asteroids. For many astronomers, amateur and pro alike, Orion is often the "first light" constellation of choice for new equipment!

Image Credit: Caltech Optical Observatories

Space News

News from around the Net

Astronomers Uncover Largest Group Of Rogue Planets Yet

Rogue planets are elusive cosmic objects that have masses comparable to those of the planets in our Solar System but do not orbit a star, instead roaming freely on their own. Not many were known until now, but a team of astronomers, using data from several European Southern Observatory (ESO) telescopes and other facilities, have just discovered at least 70 new rogue planets in our galaxy. . . . (continued at https://www.sciencedaily.com/releases/2021/12/211222153104.htm)

'29 Days On The Edge:' What's Next For NASA's Newly Launched James Webb Space Telescope NASA's next big space observatory is finally aloft, but it'll be a while before it starts its highly anticipated science mission. The $10 billion James Webb Space Telescope launched atop an Ariane 5 rocket from French Guiana yesterday (Dec. 25), kicking off a long-delayed, potentially transformative mission to study the early universe, nearby exoplanets and more. . . . (continued at https://www.space.com/nasa-james-webb-space-telescope-next-steps)

The James Webb Space Telescope Is Headed To Space

At last! After two decades of development, cost overruns, redesigns, and brushes with cancellation, the James Webb Space Telescope (JWST) launched this morning on an Arianespace Ariane 5 ECA rocket on mission VA 256. Liftoff from pad Ensemble de Lancement at the Guiana Space Center in French Guiana occurred at 7:20 a.m. EST (12:20 UT) on December 25th. The launch was delayed a couple times this past week, due to tracking issues and weather concerns, but the Christmas Day launch went off without a hitch. Mission controllers report that the payload is in good health, and ground stations are receiving good telemetry from the telescope. . . . (continued at https://skyandtelescope.org/astronomy-news/the-james-webb-space-telescope-is-headed-to-space/)

Comets' Heads Can Be Green, But Never Their Tails. After 90 Years, We Finally Know Why

Every so often, the Kuiper Belt and Oort Cloud throw galactic snowballs made up of ice, dust and rocks our way: 4.6-billion-year-old leftovers from the formation of the solar system. These snowballs -- or as we know them, comets -- go through a colourful metamorphosis as they cross the sky, with many comets' heads turning a radiant green colour that gets brighter as they approach the Sun. . . . (continued at https://www.sciencedaily.com/releases/2021/12/211220190658.htm)

The Earliest Atmosphere On Mercury

Mercury is a most unusual planet. The smallest planet in the solar system, and the closest planet to the sun, it is in a 3:2 spin resonance, slowly turning and experiencing scorching heat up to 430 degrees Celsius, and the night side frigid, down to -170 degrees Celsius. Due to its much larger iron-rich core compared to Earth, it has the second-highest average density in the solar system, just 1.5 percent below Earth's. . . . (continued at https://phys.org/news/2021-12-earliest-atmosphere-mercury.html)

Space News

News from around the Net

The Best Meteor Showers Of 2022

Here's a cosmic quiz: What celestial event happens every hour of every day — and yet never fails to evoke an unexpected gasp of excitement when you see it? The answer, of course, is a bright meteor — often called a "shooting star." Derived from the Greek word meteoros (meaning "high in the air"), meteors are actually fairly common. If you look up into a dark, Moonless night sky from a location far from city lights, you'll see brief streaks from sporadic meteors a few times every hour. They can occur at any time on any night in any part of the sky. (continued at https://skyandtelescope.org/astronomy-news/best-meteor-showers-of-2022/)

With Its Single 'Eye,' NASA's Dart Returns First Images From Space

Just two weeks after launching from Vandenberg Space Force Base in California, NASA's Double Asteroid Redirection Test (DART) spacecraft has opened its "eye" and returned its first images from space—a major operational milestone for the spacecraft and DART team. After the violent vibrations of launch and the extreme temperature shift to minus 80 degrees C in space, scientists and engineers at the mission operations center . . . (continued at https://phys.org/news/2021-12-eye-nasa-dart-images-space.html)

Comet Leonard: A Gift At Christmastime

Comet Leonard (C/2021 A1), which appeared to stall out around magnitude 5 in early December, has become a surprise performer. Since transitioning to the evening sky, it's undergone three successive bright outbursts — on December 15th, 20th, and 23rd — that catapulted it to naked-eye visibility at 3rd magnitude. After each flare-up, the comet had faded back to around 4th magnitude. Today, December 25th, it's around 3½. More outbursts are likely as Comet Leonard speeds toward perihelion . . . (continued at https://skyandtelescope.org/astronomy-news/comet-leonard-a-gift-at-christmastime/)

Venus Farewell, Moonless Skies For The Quadrantids

Like the porch light that welcomes you home at night, the brightest nighttime planet has been part of the celestial evening scenery since May. But that's changing. Venus is slipping away, winding down its evening apparition and transitioning into the morning sky. Inferior conjunction, when the planet passes between the Earth and Sun, occurs on January 8th. Hard to believe but fewer than two weeks of evening visibility remain. . . . (continued at https://skyandtelescope.org/astronomy-blogs/explore-night-bob-king/venus-farewell-moonless-skies-for-the-quadrantids/)

Citizen Scientists Find Young-Jupiter-Like Object Missed By Previous Exoplanet Searches

Citizen scientists have discovered a new object orbiting a Sun-like star that had been missed by previous searches. The object is very distant from its host star -- more than 1,600 times farther than the Earth is from the Sun -- and is thought to be a large planet or a small brown dwarf, a type of object that is not massive enough to burn hydrogen like true stars.. . . (continued at https://www.sciencedaily.com/releases/2021/12/211209124207.htm)

Dark Sky Observing Sites

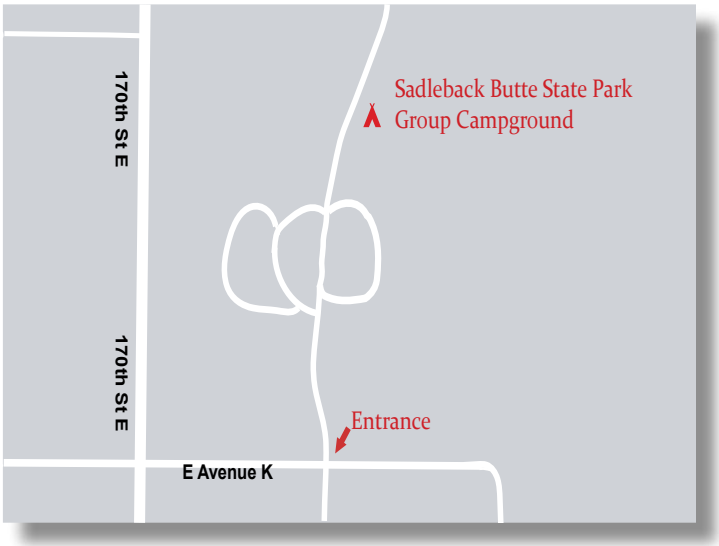
The Chuchupate parking lot is a half a mile beyond the Mt Pinos ranger station (on some maps The Chuchupate Ranger Sta., the parking lot is also called Frazier Mountain trailhead).

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.

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 and the Club pays a $100 fee. Individual campsites cost $20 per night. Enter off Avenue K.



Planet Summary

The **Sun** starts January in Sagittarius and ends the month in Capricorn.

Mercury starts the month trailing the Sun by 18° and reaches the maximum eastern elongation on the 7th. After this, the plunge toward the Sun occurs with Mercury passing in front of the Sun and thereafter shows up in the morning twilight.

Venus is still in the evening twilight at the beginning of the year. But that only lasts a few days as inferior conjunction is achieved, and it makes its closest approach to Earth in a century on the 8th at 133 light seconds (0.2658 AU). After that it parks itself in the morning twilight until the end of September.

Mars is slowly separating itself from the Sun emerging meekly at +1.5 mag in the bright morning twilight. Crossing the border from Ophiuchus into Sagittarius by mid -month. The 6% waning Moon glides past on the 29th.

Jupiter continues its eastward motion in Aquarius. It's low in the southwest sky during the early evening. The 15% waxing Moon passes 5° to the south on the evening of the 5th. By the end of the month it will be hard to see in the evening twilight, not to reemerge until early April in the morning glare.

Saturn spends the month and the entirety of 2022 moving though among the stars of Capricorn. On the 4th the 7% waxing Moon passes 5¾° to the south. By mid month it will it will hard to see in the Sun's glare.

Uranus continues moving west in central Aries at mag 5.7. About the 16th Uranus turns east.

Neptune will spend the month slowly moving east in northeast Aquarius at mag 7.9.

Pluto spends the month slowing moving west in Sagittarius at mag 14.4. On the 16th the Sun is in conjunction.

Moon Phases

First Qtr	Full	Third Qtr	New
Jan 9	Jan 17	Jan 25	Jan 2 & 31

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
1/1/2022	05:59	15:49	06:59	16:53
1/5/2022	09:43	20:30	07:00	16:56
1/10/2022	12:09	00:37	07:00	17:06
1/15/2022	15:07	05:24	06:59	17:05
1/20/2022	19:57	08:58	06:57	17:10
1/25/2022	00:07	11:23	06:55	17:15
1/30/2022	05:52	15:40	06:52	17:20

Planet Data*

January 1

	Rise	Transit	Set	Mag	Phase%
Mercury	08:16	13:15	18:14	-0.72	77.0
Venus	07:35	12:43	17:52	-4.26	2.2
Mars	05:00	09:56	14:52	1.53	97.7
Jupiter	09:51	15:19	20:46	-2.17	99.4
Saturn	08:55	14:05	19:15	0.17	99.9

January 15

	Rise	Transit	Set	Mag	Phase%
Mercury	07:46	13:00	18:15	0.82	21.7
Venus	05:59	11:13	16:27	-4.24	2.1
Mars	04:51	09:44	14:36	1.47	96.9
Jupiter	09:04	14:35	20:05	-2.12	99.6
Saturn	08:05	13:17	18:38	0.70	99.9

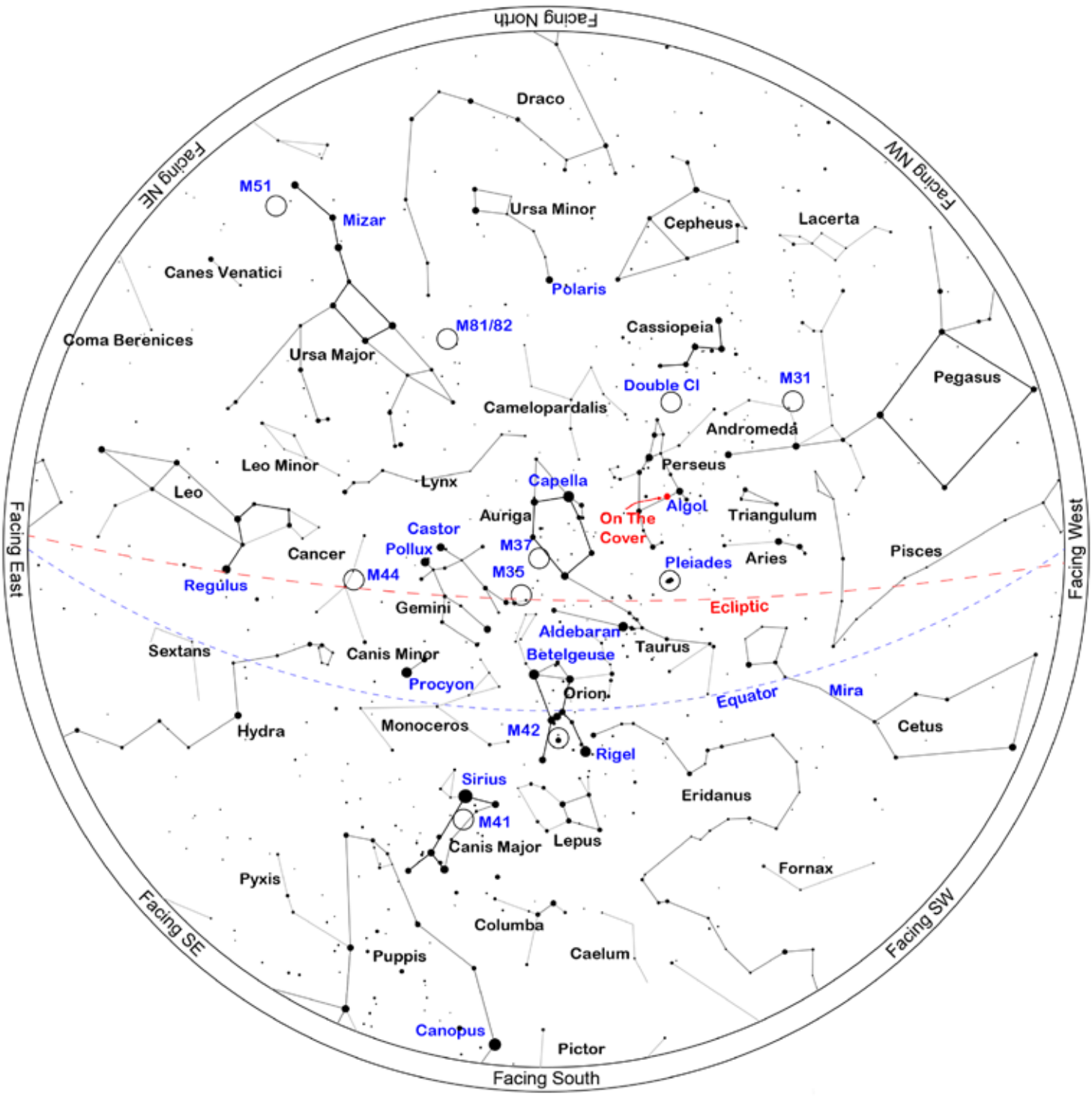
January 30

	Rise	Transit	Set	Mag	Phase%
Mercury	05:50	11:01	16:11	1.63	14.8
Venus	04:43	09:59	15:15	-4.60	13.7
Mars	04:41	09:33	14:25	1.41	96.0
Jupiter	08:14	13:48	19:22	-2.07	99.8
Saturn	07:12	12:25	17:38	0.68	100

*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 January 29, 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 January 29, 2022. The list is sorted by the transit time of the object.

ID	Common Name	Type		RA	Dec	Mag	Rise	Transit	Set
IC1434		Open	Lac	22h 10m 42s	+52° 51.0'	9.0	02:55	13:34	00:12
NGC7245		Open	Lac	22h 15m 11s	+54° 20.6'	9.2	02:12	13:38	01:05
NGC7232		Galaxy	Gru	22h 15m 38s	-45° 51.0'	13.0	10:36	13:39	16:41
NGC7261		Open	Cep	22h 20m 06s	+58° 03.0'	8.4	Circu	13:43	Circu
NGC7293	Helix Nebula	P Neb	Aqr	22h 29m 36s	-20° 48.0'	7.3	08:51	13:53	18:55
NGC7380		Open	Cep	22h 47m 21s	+58° 07.9'	7.2	Circu	14:10	Circu
C9	Cave Nebula	BrNeb	Cep	22h 56m 48s	+62° 37.0'		Circu	14:20	Circu
IC1470		Neb	Cep	23h 05m 10s	+60° 14.6'		Circu	14:28	Circu
NGC7492		Globular	Aqr	23h 08m 27s	-15° 36.6'	11.5	09:13	14:32	19:50
HR8872	HD219916	Triple	Cep	23h 18m 38s	+68° 06.6'	4.8	Circu	14:42	Circu
IC5308		Galaxy	Gru	23h 19m 21s	-42° 15.4'	12.0	11:14	14:42	18:11
M52	The Scorpion	Open	Cas	23h 24m 48s	+61° 35.6'	8.0	Circu	14:48	Circu
NGC7662	Blue Snowball	P Neb	And	23h 25m 54s	+42° 33.0'	8.3	06:06	14:49	23:33
NGC7686		Open	And	23h 30m 07s	+49° 08.0'	5.6	05:12	14:53	00:34
IC5332		Galaxy	Scl	23h 34m 27s	-36° 06.0'	10.6	10:55	14:58	19:00
NGC7785		Galaxy	Psc	23h 55m 19s	+05° 54.9'	11.6	08:59	15:18	21:38
HR9071	HD224572	Triple	Cas	23h 59m 01s	+55° 45.3'	4.9	Circu	15:22	Circu
NGC7822		Neb	Cep	00h 03m 36s	+67° 09.0'		Circu	15:27	Circu
NGC55	C72	S Gal	Scl	00h 14m 54s	-39° 11.0'	7.9	11:52	15:38	19:24
NGC129		Open	Cas	00h 30m 00s	+60° 13.1'	6.5	Circu	15:53	Circu
NGC133		Open	Cas	00h 31m 19s	+63° 21.0'	9.0	Circu	15:54	Circu
NGC146		Open	Cas	00h 33m 03s	+63° 18.0'	9.1	Circu	15:56	Circu
NGC147	C17	E Gal	Cas	00h 33m 12s	+48° 30.0'	9.3	06:22	15:56	01:30
NGC190		Galaxy	Psc	00h 38m 55s	+07° 03.7'	14.0	09:39	16:02	22:25
M110	Andromeda Galaxy Satellite	Galaxy	And	00h 40m 22s	+41° 41.1'	8.9	07:26	16:03	00:41
NGC210		Galaxy	Cet	00h 40m 35s	-13° 52.3'	10.9	10:40	16:04	21:27
NGC206	V-36	Neb	And	00h 40m 36s	+40° 44.0'		07:32	16:04	00:35
Arp168	M32	Galaxy	And	00h 42m 41s	+40° 51.0'	9.0	07:33	16:06	00:38
M32	Andromeda Galaxy Satellite	Galaxy	And	00h 42m 42s	+40° 51.9'	9.1	07:33	16:06	00:38
M31	Andromeda Galaxy	Galaxy	And	00h 42m 44s	+41° 16.1'	4.3	07:31	16:06	00:41
NGC246	C56	P Neb	Cet	00h 47m 00s	-11° 53.0'	10.9	10:41	16:10	21:39
NGC254		Galaxy	Scl	00h 47m 28s	-31° 25.2'	11.8	11:48	16:11	20:34
NGC288		Globular	Scl	00h 52m 45s	-26° 35.0'	8.1	11:34	16:16	20:58
NGC281	PacMan Nebula	Open	Cas	00h 52m 54s	+56° 37.4'	7.0	Circu	16:16	Circu
IC59	Gamma Cassiopeiae Nebula	Neb	Cas	00h 57m 29s	+61° 08.6'		Circu	16:21	Circu

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC63	Gamma Cassiopeiae Nebula	Neb	Cas	00h 59m 29s	+60° 54.7'		Circu	16:23	Circu
C51	IC1613	IrrGal	Cet	01h 04m 48s	+02° 07.0'	9.3	10:19	16:28	22:37
NGC474		Galaxy	Psc	01h 20m 07s	+03° 24.9'	11.1	10:31	16:43	22:56
NGC485		Galaxy	Psc	01h 21m 28s	+07° 01.0'	14.0	10:22	16:45	23:07
M103	NGC581	Open	Cas	01h 33m 23s	+60° 39.0'	7.0	Circu	16:57	Circu
NGC598	Triangulum Pinwheel Galaxy	Galaxy	Tri	01h 33m 51s	+30° 39.6'	5.7	09:16	16:57	00:38
NGC604		Neb	Tri	01h 34m 33s	+30° 47.0'		09:16	16:58	00:39
M74	The Phantom	Galaxy	Psc	01h 36m 42s	+15° 47.0'	9.8	10:12	17:00	23:48
M76	Little Dumbbell Nebula	P Neb	Per	01h 42m 18s	+51° 34.2'	12.0	06:51	17:05	03:20
NGC651	Apple Core Nebula	P Neb	Per	01h 42m 21s	+51° 34.1'	12.2	06:51	17:05	03:20
NGC637		Open	Cas	01h 43m 04s	+64° 02.4'	8.2	Circu	17:06	Circu
NGC654		Open	Cas	01h 44m 00s	+61° 53.0'	6.5	Circu	17:07	Circu
NGC720		Galaxy	Cet	01h 53m 00s	-13° 44.3'	10.2	11:52	17:16	22:40
NGC780		Galaxy	Tri	02h 00m 35s	+28° 13.5'	14.0	09:53	17:24	00:55
NGC784		Galaxy	Tri	02h 01m 17s	+28° 50.2'	11.8	09:51	17:24	00:58
NGC821		Galaxy	Ari	02h 08m 21s	+10° 59.6'	10.8	10:58	17:31	00:05
Baily191	NGC884,	Open	Per	02h 22m 18s	+57° 08.1'	4.0	Circu	17:45	Circu
IC1795		Neb	Cas	02h 26m 32s	+62° 02.4'		Circu	17:50	Circu
NGC936		Galaxy	Cet	02h 27m 37s	-01° 09.3'	10.1	11:51	17:51	23:50
NGC943	Arp309	Galaxy	Cet	02h 29m 09s	-10° 49.0'	11.4	12:20	17:52	23:25
NGC956		Open	And	02h 32m 30s	+44° 35.6'	9.0	08:57	17:56	02:54
IC1805	Heart Nebula	Open	Cas	02h 32m 47s	+61° 27.6'	6.5	Circu	17:56	Circu
NGC1052		Galaxy	Cet	02h 41m 05s	-08° 15.3'	10.6	12:25	18:04	23:44
M34	Spiral Cluster	Open	Per	02h 42m 05s	+42° 45.6'	6.0	09:20	18:05	02:50
M77	Cetus A	Galaxy	Cet	02h 42m 41s	-00° 00.8'	9.7	12:03	18:06	00:09
NGC1084		Galaxy	Eri	02h 46m 00s	-07° 34.6'	10.6	12:28	18:09	23:51
IC1848	Soul Nebula	Open	Cas	02h 51m 18s	+60° 24.4'	6.5	Circu	18:14	Circu
NGC1156		Galaxy	Ari	02h 59m 42s	+25° 14.2'	11.7	11:03	18:23	01:43
NGC1201		Galaxy	For	03h 04m 08s	-26° 04.1'	10.6	13:44	18:27	23:11
NGC1175		Galaxy	Per	03h 04m 32s	+42° 20.3'	12.8	09:46	18:28	03:10
NGC1316	Fornax A	Galaxy	For	03h 22m 42s	-37° 12.4'	8.9	14:49	18:46	22:42
Barnard202	B202	DkNeb	Ari	03h 25m 38s	+30° 16.0'		11:10	18:49	02:28
Barnard204	B204	DkNeb	Ari	03h 28m 29s	+30° 11.0'		11:13	18:52	02:30
NGC1350		Galaxy	For	03h 31m 08s	-33° 37.7'	10.5	14:41	18:54	23:08
Barnard1	B1	DkNeb	Per	03h 32m 57s	+31° 09.0'		11:13	18:56	02:39
Barnard2	B2	DkNeb	Per	03h 33m 31s	+32° 19.0'		11:09	18:57	02:45
Barnard3	B3	DkNeb	Per	03h 40m 01s	+31° 58.0'		11:17	19:03	02:50
NGC1407		Galaxy	Eri	03h 40m 12s	-18° 34.8'	9.8	13:54	19:03	00:12

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
IC347		Galaxy	Eri	03h 42m 32s	-04° 17.9'	13.0	13:15	19:06	00:56
NGC1448		Galaxy	Hor	03h 44m 32s	-44° 38.6'	11.0	15:56	19:08	22:20
IC348		Open	Per	03h 44m 34s	+32° 09.7'	7.3	11:20	19:08	02:55
M45	Pleiades, Subaru Seven Sisters,	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	11:55	19:11	02:26
Barnard5	B5	DkNeb	Per	03h 47m 53s	+32° 53.0'		11:20	19:11	03:02
NGC1461		Galaxy	Eri	03h 48m 27s	-16° 23.5'	11.7	13:56	19:12	00:27
IC353		Neb	Tau	03h 53m 00s	+25° 48.0'		11:54	19:16	02:38
IC2003		P Neb	Per	03h 56m 22s	+33° 52.5'	13.0	11:24	19:19	03:15
NGC1499	California Nebula	Neb	Per	04h 03m 14s	+36° 22.0'		11:19	19:26	03:34
NGC1515		Galaxy	Dor	04h 04m 03s	-54° 06.0'	11.0	18:07	19:27	20:47
NGC1496		Open	Per	04h 04m 32s	+52° 39.7'	10.0	08:53	19:28	06:02
NGC1502		Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circu	19:31	Circu
IC360		Neb	Tau	04h 09m 00s	+26° 06.0'		12:09	19:32	02:55
NGC1514	Crystal Ball Nebula	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	11:51	19:32	03:14
NGC1513		Open	Per	04h 09m 57s	+49° 30.8'	8.4	09:48	19:33	05:19
IC359		Neb	Tau	04h 12m 28s	+27° 42.1'		12:07	19:36	03:05
NGC1535		P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	14:11	19:37	01:04
Barnard10	B10	DkNeb	Tau	04h 18m 41s	+28° 16.0'		12:11	19:42	03:13
NGC1545		Open	Per	04h 20m 57s	+50° 15.2'	6.2	09:49	19:44	05:39
NGC1569		Galaxy	Cam	04h 30m 49s	+64° 50.8'	11.2	Circu	19:54	Circu
Barnard18	B18	DkNeb	Tau	04h 31m 13s	+24° 21.0'		12:38	19:54	03:11
NGC1582		Open	Per	04h 31m 53s	+43° 49.0'	7.0	11:02	19:55	04:48
NGC1560		Galaxy	Cam	04h 32m 48s	+71° 52.7'	11.5	Circu	19:56	Circu
Barnard19	B19	DkNeb	Tau	04h 33m 00s	+26° 16.0'		12:33	19:56	03:20
Barnard20	B20	DkNeb	Per	04h 37m 04s	+50° 58.0'		09:55	20:00	06:05
Barnard22	B22	DkNeb	Tau	04h 38m 00s	+26° 03.0'		12:38	20:01	03:24
Barnard14	B14	DkNeb	Tau	04h 39m 59s	+25° 44.0'		12:42	20:03	03:25
IC2087		Neb	Tau	04h 40m 00s	+25° 44.5'		12:42	20:03	03:25
Barnard23	B23	DkNeb	Tau	04h 40m 33s	+29° 52.0'		12:26	20:04	03:41
NGC1624		Open	Per	04h 40m 36s	+50° 27.6'	10.4	10:06	20:04	06:01
NGC1640		Galaxy	Eri	04h 42m 14s	-20° 26.0'	11.7	15:02	20:05	01:08
NGC1647		Open	Tau	04h 45m 55s	+19° 06.8'	6.4	13:10	20:09	03:08
IC2118	Witch Head Nebula	Neb	Eri	05h 04m 54s	-07° 15.0'		14:46	20:28	02:11
NGC1851	C73	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	16:56	20:37	00:19
IC405	Flaming Star Nebula	Neb	Aur	05h 16m 29s	+34° 21.3'		12:42	20:40	04:37
M79	NGC1904	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	15:58	20:47	01:37
M38	Starfish Cluster	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	12:47	20:52	04:56
M1	Crab Nebula, Taurus A	SNR	Tau	05h 34m 32s	+22° 00.8'	8.4	13:49	20:58	04:06

ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M42	Great Orion Nebula	Open+D Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	15:11	20:58	02:46
M43	De Mairan's Nebula	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	15:11	20:59	02:47
M36	Pinwheel Cluster	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	13:03	20:59	04:56
M78	NGC2068	D Neb	Ori	05h 46m 45s	+00° 04.8'	8.0	15:07	21:10	03:13
M37	Auriga Salt-and-pep-per Cluster	Open	Aur	05h 52m 18s	+32° 33.2'	6.0	13:26	21:15	05:04
M35	NGC2168	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	14:16	21:32	04:49
M41	Little Beehive	Open	CMa	06h 46m 01s	-20° 45.3'	5.0	17:07	22:09	03:11
M50	Heart-shaped Cluster	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	16:47	22:26	04:05
M47	NGC2422	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	17:38	23:00	04:21
M46	NGC2437	Open	Pup	07h 41m 46s	-14° 48.6'	6.5	17:44	23:05	04:25
M93	NGC2447	Open	Pup	07h 44m 30s	-23° 51.4'	6.5	18:16	23:08	03:59
M48	NGC2548	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	17:50	23:37	05:24
M44	Beehive Cluster	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	17:03	00:04	07:04
M67	King Cobra	Open	Cnc	08h 51m 18s	+11° 48.0'	7.5	17:38	00:14	06:51
M81	Bode's Galaxy	Galaxy	UMa	09h 55m 33s	+69° 03.9'	7.8	Circu	01:19	Circu
M82	Cigar Galaxy Ursa Major A	Galaxy	UMa	09h 55m 53s	+69° 40.8'	9.2	Circu	01:19	Circu
M95	NGC3351,UGC5850	Galaxy	Leo	10h 43m 58s	+11° 42.2'	10.6	19:31	02:07	08:43
M96	NGC3368,UGC5882	Galaxy	Leo	10h 46m 46s	+11° 49.2'	10.1	19:34	02:10	08:46
M105	NGC3379,UGC5902	Galaxy	Leo	10h 47m 50s	+12° 34.9'	10.5	19:32	02:11	08:50
M108	NGC3556,UGC6225	Galaxy	UMa	11h 11m 31s	+55° 40.4'	10.6	Circu	02:35	Circu
M97	Owl Nebula	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	Circu	02:38	Circu
M65	Leo Triplet	Galaxy	Leo	11h 18m 56s	+13° 05.5'	10.1	20:02	02:42	09:22
M66	Leo Triplet	Galaxy	Leo	11h 20m 15s	+12° 59.4'	9.7	20:04	02:43	09:23
M109	NGC3992,UGC6937	Galaxy	UMa	11h 57m 36s	+53° 22.4'	10.6	16:30	03:21	14:12
M98	NGC4192,UGC7231	Galaxy	Com	12h 13m 48s	+14° 54.0'	10.9	20:51	03:37	10:22
M99	Coma Pinwheel Galaxy	Galaxy	Com	12h 18m 50s	+14° 25.0'	10.4	20:58	03:42	10:26
M106	NGC4258,UGC7353	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	18:20	03:42	13:04

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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