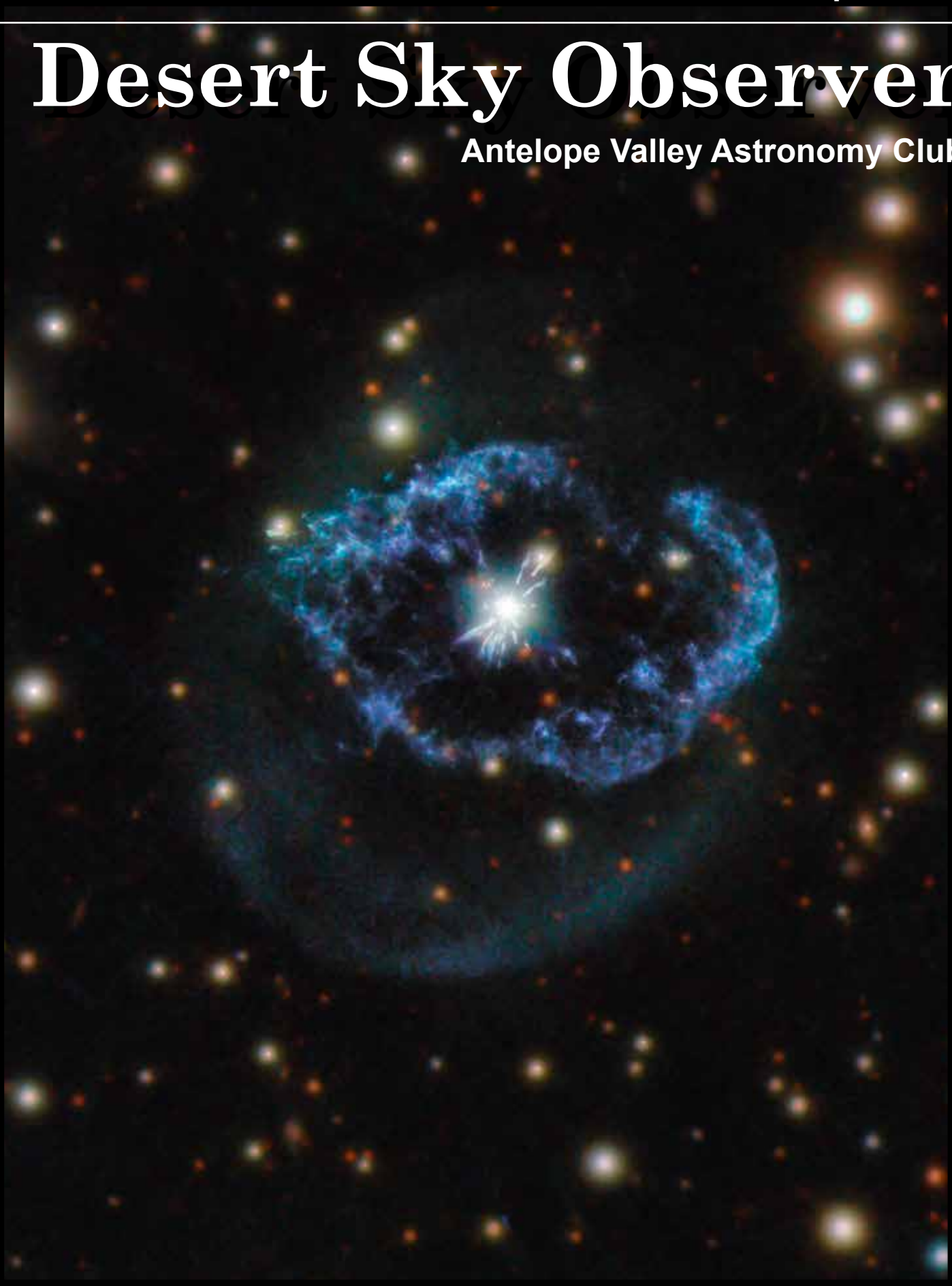
Volume 41.4 April 2021

# Desert Sky Observer

Antelope Valley Astronomy Club



## Upcoming Events

April 9: Club Meeting -- Zoom

April 10: Messier Marathon -- Chuchupate

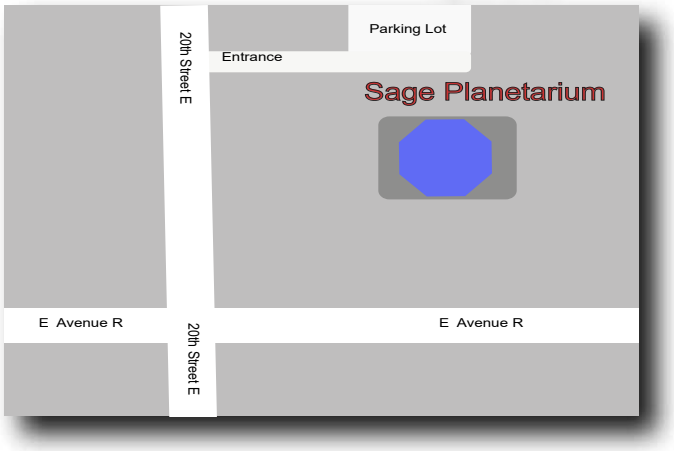
Any clear night: Personal Star Party

May 8: Deep Sky Star Party

May 14: Club Meeting -- Zoom

May 15: Lunar Club

AVAC Calendar




## Board Members

**President:** Darrell Bennett (661) 220-0122
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**Treasurer:** Rod Girard (661) 803-7838
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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:**
Frank Moore (661) 972-4775
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www.avastronomyclub.org
ANTELOPE VALLEY
ASTRONOMY CLUB, INC.

## 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

Hello Everyone,

Is it just me? It seems like this year is going by fast. It's already April, the days are getting warmer and so are the nights, but the wind is still there, blowing just as hard.

As we start getting into the observing season, we will start with the Messier Marathon on April 10th at Chuchupate parking lot off of Lockwood Valley Rd. We usually park at the east end of the parking lot on the uphill side. So come out and see some of your old friends. As usual, you do not need a telescope to come. The nights will be around 40 degrees so dress warm and bring what you want to drink and eat. There is a restroom there but no light inside.

We will be following the State Covid-19 guidelines so that everyone can be safe. By then I will have had both Covid-19 shots.

I am still trying to get the group campsite at Saddleback Butte State Park for June, to have a club picnic. This is still up in the air right now.

I do not know if Jeremy is going to hold another Zoom meeting this month, but I did catch part of the one last month once I figured out how to work Zoom. Keep checking your email about how to get in.

I hope to see you all at the Messier Marathon.

Until next month keep looking up.

Darrell

## On The Cover

Located around 5000 light-years away in the constellation of Cygnus (The Swan), Abell 78 is an unusual type of planetary nebula.

After exhausting the nuclear fuel in their cores, stars with a mass of around 0.8 to 8 times the mass of our Sun collapse to form dense and hot white dwarf stars. As this process occurs, the dying star will throw off its outer layers of material, forming an elaborate cloud of gas and dust known as a planetary nebula. This phenomenon is not uncommon, and planetary nebulae are a popular focus for astrophotographers because of their often beautiful and complex shapes. However, a few like Abell 78 are the result of a so-called "born again" star.

Although the core of the star has stopped burning hydrogen and helium, a thermonuclear runaway at its surface ejects material at high speeds. This ejecta shocks and sweeps up the material of the old nebula, producing the filaments and irregular shell around the central star seen in this Picture of the Week, which features data from Hubble's Wide Field Camera 3 and PANSTARSS.

Credit: ESA/Hubble & NASA, M. Guerrero
Acknowledgement: Judy Schmidt

## From the Secretary

By Rose Moore

Members:

Finally spring is here, and maybe we'll be able to have some star parties!

We will have a Club Zoom meeting on Friday April 9th at 7pm. An email will be sent out as a reminder, with the link, to let you know if we have a speaker for the meeting. Jeremy conducted the last 2 meetings, and for the meeting in March, he went over some of the Messier objects. Come join us for a bit of astronomy and a some socialization with AVAC members!

Our first star party for 2021 will be on Saturday April 10th! Because the group campsite is still closed at Saddleback State Park, we will be having our Messier Marathon up at the Chuchupate parking area. Arrival time can be anytime on that Saturday. Allow yourself enough time to set up your scope before darkness. Sunset is at 7:22pm. The Moon, a waning crescent, will set at 6:18pm. Weather permitting. Please dress appropriately as it will still be chilly or cold at night for this time of year. An email will be sent out a few days before the event, with directions to Chuchupate, and other information.

Coming up in May will be a star party on Saturday May 8th, site TBA; Club meeting via Zoom on Friday May 14th; and a Lunar Club meeting at Judy's home on Saturday May 15th. Further information will be sent out via email regarding these events.

Because Frank and I are still planning to downsize and move, hopefully this year, our club needs to find a person to replace me as club Secretary. Are there any members interested in resuming the job of club Secretary? That person needs to be comfortable with handling emails, organizing the club calendar, maintaining contact with other Board members and club members, and various other duties. I and other Board members can train someone for the position, and the person can assume the position gradually as I will probably be here for awhile.

Hoping for warm weather and clear skies!

Rose

### Club's Trailer For Sale

The Executive Board has decided that the Club's trailer is no longer needed. The last active use for the trailer was to store members scopes overnight at the Poppy Festival, and lately has been storing a few boxes of club records. It's believed to be a 6x10 single axle cargo van. Contact Darrel for more info...

# AVAC Membership Renewal

It is that time year again, time to renew your AVAC Membership. In a normal year I would be enjoying your company and announcing this at our January meeting, but sadly for us all this is still not a normal year. I remain hopeful that we will be able to resume our monthly meetings soon.

It is very gratifying to see the early membership renewals. Even though we are unable to have meetings, our members are still the life blood for the AVAC. And worry not, financially the club is still solvent and we are able to meet all our obligations.

Please remember that when we are able to have our monthly meetings again 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 myself the easiest way to renew my membership was through the AVAC website via our PayPal account. But you can still renew using a check via the club's Post Office Box:

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

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.

In my opinion renewing on the AVAC website is the best way to go. You will get an almost instant online receipt and the transaction is fully documented. And trust me, if I can do it, anyone should be able to do it also.

Thank you,
Rod Girard, AVAC Treasurer

# What is a "Messier Marathon"?

A star party that is devoted to observing as many of the Messier objects as possible in a single evening has come to be called a "Messier Marathon." These turn out to be some of the most memorable evenings of stargazing that you'll do - not only because of the quantity of objects that you can observe, but because the you're 'forced' to interact with the breadth of the night sky in a short period of time. I also enjoy the discussions with other amateurs as we each tackle the Virgo Cluster galaxies!

How is it possible to see what amounts to an entire year's worth of deep sky objects in just one night? With a lot of planning and patience (See Messier Marathon Tips). After a review of your planisphere, you can determine that it's possible to see all of the Messier Objects if you try during the period near the Spring Equinox of March 17-24. Anything can happen at this time of year though; clouds, rain, high winds. Many roadblocks to success are possible/probable.

There is a suggested order to observing the Messier objects in one evening. This logical progression across the night sky has little to do with the order of Charles Messier's list! This suggested order has been established after many years of Messier Marathoning - give it a try and see what you think.

It is all worthwhile on that crystal clear, steady night when the local astronomy club visits their favorite dark sky site, everyone has set up early with their scopes roughly aligned and pointed west - a sense of excitement awaiting M74 and M77's emergence. The sun sets, the twilight deepens. And you're off! Two down and just 108 items on your list to go before dawn washes out your chance of finding M30! Good Luck!

**Suggested Messier Marathon Observing Order**

Marathon order (html file)

Marathon order (Excel file)

Marathon order (.pdf file)

# Tips on Participating in a Messier Marathon

By John Barra, Peoria Astronomical Society
Edited to reflect the Antelope Valley Astronomy Club's observing sites.

Here a few tips for those who are participating in a Messier Marathon:

**1. BE PREPARED:**
The Boy's Scout motto is a good one for the marathon that is twelve hours long. Have a good plan of attack. Included at the end of this article is one suggested order to follow. Get the star charts you are going to use and study them.

Do not forget to bring the extras you will need such as a red flashlight, extra batteries for your Telrad or other battery-operated equipment, and a dew zapper. You will have dew in the spring. If you don't have one, bring a hair dryer and a long extension cord.

**2. GET THERE EARLY:**
Get to the site as early as you can, at least by 6:30 pm. The first object viewable will be M45, the Pleiades, at 6:45. If you are set up by then you can get a few of the brighter objects out of the way fast, even if the are actually listed lower on the list.

**3. HAVE A PLAN ON THE TOUGH EARLY OBJECTS:**
Try the suggested Messier Marathon order.

You will not have much time between the first signs of darkness, around 7 pm., and the time several of the first tough objects on your list will set in the west. You must be prepared for them. M74 and M77 will be particularly hard to locate. M74, a faint galaxy in Pisces, will undoubtedly be the toughest to find all night. I have trouble finding it when it is high in the sky if seeing conditions are not excellent. It has a low surface brightness. You will need to find a target nearby star and be able to find it fairly quickly after 7 pm. M77, a galaxy in Cetus, is a little easier and you can locate it first because it is brighter.

**4. VIEW AS MANY AS YOU CAN AS EARLY AS YOU CAN:**
Once you completed the first ten, you can slower your pace a little. However, since you have the most energy early, you need to move across the sky at a fairly good pace. You may need the extra time on the dreaded Virgo Cluster. You should be able to get through the first 48 by 10:30 or 11 pm. By then the Virgo Cluster will be in a good position in the sky to attack.

**5. TAKE A BREAK BEFORE THE VIRGO CLUSTER:**
Now is a good time to take a break. Have some coffee. Go inside. Rest your feet. Have a snack. After 15 minutes or half an hour, you will be ready to go again.

**6. PREPARE FOR VIRGO CLUSTER:**
You will need a good plan to wind your way through the Virgo Cluster, comprised of 14 galaxies in Virgo and Coma Berenices. I recommend you follow the path suggested in the chart on pages 42 and 43 of the May 1994 issue of Sky & Telescope. (See this link for the Messier Marathon Order.) It starts in the eastern edge at Epsilon Virginis and goes toward the west rather than following the west to east, right ascension order from the list below

that works well with most of the other objects. If you have Uranometria 2000, copy the charts on pages 192 and 193 and highlight the path suggested in the article. That night if you get halfway through and get lost, don't panic. Start over again and the second time you will be able to quickly get back to the last galaxy you had observed.

**7. VIEW ALL THE OBJECTS DOWN TO THE EASTERN HORIZON:**
Continue to view as many objects as you can now as you cross the sky at a leisurely pace to the eastern horizon. If you have been successful so far, by about 1:30 am you should have completed 90 of the 110 objects. No more will be high enough above the eastern horizon to view now.

**8. TAKE A LONG BREAK OR NAP:**
At this time there is a natural break in the marathon. Rather than waiting outside for a few objects to rise, you might as well rest for an hour-and-a half or two while you wait for a larger number to rise sufficiently above the horizon. You may even want to try to take a nap someplace warm. Make sure however you have someone to wake you at 3 or 3:30. You don't want to oversleep and miss the end.

**9. GO AT A LEISURELY PACE DOWN THE STRETCH:**
You will have a couple of hours to locate the next fifteen objects, so take extra time to view these objects. Enjoy the beauty of the Lagoon and Swan Nebulae. You're almost done.

**10. HAVE A PLAN FOR THE LAST TOUGH OBJECTS:**
Just as you had to hurry at the beginning to catch the early objects before they set, you will have to hurry to catch the last few objects when they rise shortly before dawn. M72, a faint globular cluster, and M73, a faint four-star asterism, are both in late-rising Aquarius and will be difficult to find. Have your route carefully marked on your chart. If the marathon is later in the month, M30 may be visible but M74 and M77 may not be. If we are delayed to the late April dates, 5 or 6 objects at the beginning of our list may not be visible.

**11. PRACTICE AHEAD OF THE TIME:**
If you have the time and the weather permits, you might want to try a dry run on the tough twilight objects and the Virgo Cluster. Practice might make the difference on whether or not you view all those objects during the marathon. I won't be so presumptuous to suggest that you do a dry run on the early morning objects. Even I won't go out at 4:30 a.m. to do that.

**12. HAVE FUN:**
Last and most important, have fun. You don't have to view them all. The competition is friendly. Messier Marathons, while a challenge, are designed to improve your viewing skills rather than being an end in themselves. Finally, if you do come after sunset, don't forget to turn on your parking lights and then turn off your headlights when you drive up.

# Watch The Lion: Celestial Wonders In Leo

by David Prosper, NASA Night Sky Network

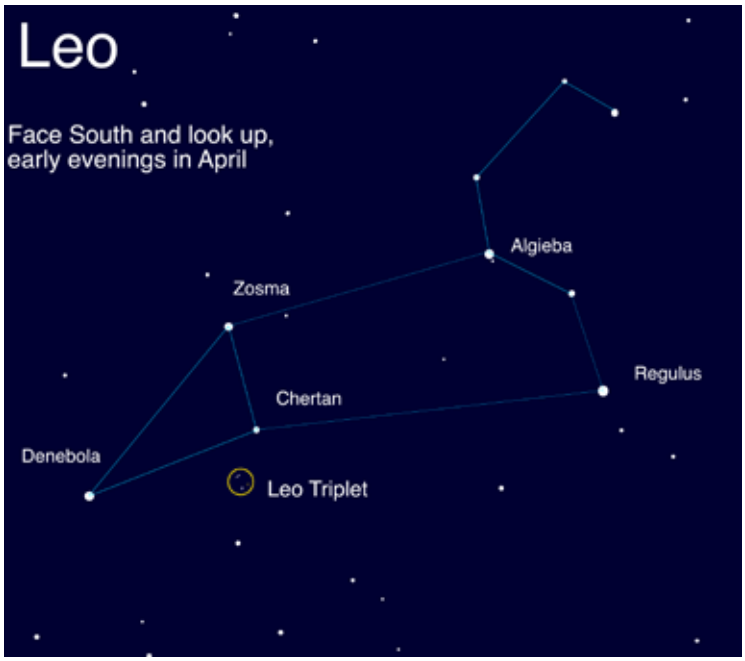
Leo is a prominent sight for stargazers in April. Its famous sickle, punctuated by the bright star Regulus, draws many a beginning stargazer's eyes, inviting deeper looks into some of Leo's celestial delights, including a great double star and a famous galactic trio.

Leo's distinctive forward sickle, or "reverse question mark," is easy to spot as it climbs the skies in the southeast after sunset. If you are having a difficult time spotting the sickle, look for bright Sirius and Procyon - featured in last month's article – and complete a triangle by drawing two lines to the east, joining at the bright star Regulus, the "period" in the reverse question mark. Trailing them is a trio of bright stars forming an isosceles triangle, the brightest star in that formation named Denebola. Connecting these two patterns together forms the constellation of Leo the Lion, with the forward-facing sickle being the lion's head and mane, and the rear triangle its hindquarters. Can you see this mighty feline? It might help to imagine Leo proudly sitting up and staring straight ahead, like a celestial Sphinx.

If you peer deeper into Leo with a small telescope or binoculars, you'll find a notable double star! Look in the sickle of Leo for its second-brightest star, Algieba - also called Gamma Leonis. This star splits into two bright yellow stars with even a small magnification - you can make this "split" with binoculars, but it's more apparent with a telescope. Compare the color and intensity of these two stars - do you notice any differences? There are other multiple star systems in Leo – spend a few minutes scanning with your instrument of choice, and see what you discover.

One of the most famous sights in Leo is the "Leo Triplet": three galaxies that appear to be close together. They are indeed gravitationally bound to one another, around 30 million light years away! You'll need a telescope to spot them, and use an eyepiece with a wide field of view to see all three galaxies at once! Look below the star Chertan to find these galaxies. Compare and contrast the appearance of each galaxy – while they are all spiral galaxies, each one is tilted at different angles to our point of view! Do they all look like spiral galaxies to you?

April is Citizen Science Month, and there are some fun Leo-related activities you can participate in! If you enjoy comparing the Triplets, the "Galaxy Zoo" project (galaxyzoo.org) could use your eyes to help classify different galaxies from sky survey data! Looking at Leo itself can even help measure light pollution: the Globe at Night project (globeatnight.org) uses Leo as their target constellation for sky quality observations from the Northern Hemisphere for their April campaign, running from April 3-12. Find and participate in many more NASA community science programs at science.nasa.gov/citizenscience. Happy observing!




*The stars of Leo: note that you may see more or less stars, depending on your sky quality. The brightness of the Leo Triplet has been exaggerated for the purposes of the illustration - you can't see them with your unaided eye.*

*Your view of the three galaxies in the Leo Triplet won't look as amazing as this image taken by the VLT Survey Telescope, unless you have a telescope with a mirror 8 feet or more in diameter! Still, even a small telescope will help your eyes pick up these three galaxies as "faint fuzzies": objects that seem blurry against a background of pinpoint stars. Let your eyes relax and experiment with observing these galaxies by looking slightly away from them, instead of looking directly at them; this is called averted vision, a handy technique that can help you see details in fainter, more nebulous objects.*
*Image Credit: ESO, INAF-VST, OmegaCAM; Acknowledgement: OmegaCen, Astro-WISE, Kapteyn I.*

**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

**Astronomers image magnetic fields at the edge of M87's black hole**

The Event Horizon Telescope (EHT) collaboration, which produced the first-ever image of a black hole, has today revealed a new view of the massive object at the center of the Messier 87 (M87) galaxy: How it looks in polarized light. This is the first time astronomers have been able to measure polarization, a signature of magnetic fields, this close to the edge of a black hole. The observations are key to explaining how the M87 galaxy, located 55 million light-years away, is able to launch energetic jets from its core. . . (continued at https://phys.org/news/2021-03-astronomers-image-magnetic-fields-edge.html )

**Join Us In Planning For The Next "Great American Eclipse"**

Are you a solar eclipse enthusiast with an organizational bent? An upcoming virtual workshop geared toward planning for the 2023 and 2024 events could be just the thing for you. In a little more than three years' time — on April 8, 2024 to be exact — the Sun will be blotted out of the sky for many excited viewers in North America. It will be the continent's first total solar eclipse in seven years, since totality last crossed the United States in August 2017. . . (continued at https://skyandtelescope.org/get-involved/join-us-in-planning-for-the-next-great-american-eclipse/ )

**Asteroid Apophis Will Miss Earth In 2068**

Radar measurements taken early this month rule out any chance of a collision with Apophis over the next 100 years. When scores of asteroid specialists convened virtually for a special 3-day conference dedicated to 99942 Apophis last November, one question was on everyone's mind: Could this sizable asteroid conceivably strike Earth in 2068? After all, with an estimated length of 340 meters (1,100 feet) and a mass somewhere north of 20 million tons, Apophis would surely deal a devastating blow to much of our planet were it ever to hit. . . (continued at https://skyandtelescope.org/astronomy-news/asteroid-apophis-will-miss-earth-in-2068/ )

**Is An Ocean Of Mars Water Trapped In The Planet's Crust?**

A new study suggests that by 3 billion years ago, most of the Red Planet's water was locked away in minerals, and it has stayed there ever since. Nearly two dozen orbiters, landers, and rovers sent to Mars have shown that the Red Planet was once quite wet. There's evidence for enough past water to surround Mars in a global ocean between 100 and 1,500 meters (300 to 5,000 feet) deep. Now Mars is effectively a desert planet — so where did all that water go? (continued at https://skyandtelescope.org/astronomy-news/is-an-ocean-of-mars-water-trapped-in-the-planets-crust/ )

**New nova in Cassiopeia brightens rapidly**

There's a 'new star' – a classical nova – on show among the stars of the far-northern constellation of Cassiopeia. Nova Cas 2021 was discovered on 18 March shining at around magnitude +9.6, but it appears to have brightened rapidly to around magnitude +7.5 on 19 March. Nova Cas 2021 should be visible through a pair of 10 x 50 binoculars or a small telescope at the precise position RA 23h 24m 47.73s, Dec +61° 11' 14.8" (J2000.0). It's handily placed, lying just 2.5 arcminutes north-east of the magnitude +8.9 star HIP 115566 (SAO 20610), which itself is located a 24-arcminute hop to the south of the bright open star cluster Messier 52 (NGC 7654). ( continued at https://astronomynow.com/2021/03/19/new-nova-in-cassiopeia-brightens-rapidly/ )

# Space News

News from around the Net

**Earth has been hiding a fifth layer in its inner core**

One of geology's basic principles is that the Earth is made up of four layers: the crust, the mantle, the outer core, and the inner core. But this may be squashed in light of a new study that suggests Earth actually has a distinct fifth layer that's been under our feet all along. Researchers at the Australian National University (ANU) say that the new layer they uncovered is located within Earth's inner core. Deeper analysis of this discovery could help scientists better understand our planet's history and evolution.. .(continued at https://astronomy.com/news/2021/03/earth-has-been-hiding-a-fifth-layer-in-its-inner-core )

**A 'lump' of dark matter may be ripping apart Taurus' face**

The Hyades — a young, V-shaped cluster of stars swooshing through the head of the constellation Taurus — is slowly being ripped apart by an enormous, invisible mass, a new study suggests. This unrest in the bull's head could point to an ancient cache of dark matter left over from the Milky Way's creation, the study authors said. . . . (continued at https://www.space.com/hyades-star-cluster-dissolving-dark-matter.html )

**A Planet For Vega.**

Vega is arguably one of the prettiest stars in the night sky. Brilliant and blue, it's the sparkling sapphire that marks the constellation Lyra high in the northern sky. It's one of the brightest stars in the sky, due to it being close to us, just 25 light years away, and intrinsically luminous, pouring out 40 times more energy than the Sun. . . ( continued at https://www.syfy.com/syfywire/a-planet-for-vega )

**The Best Image Ever Taken Of The Cosmic Web Reveals The Birthplace Of Galaxies**

For the first time, astronomers have obtained large-scale images of the cosmic web — the incredibly ancient scaffolding of dark matter and hydrogen gas out of which galaxies in the Universe were formed. This material is so far away and so incredibly faint that it took one of the largest telescopes in the world coupled with one of the most powerful cameras to see it at all. But what they found in their images was the very framework of the Universe. . . ( continued at https://www.syfy.com/syfywire/the-best-image-ever-taken-of-the-cosmic-web-reveals-the-birthplace-of-galaxies )

**What If Another Sun Entered Our Solar System?**

With the vastness of the Universe, everything in it seems so spread out. But some objects are closer than you might realize. Every now and then, a random interstellar asteroid passes through the Oort cloud, the wall of icy debris at the very edge of our Solar System. But what if a rogue star unceremoniously rampaged right through the Oort cloud? And how bad would it be, if it brought other planets along for the ride? . . ( continued at https://insh.world/science/what-if-another-sun-entered-our-solar-system/ )

# Space News

News from around the Net

**How do we measure distance in space?**

How do we know how far away objects are in space, and what units of measurements are used in astronomy for determining these distances? How do astronomers measure distances in space? How can we possibly determine the distance to a nearby galaxy? Astronomers regularly talk with confidence about how far away stars and galaxies are, but how is it possible to calculate such distances? Astronomers measure the distance between objects in space using a tool called the 'cosmic distance ladder', which is a range of different interconnected techniques (see below). . . . ( continued at https://www.skyatnightmagazine.com/space-science/measuring-distance-space/ )

**NASA's Pandora Mission Will Open A Pandora's Box Of Mysteries About Alien Atmospheres**

That mythical box Pandora should have never opened might have unleashed all sorts of terrors on Earth, but there could be much more tantalizing things hiding in the depths of space. Millions of secrets are hiding the atmospheres of exoplanets. Now that we are transitioning from exoplanet discovery to characterization, NASA wants to launch its Pandora mission around the same time as the James Webb Space Telescope (JWST) to see what is really out there. There has been one problem plaguing past planet-hunting telescopes including Kepler, Spitzer, Hubble and even TESS. Stars have gotten in the way and made it look like some transiting exoplanets had characteristics that actually belonged to those stars. (continued at https://www.syfy.com/syfywire/nasas-pandora-mission-will-see-into-alien-atmospheres )

**Space Telescope Delivers the Goods: 2,200 Possible Planets**

The news is out of this world: NASA's TESS space telescope has captured evidence of more than 2,200 candidate planets orbiting bright, nearby stars, including hundreds of "smaller" planets – many possibly rocky worlds in some ways similar to Earth. As scientists seek to confirm the discoveries, TESS's large haul promises a possible explosion in the number of known exoplanets – planets orbiting other stars. Perhaps even better: The relative brightness of the stars they orbit should allow TESS's successor telescopes to probe some of these planets' atmospheres to search for water, oxygen, and other molecules that might make them hospitable to life. . . .( continued at https://exoplanets.nasa.gov/news/1677/space-telescope-delivers-the-goods-2200-possible-planets/ )

**Satellites contribute significant light pollution to night skies**

Scientists reported new research results today suggesting that artificial objects in orbit around the Earth are brightening night skies on our planet significantly more than previously understood. The research, accepted for publication in Monthly Notices of the Royal Astronomical Society: Letters, finds that the number of objects orbiting Earth could elevate the overall brightness of the night sky by more than 10 percent above natural light levels across a large part of the planet. This would exceed a threshold that astronomers set over 40 years ago for considering a location "light polluted." . . .( continued at https://www.sciencedaily.com/releases/2021/03/210329122817.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. Individual campsites cost $20 per night. Enter off Avenue K.

## Planet Summary

The **Sun** starts April in Pisces and crosses into Aries by the end of the month.

**Mercury** can be observed early in the month in the morning sky, and then with difficulty in the evening sky very late in the month. In between it will achieve superior conjunction on the 19th.

**Venus** starts the month in Pisces ending the month in Aries at a mag of -3.91. Problem is the Sun is in Pisces too. It reemerges in the evening twilight very late in the month.

**Mars** starts the month in Taurus slowly moving east ending the month at the feet of Gemini. On the 17th the Moon slides past, seen best from the eastern hemisphere. On the 27th Mars is just 0.5° north for M35.

**Jupiter** starts the month in eastern Capricorn ending up in western Aquarius. The waning crescent Moon makes a close, 4°south, pass on the 7th.

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**Saturn** spends the month leading Jupiter among the stars of Capricorn. On the 6th 28% waning Moon passes less than 5° to the south.

**Uranus** will spend the month in southern Aries at magnitude 5.8. An almost new Moon slides past on the 13th but fades into twilight as it approaches solar conjunction on the 30th. .

**Neptune** will spend the month stationary in northeast Aquarius at mag 7.9. The 6% waning Moon will pass 5° south the morning of the 9th.

**Pluto** spends the month in Sagittarius at mag 14 . On the 4th the waning Moon slides past to the south by 5°

## Sun and Moon Rise and Set

First Qtr Apr 20 | Full Apr 26 | Third Qtr Apr 4 | New Apr 11

## Sun and Moon Rise and Set*

| Date | Moonrise | Moonset | Sunrise | Sunset |
|---|---|---|---|---|
| 4/1/2021 | 23:01 | 09:28 | 06:39 | 19:14 |
| 4/5/2021 | 08:27 | 22:58 | 06:33 | 19:17 |
| 4/10/2021 | 06:06 | 18:16 | 06:27 | 19:21 |
| 4/15/2021 | 08:27 | 22:58 | 06:20 | 19:25 |
| 4/20/2021 | 12:32 | 02:27 | 06:14 | 19:29 |
| 4/25/2021 | 18:09 | 05:27 | 06:08 | 19:33 |
| 4/30/2021 | 23:08 | 09:00 | 06:03 | 19:37 |

## Planet Data*

Apr 1

| | Rise | Transit | Set | Mag | Phase% |
|---|---|---|---|---|---|
| Mercury | 06:07 | 12:00 | 17:53 | -0.53 | 87.0 |
| Venus | 06:50 | 13:05 | 19:20 | -3.91 | 99.9 |
| Mars | 09:58 | 17:14 | 00:29 | 1.31 | 91.4 |
| Jupiter | 04:34 | 09:56 | 15:17 | -2.11 | 99.4 |
| Saturn | 03:57 | 09:08 | 14:19 | 0.75 | 99.8 |

Apr 15

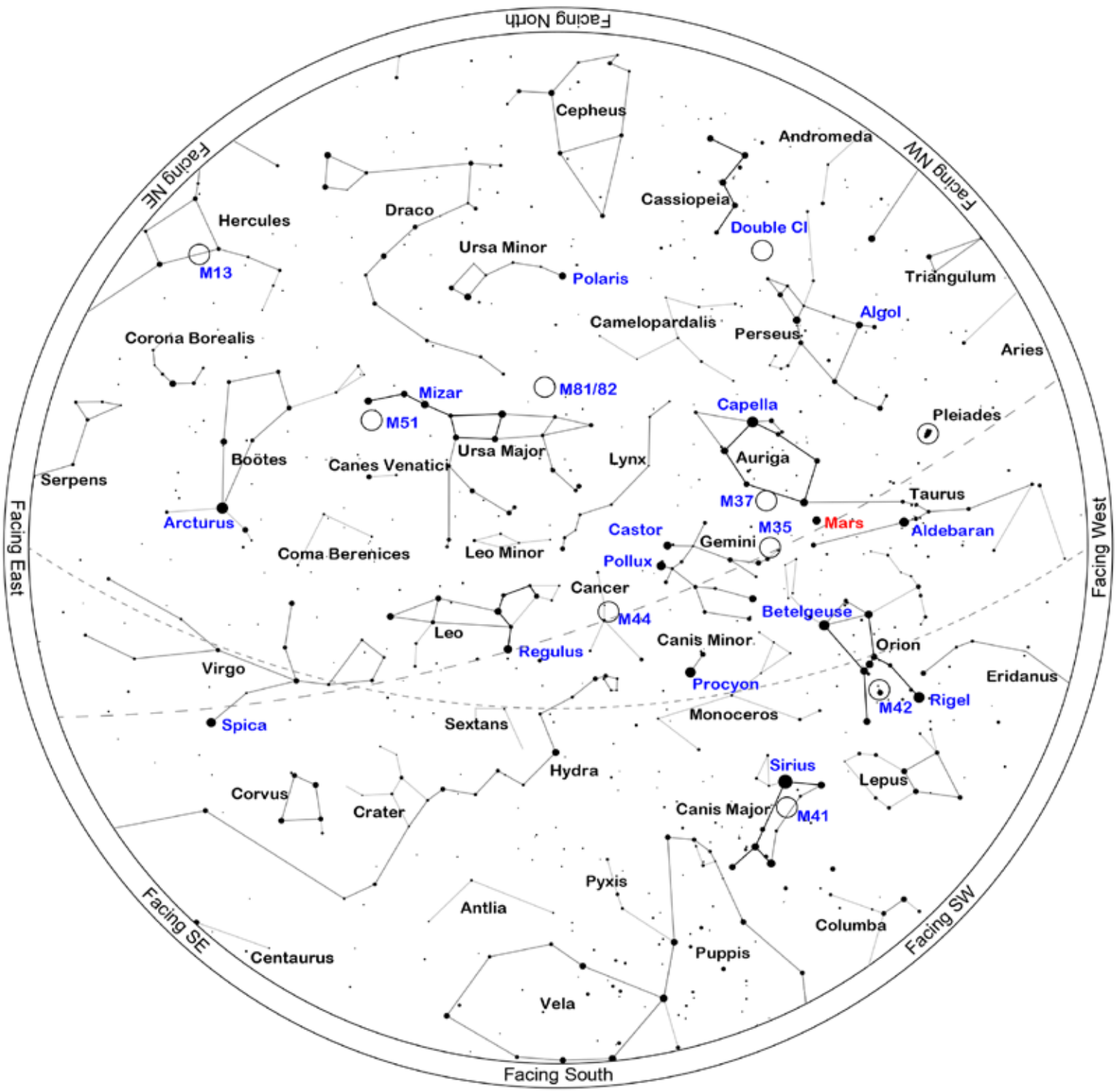
| | Rise | Transit | Set | Mag | Phase% |
|---|---|---|---|---|---|
| Mercury | 06:16 | 12:41 | 19:07 | -1.77 | 99.2 |
| Venus | 06:40 | 13:14 | 19:49 | -3.91 | 99.5 |
| Mars | 09:38 | 16:55 | 00:13 | 1.44 | 92.4 |
| Jupiter | 03:47 | 09:11 | 14:34 | -2.18 | 99.2 |
| Saturn | 03:05 | 08:17 | 13:28 | 0.74 | 99.7 |

Apr 30

| | Rise | Transit | Set | Mag | Phase% |
|---|---|---|---|---|---|
| Mercury | 06:39 | 13:41 | 20:45 | -1.14 | 82.9 |
| Venus | 06:34 | 13:27 | 20:20 | -3.91 | 98.7 |
| Mars | 09:19 | 16:36 | 23:54 | 1.56 | 93.4 |
| Jupiter | 02:55 | 08:21 | 13:47 | -2.22 | 99.0 |
| Saturn | 02:09 | 07:21 | 12:33 | 0.70 | 99.7. |

*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 April 10, 21:00 (UTC -07:00)

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 April 10, 2021. The list is sorted by the transit time of the object.

| ID | Type | | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| M110 | Galaxy | And | 00h 40m 22s | +41° 41.1' | 8.9 | 03:45 | 12:23 | 21:00 |
| M32 | Galaxy | And | 00h 42m 42s | +40° 51.9' | 9.1 | 03:52 | 12:25 | 20:57 |
| M31 | Galaxy | And | 00h 42m 44s | +41° 16.1' | 4.3 | 03:50 | 12:25 | 21:00 |
| M103 | Open | Cas | 01h 33m 23s | +60° 39.0' | 7.0 | Circum | 13:16 | Circum |
| M33 | Galaxy | Tri | 01h 33m 51s | +30° 39.6' | 6.2 | 05:35 | 13:16 | 20:57 |
| M74 | Galaxy | Psc | 01h 36m 42s | +15° 47.0' | 9.8 | 06:31 | 13:19 | 20:07 |
| M76 | P Neb | Per | 01h 42m 18s | +51° 34.2' | 12.0 | 03:10 | 13:25 | 23:39 |
| M34 | Open | Per | 02h 42m 05s | +42° 45.6' | 6.0 | 05:39 | 14:24 | 23:09 |
| M77 | Galaxy | Cet | 02h 42m 41s | -00° 00.8' | 9.7 | 08:22 | 14:25 | 20:28 |
| M45 | Open | Tau | 03h 47m 30s | +24° 07.0' | 1.6 | 08:14 | 15:30 | 22:45 |
| M79 | Globular | Lep | 05h 24m 11s | -24° 31.4' | 8.5 | 12:17 | 17:06 | 21:56 |
| M38 | Open | Aur | 05h 28m 40s | +35° 50.8' | 7.0 | 09:06 | 17:11 | 01:15 |
| M1 | SNR | Tau | 05h 34m 32s | +22° 00.8' | 8.4 | 10:08 | 17:17 | 00:25 |
| M42 | Open+D Neb | Ori | 05h 35m 16s | -05° 23.4' | 4.0 | 11:30 | 17:18 | 23:05 |
| M43 | D Neb | Ori | 05h 35m 31s | -05° 16.0' | 9.0 | 11:30 | 17:18 | 23:06 |
| M36 | Open | Aur | 05h 36m 18s | +34° 08.3' | 6.5 | 09:22 | 17:19 | 01:15 |
| M78 | D Neb | Ori | 05h 46m 45s | +00° 04.7' | 8.0 | 11:26 | 17:29 | 23:32 |
| M37 | Open | Aur | 05h 52m 18s | +32° 33.1' | 6.0 | 09:46 | 17:35 | 01:24 |
| M35 | Open | Gem | 06h 09m 00s | +24° 21.0' | 5.5 | 10:35 | 17:51 | 01:08 |
| M41 | Open | CMa | 06h 46m 01s | -20° 45.3' | 5.0 | 13:26 | 18:28 | 23:30 |
| M50 | Open | Mon | 07h 02m 42s | -08° 23.0' | 7.0 | 13:06 | 18:45 | 00:24 |
| M47 | Open | Pup | 07h 36m 35s | -14° 29.0' | 4.5 | 13:57 | 19:19 | 00:40 |
| M46 | Open | Pup | 07h 41m 46s | -14° 48.6' | 6.5 | 14:03 | 19:24 | 00:45 |
| M93 | Open | Pup | 07h 44m 30s | -23° 51.3' | 6.5 | 14:35 | 19:27 | 00:18 |
| M48 | Open | Hya | 08h 13m 43s | -05° 45.0' | 5.5 | 14:09 | 19:56 | 01:43 |
| M44 | Open | Cnc | 08h 40m 24s | +19° 40.0' | 4.0 | 13:22 | 20:23 | 03:23 |
| M67 | Open | Cnc | 08h 51m 18s | +11° 48.0' | 7.5 | 13:57 | 20:34 | 03:10 |
| M81 | Galaxy | UMa | 09h 55m 33s | +69° 03.9' | 7.8 | Circum | 21:38 | Circum |
| M82 | Galaxy | UMa | 09h 55m 53s | +69° 40.8' | 9.2 | Circum | 21:38 | Circum |
| M95 | Galaxy | Leo | 10h 43m 58s | +11° 42.2' | 10.6 | 15:50 | 22:26 | 05:02 |
| M96 | Galaxy | Leo | 10h 46m 46s | +11° 49.2' | 10.1 | 15:53 | 22:29 | 05:05 |
| M105 | Galaxy | Leo | 10h 47m 50s | +12° 34.9' | 10.5 | 15:52 | 22:30 | 05:09 |
| M108 | Galaxy | UMa | 11h 11m 31s | +55° 40.4' | 10.6 | Circum | 22:54 | Circum |
| M97 | P Neb | UMa | 11h 14m 48s | +55° 01.1' | 12.0 | Circum | 22:57 | Circum |
| M65 | Galaxy | Leo | 11h 18m 56s | +13° 05.5' | 10.1 | 16:21 | 23:01 | 05:41 |
| M66 | Galaxy | Leo | 11h 20m 15s | +12° 59.4' | 9.7 | 16:23 | 23:02 | 05:42 |

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| M109 | Galaxy | UMa | 11h 57m 36s | +53° 22.4' | 10.6 | 12:49 | 23:40 | 10:31 |
| M98 | Galaxy | Com | 12h 13m 48s | +14° 54.0' | 10.9 | 17:11 | 23:56 | 06:42 |
| M99 | Galaxy | Com | 12h 18m 50s | +14° 25.0' | 10.4 | 17:17 | 00:01 | 06:45 |
| M106 | Galaxy | CVn | 12h 18m 58s | +47° 18.2' | 9.1 | 14:39 | 00:01 | 09:23 |
| M61 | Galaxy | Vir | 12h 21m 55s | +04° 28.3' | 10.1 | 17:49 | 00:04 | 06:19 |
| M40 | Dbl+Asterism | UMa | 12h 22m 12s | +58° 05.0' | 8.7 | Circum | 00:04 | Circum |
| M100 | Galaxy | Com | 12h 22m 55s | +15° 49.3' | 10.1 | 17:17 | 00:05 | 06:54 |
| M84 | Galaxy | Vir | 12h 25m 04s | +12° 53.2' | 10.2 | 17:28 | 00:07 | 06:47 |
| M85 | Galaxy | Com | 12h 25m 24s | +18° 11.4' | 10.0 | 17:12 | 00:08 | 07:03 |
| M86 | Galaxy | Vir | 12h 26m 12s | +12° 56.7' | 9.9 | 17:29 | 00:08 | 06:48 |
| M49 | Galaxy | Vir | 12h 29m 47s | +08° 00.0' | 9.3 | 17:47 | 00:12 | 06:37 |
| M87 | Galaxy | Vir | 12h 30m 49s | +12° 23.4' | 9.6 | 17:35 | 00:13 | 06:51 |
| M88 | Galaxy | Com | 12h 31m 59s | +14° 25.2' | 10.2 | 17:30 | 00:14 | 06:58 |
| M91 | Galaxy | Com | 12h 35m 27s | +14° 29.7' | 10.9 | 17:33 | 00:18 | 07:02 |
| M89 | Galaxy | Vir | 12h 35m 40s | +12° 33.3' | 10.9 | 17:39 | 00:18 | 06:56 |
| M90 | Galaxy | Vir | 12h 36m 50s | +13° 09.7' | 10.2 | 17:39 | 00:19 | 06:59 |
| M58 | Galaxy | Vir | 12h 37m 44s | +11° 49.1' | 10.4 | 17:44 | 00:20 | 06:56 |
| M68 | Globular | Hya | 12h 39m 28s | -26° 44.5' | 9.0 | 19:40 | 00:22 | 05:03 |
| M104 | Galaxy | Vir | 12h 39m 59s | -11° 37.3' | 9.2 | 18:52 | 00:22 | 05:52 |
| M59 | Galaxy | Vir | 12h 42m 02s | +11° 38.7' | 10.7 | 17:48 | 00:24 | 07:00 |
| M60 | Galaxy | Vir | 12h 43m 40s | +11° 33.1' | 9.8 | 17:50 | 00:26 | 07:01 |
| M94 | Galaxy | CVn | 12h 50m 53s | +41° 07.1' | 8.9 | 15:59 | 00:33 | 09:07 |
| M64 | Galaxy | Com | 12h 56m 44s | +21° 41.0' | 9.3 | 17:32 | 00:39 | 07:46 |
| M53 | Globular | Com | 13h 12m 55s | +18° 10.1' | 8.5 | 17:59 | 00:55 | 07:51 |
| M63 | Galaxy | CVn | 13h 15m 49s | +42° 01.7' | 9.3 | 16:18 | 00:58 | 09:38 |
| M51 | Galaxy | CVn | 13h 29m 52s | +47° 11.7' | 8.9 | 15:51 | 01:12 | 10:33 |
| M83 | Galaxy | Hya | 13h 37m 00s | -29° 51.8' | 8.0 | 20:50 | 01:19 | 05:49 |
| M3 | Globular | CVn | 13h 42m 11s | +28° 22.5' | 7.0 | 17:53 | 01:24 | 08:56 |
| M101 | Galaxy | UMa | 14h 03m 13s | +54° 20.9' | 8.2 | 14:18 | 01:45 | 13:13 |
| M102 | Galaxy | Dra | 15h 06m 30s | +55° 45.7' | 10.8 | Circum | 02:49 | Circum |
| M5 | Globular | Ser | 15h 18m 33s | +02° 04.9' | 7.0 | 20:52 | 03:01 | 09:09 |
| M80 | Globular | Sco | 16h 17m 03s | -22° 58.5' | 8.5 | 23:05 | 03:59 | 08:54 |
| M4 | Globular | Sco | 16h 23m 35s | -26° 31.5' | 7.5 | 23:24 | 04:06 | 08:48 |
| M107 | Globular | Oph | 16h 32m 32s | -13° 03.1' | 10.0 | 22:49 | 04:15 | 09:41 |
| M13 | Globular | Her | 16h 41m 41s | +36° 27.5' | 7.0 | 20:16 | 04:24 | 12:32 |
| M12 | Globular | Oph | 16h 47m 14s | -01° 56.8' | 8.0 | 22:32 | 04:29 | 10:27 |
| M10 | Globular | Oph | 16h 57m 09s | -04° 05.9' | 7.5 | 22:48 | 04:39 | 10:31 |
| M62 | Globular | Oph | 17h 01m 13s | -30° 06.7' | 8.0 | 00:15 | 04:43 | 09:12 |
| M19 | Globular | Oph | 17h 02m 38s | -26° 16.0' | 8.5 | 00:02 | 04:45 | 09:28 |
| M92 | Globular | Her | 17h 17m 07s | +43° 08.1' | 7.5 | 20:12 | 04:59 | 13:47 |
| M9 | Globular | Oph | 17h 19m 12s | -18° 31.0' | 9.0 | 23:52 | 05:01 | 10:11 |

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| M14 | Globular | Oph | 17h 37m 36s | -03° 14.7' | 9.5 | 23:26 | 05:20 | 11:14 |
| M6 | Open | Sco | 17h 40m 20s | -32° 15.2' | 4.5 | 01:03 | 05:23 | 09:42 |
| M7 | Open | Sco | 17h 53m 51s | -34° 47.6' | 3.5 | 01:28 | 05:36 | 09:44 |
| M23 | Open | Sgr | 17h 57m 04s | -18° 59.1' | 6.0 | 00:32 | 05:39 | 10:47 |
| M20 | Open+D Neb | Sgr | 18h 02m 42s | -22° 58.2' | 5.0 | 00:50 | 05:45 | 10:40 |
| M8 | Open+D Neb | Sgr | 18h 03m 41s | -24° 22.7' | 5.0 | 00:56 | 05:46 | 10:36 |
| M21 | Open | Sgr | 18h 04m 13s | -22° 29.3' | 7.0 | 00:50 | 05:46 | 10:43 |
| M24 | Open | Sgr | 18h 18m 26s | -18° 24.3' | 4.5 | 00:51 | 06:01 | 11:10 |
| M16 | Open+D Neb | Ser | 18h 18m 48s | -13° 48.3' | 6.5 | 00:38 | 06:01 | 11:25 |
| M18 | Open | Sgr | 18h 19m 58s | -17° 06.1' | 8.0 | 00:49 | 06:02 | 11:16 |
| M17 | Open+D Neb | Sgr | 18h 20m 47s | -16° 10.3' | 7.0 | 00:47 | 06:03 | 11:19 |
| M28 | Globular | Sgr | 18h 24m 33s | -24° 52.1' | 8.5 | 01:19 | 06:07 | 10:55 |
| M69 | Globular | Sgr | 18h 31m 23s | -32° 20.8' | 9.0 | 01:54 | 06:14 | 10:33 |
| 25 | Open | Sgr | 18h 31m 42s | -19° 07.0' | 6.5 | 01:07 | 06:14 | 11:21 |
| M22 | Globular | Sgr | 18h 36m 24s | -23° 54.2' | 6.5 | 01:27 | 06:19 | 11:10 |
| M70 | Globular | Sgr | 18h 43m 12s | -32° 17.4' | 9.0 | 02:06 | 06:25 | 10:45 |
| M26 | Open | Sct | 18h 45m 18s | -09° 23.0' | 9.5 | 00:51 | 06:28 | 12:04 |
| M11 | Open | Sct | 18h 51m 05s | -06° 16.1' | 7.0 | 00:48 | 06:33 | 12:19 |
| M57 | P Neb | Lyr | 18h 53m 35s | +33° 01.7' | 9.5 | 22:45 | 06:36 | 14:27 |
| M54 | Globular | Sgr | 18h 55m 03s | -30° 28.7' | 8.5 | 02:10 | 06:37 | 11:04 |
| M56 | Globular | Lyr | 19h 16m 36s | +30° 11.0' | 9.5 | 23:20 | 06:59 | 14:38 |
| M55 | Globular | Sgr | 19h 40m 00s | -30° 57.7' | 7.0 | 02:57 | 07:22 | 11:47 |
| M71 | Globular | Sge | 19h 53m 46s | +18° 46.6' | 8.5 | 00:38 | 07:36 | 14:34 |
| M27 | P Neb | Vul | 19h 59m 36s | +22° 43.2' | 7.5 | 00:31 | 07:42 | 14:53 |
| M75 | Globular | Sgr | 20h 06m 05s | -21° 55.3' | 9.5 | 02:50 | 07:48 | 12:46 |
| M29 | Open | Cyg | 20h 23m 57s | +38° 30.5' | 9.0 | 23:48 | 08:06 | 16:25 |
| M72 | Globular | Aqr | 20h 53m 28s | -12° 32.2' | 10.0 | 03:08 | 08:36 | 14:03 |
| M73 | Open+Asterism | Aqr | 20h 58m 56s | -12° 38.1' | 9.0 | 03:14 | 08:41 | 14:08 |
| M15 | Globular | Peg | 21h 29m 58s | +12° 10.0' | 7.5 | 02:35 | 09:12 | 15:50 |
| M39 | Open | Cyg | 21h 31m 42s | +48° 25.0' | 5.5 | 23:41 | 09:14 | 18:47 |
| M2 | Globular | Aqr | 21h 33m 27s | -00° 49.3' | 7.5 | 03:15 | 09:16 | 15:16 |
| M30 | Globular | Cap | 21h 40m 22s | -23° 10.7' | 8.5 | 04:29 | 09:23 | 14:16 |
| M52 | Open | Cas | 23h 24m 48s | +61° 35.6' | 8.0 | Circum | 11:07 | Circum |
| | | | | | | | | |
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