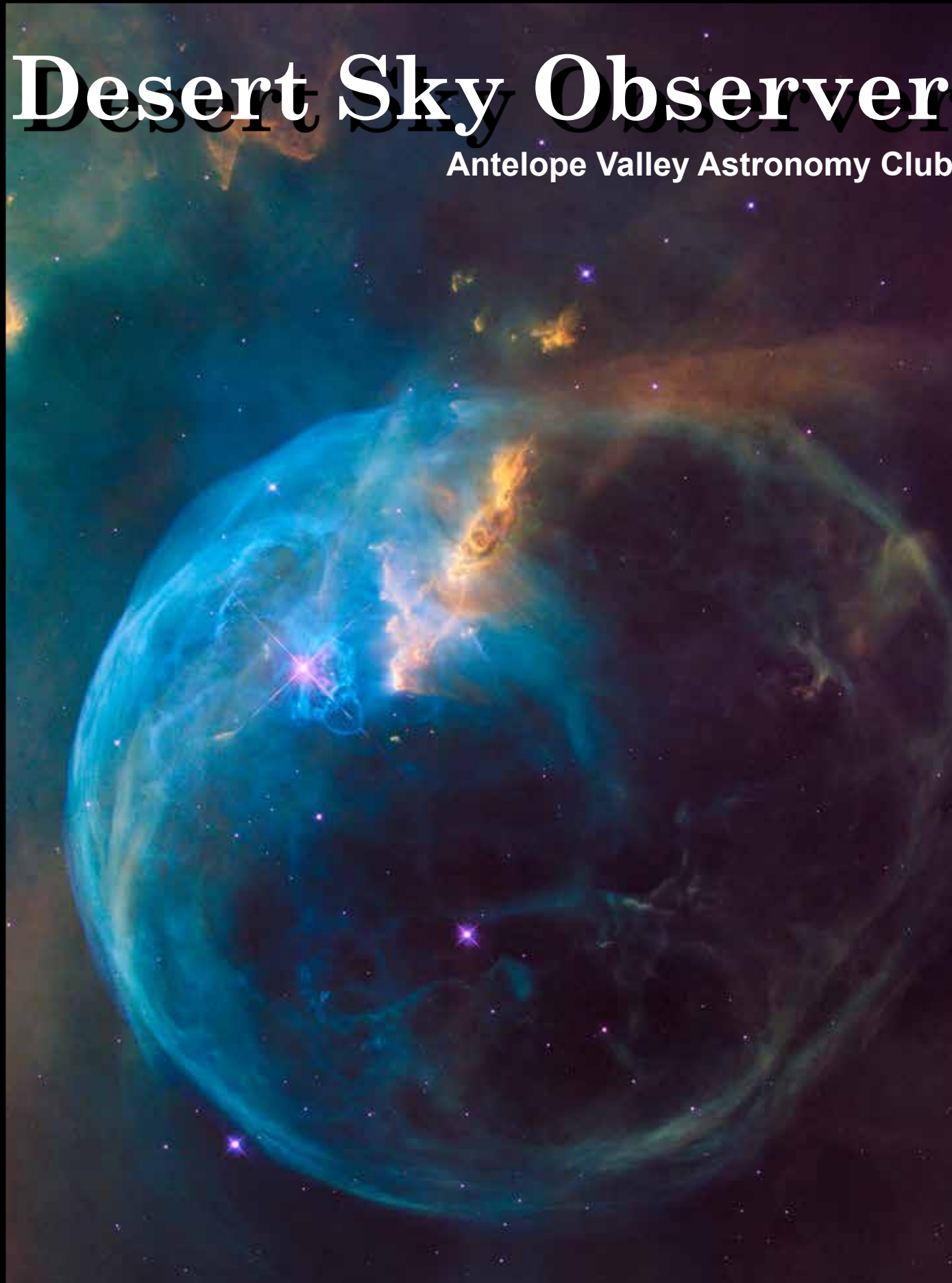


Volume 41.6

June 2021

Desert Sky Observer

Antelope Valley Astronomy Club



Desert Sky Observer

www.avastronomyclub.org

June 2021

Upcoming Events

June 11: Club Meeting -- Zoom

June 12 Deep Sky Star Party -- Chuchupate

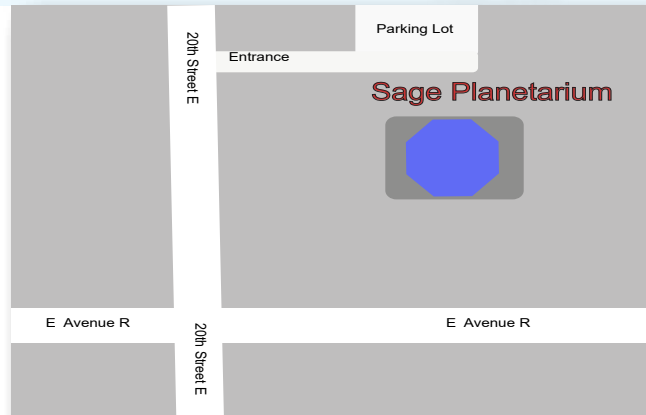
Any clear night: Personal Star Party

July 9: Club Meeting -- Zoom

July 10: Deep Sky Star Party
-- Mt Pinos ? TBA



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
ds@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/.

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

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



www.avastronomyclub.org



President's Message

By Darrell Bennett

Well hello everyone,

I hope we are seeing the light at the end of the tunnel on this Covid-19. The governor said that he would open everything this month, let's hope for it.

I miss the meeting at the Sage and most of all Prime Desert Woodlands. Caroline from the State Parks got back to me and said the group campground at Saddleback Butte is still closed and will let me know when it will open; she's just waiting to hear back from Sacramento for the ok.

Last month we had our Deep Sky Park at Chuchupate again, mainly it's the only place we can hold one. It will be there again this month on June 12th. As it's getting warmer now, I hope the viewing will be better.

I see the club Zoom meeting and the Lunar Club both were canceled. I don't know why the Zoom meeting was canceled. I heard about the wind at Judy's house. I was in Texas for my granddaughter's first birthday party.

Did anyone get up in the middle of the night to see the Lunar Eclipse? I didn't get up, because I enjoy my sleep more. There will be one next year at a decent hour. If anyone did get up to watch it and took some pictures please send them to Phil so he can put them in the next DSO.

I hope to see some of you at Chuchupate on June 12th.

Until then keep looking up.

On The Cover

The Bubble Nebula, also known as NGC 7635, is an emission nebula located 8 000 light-years away. This stunning new image was observed by the NASA/ESA Hubble Space Telescope to celebrate its 26th year in space.

Credit:

NASA, ESA, Hubble Heritage Team

From the Secretary

By Rose Moore

Members:

I know some of us were looking forward to attending the Lunar Club at Judy's home, but we had to cancel due to the wind. We'll try to get another rescheduled. Otherwise our next Lunar Club will be in September.

Coming up in June we have a Zoom meeting on Friday June 11th at 7pm. Further info to follow. I'm not sure if things will be open enough for us to be attending meetings at the SAGE for June or July.

We have a dark sky star party scheduled for Saturday June 12th at either Chuchupate or Mt. Pinos. We will send out info as we get closer to the date, weather permitting, and hopefully no forest fires! Remember, even if you have no telescope, you are welcome to come up and view through other member's scopes! This is an overnight event, and people usually start arriving by mid-afternoon on Saturday.

As of this past week, Saddleback still has not opened the group campsite. I have been in contact with Ranger Jean Rhyne, and she'll keep us posted.

Did anyone see the Lunar Eclipse on the 26th? Frank was up and went out but we were clouded over.

We are thinking of holding a club picnic and star party sometime during the summer. Stay tuned for details on this. We have to find a venue, hopefully close by the Antelope Valley.

If anyone would like to contribute any astronomy pictures they've taken, or write up something of interest they've done with astronomy or observing, please submit them to Phil, our DSO Editor. We'd love to hear from you!

Be safe, 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...



Dark Sky Star Party at Chuchupate parking lot on May 8, 2021. Only Darrell, Matt, Rod, and Phil were from AVAC (the four closest cars). Everybody else came from other clubs in Ventura and Kern counties.

Q: What's a light-year?

A: The same as a regular year, but with less calories.

AVAC Membership Renewal

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.

The easiest way to renew your membership is 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

Astrophotography With Your Smartphone

by David Prosper, NASA Night Sky Network

Have you ever wanted to take night time photos like you've seen online, with the Milky Way stretched across the sky, a blood-red Moon during a total eclipse, or a colorful nebula? Many astrophotos take hours of time, expensive equipment, and travel, which can intimidate beginners to astrophotography. However, anyone with a camera can take astrophotos; even if you have a just smartphone, you can do astrophotography. Seriously!

Don't expect Hubble-level images starting out! However, you can take surprisingly impressive shots by practicing several basic techniques: steadiness, locked focus, long exposure, and processing. First, steady your smartphone to keep your subjects sharp. This is especially important in low light conditions. A small tripod is ideal, but an improvised stand, like a rock or block of wood, works in a pinch. Most camera apps offer timer options to delay taking a photo by a few seconds, which reduces the vibration of your fingers when taking a shot. Next, lock your focus. Smartphones use autofocus, which is not ideal for low-light photos, especially if the camera readjusts focus mid-session. Tap the phone's screen to focus on a distant bright star or streetlight, then check for options to fine-tune and lock it. Adjusting your camera's exposure time is also essential. The longer your camera is open, the more light it gathers - essential for low-light astrophotography. Start by setting your exposure time to a few seconds. With those options set, take a test photo of your target! If your phone's camera app doesn't offer these options, you can download apps that do. While some phones offer an "astrophotography" setting, this is still rare as of 2021. Finally, process your photos using an app on your phone or computer to bring out additional detail! Post-processing is the secret of all astrophotography.

You now have your own first astrophotos! Wondering what you can do next? Practice: take lots of photos using different settings, especially before deciding on any equipment upgrades. Luckily, there are many amazing resources for budding astrophotographers. NASA has a free eBook with extensive tips for smartphone astrophotography at bit.ly/smartastrophoto, and you can also join the Smartphone Astrophotography project at bit.ly/smartphoneastroproject. Members of astronomy clubs often offer tips or even lessons on astrophotography; you can find a club near you by searching the "Clubs and Events" map on the Night Sky Network's website at nightsky.jpl.nasa.gov. May you have clear skies!

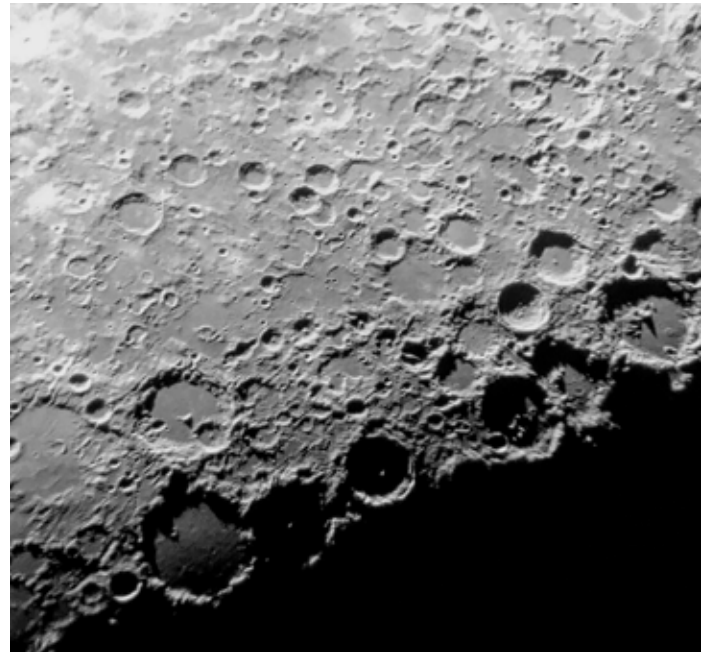
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June 2021



A small tripod for a smartphone. They are relatively inexpensive – the author found this at a local dollar store!



The Moon is large and bright, making it a great target for beginners. The author took both of these photos using an iPhone 6s. The crescent moon at sunset (left) was taken with a phone propped on the roof rack of a car; the closeup shot of lunar craters (right) was taken through the eyepiece of a friend's Celestron C8 telescope.

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

Dark Energy Survey Catalogs 226 Million Galaxies

In one of the biggest sky surveys ever, astronomers have captured 226 million galaxies up to 7 billion light-years away in an area covering about one-eighth of the entire sky. This treasure trove of data provides scientists with the best-ever probe of cosmic evolution and illuminates the role of dark matter and dark energy in shaping the large-scale structure of the universe. . . .

(continued at <https://skyandtelescope.org/astronomy-news/dark-energy-survey-catalogs-226-million-galaxies/>)



Astronomers Challenge Claim Of Planet Around Barnard's Star

Due in part to its proximity, Barnard's star has the highest proper motion of any star, so its movement across the sky is clearly visible to the patient astronomer, including E. E. Barnard, whom the star is named after. Perhaps that's part of why it caught the imagination of science fiction writers, most notably serving as a stellar waystation in both *Hitchhiker's Guide to the Galaxy* and *The Garden of Rama*. . . (continued at <https://skyandtelescope.org/astronomy-news/astronomers-challenge-claim-of-planet-around-barnards-star/>)



Snapshot: A Spiral Galaxy Being Picked Apart

Pulled out of shape by a neighboring galaxy, NGC 2276 is a perfect example of how no two galaxies are exactly the same. Cotton candy is a delectable fair staple — dyed blue, the pieces sticking to your fingers as you pull on the spun sugar strands. Like sugary sweet cotton candy coming apart strand by strand, the spiral galaxy NGC 2276 is also being pulled and picked apart. Located 120 million light-years away in the constellation Cepheus, it has a neighboring galaxy, NGC 2300 . . . (continued at <https://astronomy.com/news/2021/05/snapshot-a-spiral-galaxy-being-picked-apart>)



Study Ties Solar Variability To Onset Of Decadal La Niña Events

A new study shows a correlation between the end of solar cycles and a switch to La Niña conditions in the Pacific Ocean, suggesting that the sun's variability can drive seasonal weather variability on Earth. The findings were published in the journal *Earth and Space Science*. If the connection holds up, it could significantly improve the ability to predict the largest La Niña events, (continues at https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=302661&org=NSF&from=news)



Astronomers Spot Merging Galaxies Hosting Dual Quasars

Astronomers have spotted two close pairs of quasars in the process of merging as their host galaxies crash together in a slow-motion collision 10 billion years ago. The quasars in both pairs are separated by about 10,000 light years, closer than any two quasars yet found at such an early point in the evolution of the universe. . . . (continued at <https://astronomynow.com/2021/04/07/astronomers-spot-merging-galaxies-hosting-dual-quasars/>)



Space News

News from around the Net

Helium ‘Rain’ In Saturn’s Interior May Influence Magnetic Field

Data collected by NASA’s Cassini spacecraft during its final few orbits of Saturn are adding new insights into the nature of the ringed planet’s magnetic field. Saturn’s interior is thought to be made up of a central ice/rock core, surrounded by a layer of electrically conducting metallic hydrogen that generates the dynamo responsible for the planet’s magnetic field. . . .(continued at <https://astronomynow.com/2021/05/07/helium-rain-in-saturns-interior-may-influence-magnetic-field/>)



Explaining Saturn’s Ravioli Moons

Saturn’s moons are weird. I mean, really weird. When the Cassini spacecraft showed up at Saturn in 2004 and started doing flybys of some of the inner moons, the images it sent to Earth were so bizarre I actually had to look at them for a moment to even understand the shape I was seeing. That’s because some of them look like, well... ravioli... (continued at <https://www.syfy.com/syfywire/explaining-saturns-ravioli-moons>)



Reclusive Neutron Star May Have Been Found in Famous Supernova

What remains of the star that exploded just outside our galaxy in 1987? Debris has obscured scientists’ view, but two of NASA’s X-ray telescopes have revealed new clues. Since astronomers captured the bright explosion of a star on Feb. 24, 1987, researchers have been searching for the squashed stellar core that should have been left behind. , . . (continued at <https://www.jpl.nasa.gov/news/reclusive-neutron-star-may-have-been-found-in-famous-supernova>)



Lunar Crater Radio Telescope: Illuminating the Cosmic Dark Ages

The early-stage NASA concept could see robots hang wire mesh in a crater on the Moon’s far side, creating a radio telescope to help probe the dawn of the universe. After years of development, the Lunar Crater Radio Telescope (LCRT) project has been awarded \$500,000 to support additional work as it enters Phase II of NASA’s Innovative Advanced Concepts (NIAC) program. While not yet a NASA mission, the LCRT describes a mission concept that could transform humanity’s view of the cosmos. (continued at <https://www.jpl.nasa.gov/news/lunar-crater-radio-telescope-illuminating-the-cosmic-dark-ages>)



Surviving an In-Flight Anomaly: What Happened on Ingenuity’s Sixth Flight

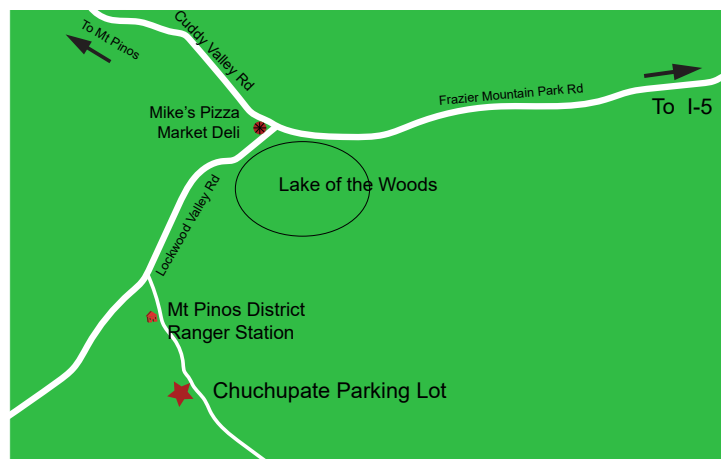
On the 91st Martian day, or sol, of NASA’s Mars 2020 Perseverance rover mission, the Ingenuity Mars Helicopter performed its sixth flight. The flight was designed to expand the flight envelope and demonstrate aerial-imaging capabilities by taking stereo images of a region of interest to the west. Ingenuity was commanded to climb to an altitude of 33 feet (10 meters) before translating 492 feet (150 meters) to the southwest at a ground speed of 9 mph (4 meters per second). At that point, it was to translate 49 feet (15 meters) to the south while taking images toward the west, then fly another 164 feet (50 meters) northeast and land. . . .(continued at <https://mars.nasa.gov/technology/helicopter/status/305/surviving-an-in-flight-anomaly-what-happened-on-ingenuitys-sixth-flight/>)



Dark Sky Observing Sites

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

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



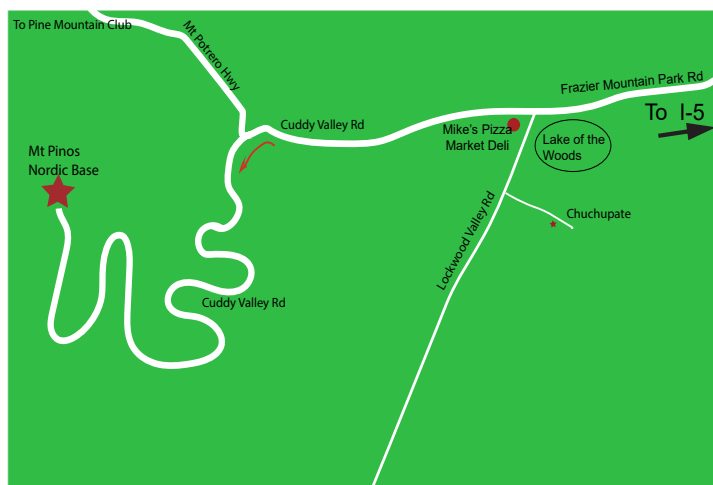
The Red Cliffs Natural Area is part of **Red Rock Canyon State Park** is a day use area and is not for use by the public after dark. The Club gets a special permit for a star party and pays a fee.

To get there: Take the CA-14 north 25 miles past Mojave. You will see giant red cliffs on the right side and a small sign that says "Red Cliffs Natural Area" and a dirt road. (If you see the large sign for the Ricardo campground, you drove a mile too far). Follow the road to the large parking lot (that hasn't been graded in a long time). Elevation is 2410 feet. There is a vault toilet.

Mt Pinos is a parking lot at 8350 feet for the "Mt Pinos Nordic Base." There is a vault toilet 300 yds to the east in the Chula Vista campground.

To get there: From I-5, get off at Frazier Mountain Park Rd and drive west about 7 miles to Mike's Pizza/Market Deli at Lockwood Valley Rd. Keep on the main roadway (don't turn left to go to Chuchupate). Continue past Mike's Pizza on Cuddy Valley Rd (the road's new name) about 5 miles. Continue straight (do not turn right on to Mil Potrero Hwy) for another 8 1/2 miles to the parking area.

Note: The entire drive from I-5 is uphill



Desert Sky Observer

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Planet Summary

The **Sun** starts June in Taurus and crosses into Gemini by the middle of the month. On the 10th there is an annual eclipse occurs at starting about 02:20. So we won't be seeing it. Go to Iceland or Siberia if this is a must see for you.

Mercury achieves inferior conjunction on the 11th, and won't be visible until early mornings very late in June.

Venus reaches perihelion on the 12th. The 3% waxing moon is in conjunction $2/3^\circ$ north on the 12th, too bad it's at 00:30 in the morning.

Mars starts the month in Gemini slowly moving east into Cancer. On the 23th about 20:30 it passes right through M44(Beehive Cluster) On the 13th the 10% waxing Moon passes 2.5° north at about 13:30

Jupiter continues its eastward motion among the stars of western Aquarius. Jupiter arrives at its first stationary point on the 21st. The waning gibbous Moon passes to the south in the early morning of the 1st and then again on the 28th and 29th.

Saturn spends the month moving retrograde among the stars of Capricorn becoming larger and more apparent in the morning sky. On the 27th the waning gibbous Moon passes less than 5° to the south

Uranus continues moving east in central Aries for the next several months. The almost new Moon zips by in the morning of the 7th.

Neptune will spend the month moving east in northeast Aquarius at mag 7.9 until the 26th after which a retrograde motion begins. The 6% waning Moon will pass 5° south the morning of the 3th.

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

Sun and Moon Rise and Set



First Qtr
June 17

Full
June 26

Third Qtr
June 3

New
June 10

Sun and Moon Rise and Set*

Date	Moonrise	Moonset	Sunrise	Sunset
6/1/2021	01:14	12:06	05:40	20:00
6/5/2021	03:06	15:56	05:39	20:03
6/10/2021	05:44	20:40	05:38	20:05
6/15/2021	10:19	23:21	05:39	20:07
6/20/2021	15:47	02:26	05:39	20:08
6/25/2021	21:37	06:25	05:41	20:09
6/30/2021	00:15	11:54	05:43	20:09

Planet Data*

June 1

	Rise	Transit	Set	Mag	Phase%
Mercury	06:37	13:46	20:55	3.16	6.16
Venus	06:50	14:07	21:23	-3.91	95.1
Mars	08:45	15:55	23:05	1.74	95.5
Jupiter	00:55	06:24	11:57	-2.49	99.0
Saturn	00:00	05:12	10:28	0.56	99.8

June 15

	Rise	Transit	Set	Mag	Phase%
Mercury	05:28	12:24	19:20	4.06	2.74
Venus	07:12	14:27	21:41	-3.96	92.8
Mars	08:33	15:36	22:46	1.79	96.4
Jupiter	00:01	05:31	11:04	-2.59	99.1
Saturn	23:04	04:16	09:31	0.47	99.8

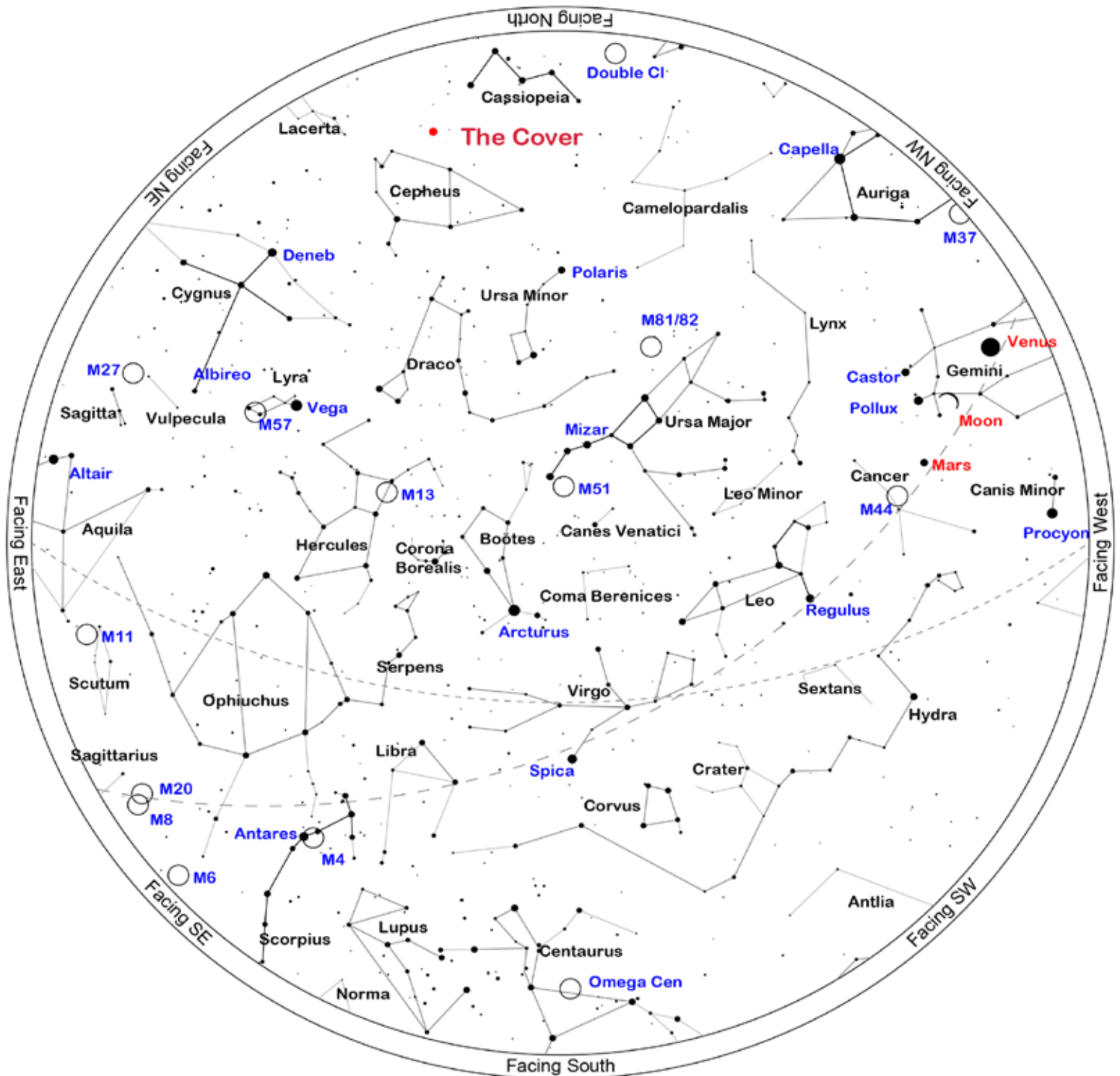
June 30

	Rise	Transit	Set	Mag	Phase%
Mercury	04:30	11:28	18:27	0.94	27.7
Venus	07:41	14:45	21:49	-3.92	89.8
Mars	08:19	15:15	22:11	1.82	97.2
Jupiter	23:02	04:31	10:04	-2.69	99.4
Saturn	22:03	03:14	08:29	0.38	99.9

*All time mentioned are local

*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 June 12, 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 June 12, 2021. The list is sorted by the transit time of the object.

ID	Type		RA	Dec	Mag	Rise	Transit	Set
NGC1569	Galaxy	Cam	04h 30m 49s	+64° 50.8'	11.2	Circum	12:05	Circum
Barnard18	DkNeb	Tau	04h 31m 13s	+24° 21.0'		04:49	12:05	19:22
NGC1582	Open	Per	04h 31m 53s	+43° 49.0'	7.0	03:13	12:06	20:58
NGC1560	Galaxy	Cam	04h 32m 48s	+71° 52.7'	11.5	Circum	12:07	Circum
Barnard19	DkNeb	Tau	04h 33m 00s	+26° 16.0'		04:43	12:07	19:30
Barnard20	DkNeb	Per	04h 37m 04s	+50° 58.0'		02:06	12:11	22:16
Barnard22	DkNeb	Tau	04h 38m 00s	+26° 03.0'		04:49	12:12	19:35
Barnard14	DkNeb	Tau	04h 39m 59s	+25° 44.0'		04:52	12:14	19:35
IC2087	Neb	Tau	04h 40m 00s	+25° 44.5'		04:52	12:14	19:35
Barnard23	DkNeb	Tau	04h 40m 33s	+29° 52.0'		04:37	12:14	19:52
NGC1624	Open	Per	04h 40m 36s	+50° 27.6'	10.4	02:17	12:14	22:12
NGC1640	Galaxy	Eri	04h 42m 14s	-20° 26.0'	11.7	07:13	12:16	17:19
NGC1647	Open	Tau	04h 45m 55s	+19° 06.8'	6.4	05:21	12:20	19:19
IC2118	Neb	Eri	05h 04m 54s	-07° 15.0'		06:56	12:39	18:21
NGC1851	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	09:07	12:48	16:29
IC405	Neb	Aur	05h 16m 29s	+34° 21.3'		04:53	12:50	20:48
M79	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	08:09	12:58	17:47
M38	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	04:58	13:03	21:07
M1	SNR	Tau	05h 34m 32s	+22° 00.8'	8.4	06:00	13:08	20:17
M42	Open+D Neb	Ori	05h 35m 16s	-05° 23.4'	4.0	07:21	13:09	18:57
M43	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	07:21	13:09	18:57
M36	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	05:14	13:10	21:06
M78	D Neb	Ori	05h 46m 45s	+00° 04.8'	8.0	07:18	13:21	19:24
M37	Open	Aur	05h 52m 18s	+32° 33.2'	6.0	05:37	13:26	21:15
M35	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	06:26	13:43	20:59
M41	Open	CMa	06h 46m 01s	-20° 45.3'	5.0	09:18	14:20	19:22
M50	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	08:57	14:37	20:16
M47	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	09:49	15:10	20:32
M46	Open	Pup	07h 41m 46s	-14° 48.6'	6.5	09:55	15:16	20:36
M93	Open	Pup	07h 44m 30s	-23° 51.4'	6.5	10:27	15:18	20:10
M48	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	10:01	15:48	21:34
M44	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	09:14	16:14	23:15
M67	Open	Cnc	08h 51m 18s	+11° 48.0'	7.5	09:49	16:25	23:01
M81	Galaxy	UMa	09h 55m 33s	+69° 03.9'	7.8	Circum	17:29	Circum
M82	Galaxy	UMa	09h 55m 53s	+69° 40.8'	9.2	Circum	17:30	Circum

Desert Sky Observer

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June 2021

ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M95	Galaxy	Leo	10h 43m 58s	+11° 42.2'	10.6	11:42	18:18	00:54
M96	Galaxy	Leo	10h 46m 46s	+11° 49.2'	10.1	11:44	18:21	00:57
M105	Galaxy	Leo	10h 47m 50s	+12° 34.9'	10.5	11:43	18:22	01:00
M108	Galaxy	UMa	11h 11m 31s	+55° 40.4'	10.6	Circum	18:45	Circum
M97	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	Circum	18:49	Circum
M65	Galaxy	Leo	11h 18m 56s	+13° 05.5'	10.1	12:13	18:53	01:33
M66	Galaxy	Leo	11h 20m 15s	+12° 59.4'	9.7	12:14	18:54	01:34
M109	Galaxy	UMa	11h 57m 36s	+53° 22.4'	10.6	08:40	19:31	06:23
M98	Galaxy	Com	12h 13m 48s	+14° 54.0'	10.9	13:02	19:48	02:33
M99	Galaxy	Com	12h 18m 50s	+14° 25.0'	10.4	13:09	19:53	02:37
M106	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	10:31	19:53	05:15
M61	Galaxy	Vir	12h 21m 55s	+04° 28.3'	10.1	13:41	19:56	02:11
M40	DbI+Asterism	UMa	12h 22m 12s	+58° 05.0'	8.7	Circum	19:56	Circum
M100	Galaxy	Com	12h 22m 55s	+15° 49.3'	10.1	13:08	19:57	02:45
M84	Galaxy	Vir	12h 25m 04s	+12° 53.2'	10.2	13:19	19:59	02:38
M85	Galaxy	Com	12h 25m 24s	+18° 11.4'	10.0	13:03	19:59	02:55
M86	Galaxy	Vir	12h 26m 12s	+12° 56.7'	9.9	13:20	20:00	02:40
M49	Galaxy	Vir	12h 29m 47s	+08° 00.0'	9.3	13:38	20:04	02:29
M87	Galaxy	Vir	12h 30m 49s	+12° 23.4'	9.6	13:27	20:05	02:43
M88	Galaxy	Com	12h 31m 59s	+14° 25.2'	10.2	13:22	20:06	02:50
M91	Galaxy	Com	12h 35m 27s	+14° 29.7'	10.9	13:25	20:09	02:54
M89	Galaxy	Vir	12h 35m 40s	+12° 33.3'	10.9	13:31	20:10	02:48
M90	Galaxy	Vir	12h 36m 50s	+13° 09.7'	10.2	13:30	20:11	02:51
M58	Galaxy	Vir	12h 37m 44s	+11° 49.1'	10.4	13:35	20:12	02:48
M68	Globular	Hya	12h 39m 28s	-26° 44.5'	9.0	15:32	20:13	00:55
M104	Galaxy	Vir	12h 39m 59s	-11° 37.3'	9.2	14:44	20:14	01:44
M59	Galaxy	Vir	12h 42m 02s	+11° 38.7'	10.7	13:40	20:16	02:52
M60	Galaxy	Vir	12h 43m 40s	+11° 33.1'	9.8	13:42	20:18	02:53
M94	Galaxy	CVn	12h 50m 53s	+41° 07.1'	8.9	11:51	20:25	04:59
M64	Galaxy	Com	12h 56m 44s	+21° 41.0'	9.3	13:23	20:31	03:38
M53	Globular	Com	13h 12m 55s	+18° 10.1'	8.5	13:51	20:47	03:43
M63	Galaxy	CVn	13h 15m 49s	+42° 01.7'	9.3	12:10	20:50	05:30
NGC5139	Globular	Cen	13h 26m 48s	-47° 29.0'	3.6	18:12	21:01	23:50
NGC5169	Galaxy	CVn	13h 28m 10s	+46° 40.3'	14.0	11:46	21:02	06:18
NGC5204	Galaxy	UMa	13h 29m 36s	+58° 25.1'	11.3	Circum	21:03	Circum
M51	Galaxy	CVn	13h 29m 52s	+47° 11.7'	8.9	11:43	21:04	06:25
Arp85	Galaxy	CVn	13h 29m 58s	+47° 16.0'	9.6	11:42	21:04	06:25
NGC5182	Galaxy	Hya	13h 30m 41s	-28° 09.0'	13.0	16:29	21:05	01:41
NGC5214	Galaxy	CVn	13h 32m 49s	+41° 52.3'	14.0	12:28	21:07	05:46
M83	Galaxy	Hya	13h 37m 00s	-29° 51.8'	8.0	16:42	21:11	01:40

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
HR5144	Triple	Boo	13h 40m 40s	+19° 57.3'	5.8	14:13	21:15	04:16
NGC5283	Galaxy	Dra	13h 41m 06s	+67° 40.3'	14.0	Circum	21:15	Circum
M3	Globular	CVn	13h 42m 11s	+28° 22.5'	7.0	13:44	21:16	04:48
NGC5286	Globular	Cen	13h 46m 24s	-51° 22.0'	7.6	19:13	21:20	23:27
NGC5292	Galaxy	Cen	13h 47m 40s	-30° 56.4'	14.0	16:56	21:22	01:47
NGC5356	Galaxy	Vir	13h 54m 59s	+05° 20.0'	14.0	15:11	21:29	03:47
NGC5363	Galaxy	Vir	13h 56m 07s	+05° 15.2'	10.2	15:13	21:30	03:47
NGC5447	Neb	UMa	14h 02m 29s	+54° 16.3'		10:13	21:36	08:59
M101	Galaxy	UMa	14h 03m 13s	+54° 20.9'	8.2	10:10	21:37	09:04
NGC5461	Neb	UMa	14h 03m 42s	+54° 19.0'		10:12	21:38	09:03
NGC5485	Galaxy	UMa	14h 07m 11s	+55° 00.0'	11.5	Circum	21:41	Circum
NGC5460	Open	Cen	14h 07m 27s	-48° 20.6'	5.6	19:00	21:41	00:22
NGC5500	Galaxy	Boo	14h 10m 15s	+48° 32.7'	14.0	12:10	21:44	07:19
IC991	Galaxy	Vir	14h 17m 48s	-13° 52.3'	13.0	16:28	21:52	03:15
HR5362	Dbl	Lup	14h 20m 10s	-43° 03.5'	5.6	18:31	21:54	01:17
IC4406	P Neb	Lup	14h 22m 26s	-44° 09.0'	11.0	18:41	21:56	01:12
HR5409	Triple	Vir	14h 28m 12s	-02° 13.6'	4.8	16:06	22:02	03:59
NGC5669	Galaxy	Boo	14h 32m 44s	+09° 53.4'	12.0	15:36	22:07	04:37
NGC5689	Galaxy	Boo	14h 35m 30s	+48° 44.5'	11.9	12:33	22:09	07:46
M102	Galaxy	Dra	15h 06m 30s	+55° 45.7'	10.8	Circum	22:40	Circum
NGC5875	Galaxy	Boo	15h 09m 13s	+52° 31.6'	13.0	12:11	22:43	09:15
NGC5907	Galaxy	Dra	15h 15m 54s	+56° 19.7'	11.4	Circum	22:50	Circum
NGC5882	P Neb	Lup	15h 16m 50s	-45° 38.9'	11.0	19:46	22:51	01:55
NGC5897	Globular	Lib	15h 17m 24s	-21° 00.6'	8.6	17:50	22:51	03:52
M5	Globular	Ser	15h 18m 33s	+02° 04.9'	7.0	16:44	22:52	05:01
Barnard228	DkNeb	Lup	15h 44m 00s	-34° 30.0'		19:08	23:18	03:28
IC4593	P Neb	Her	16h 11m 44s	+12° 04.3'	11.0	17:09	23:46	06:23
IC4592	Neb	Sco	16h 11m 59s	-19° 27.4'		18:40	23:46	04:52
M80	Globular	Sco	16h 17m 03s	-22° 58.5'	8.5	18:56	23:51	04:45
IC4601	Neb	Sco	16h 20m 18s	-20° 04.9'		18:50	23:54	04:58
Abell38	P Neb	Sco	16h 23m 17s	-31° 44.9'	11.7	19:35	23:57	04:19
M4	Globular	Sco	16h 23m 35s	-26° 31.5'	7.5	19:15	23:57	04:40
IC4603	Neb	Oph	16h 25m 24s	-24° 28.0'		19:10	23:59	04:49
IC4604	Neb	Oph	16h 25m 33s	-23° 26.5'		19:06	23:59	04:52
NGC6124	Open	Sco	16h 25m 36s	-40° 40.0'	5.8	20:22	23:59	03:37
Abell39	P Neb	Her	16h 27m 33s	+27° 54.5'	12.9	16:32	00:01	07:31
IC4605	Neb	Sco	16h 30m 12s	-25° 06.8'		19:17	00:04	04:51
NGC6153	P Neb	Sco	16h 31m 31s	-40° 15.2'	12.0	20:25	00:05	03:46
NGC6181	Galaxy	Her	16h 32m 21s	+19° 49.5'	11.9	17:05	00:06	07:07

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ID	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC6171	Globular	Oph	16h 32m 32s	-13° 03.1'	8.1	18:41	00:06	05:32
NGC6178	Open	Sco	16h 35m 47s	-45° 38.6'	7.2	21:05	00:10	03:14
NGC6193	Open	Ara	16h 41m 18s	-48° 46.0'	5.2	21:38	00:15	02:52
M13	Globular	Her	16h 41m 41s	+36° 27.5'	7.0	16:08	00:16	08:23
NGC6210	P Neb	Her	16h 44m 30s	+23° 48.0'	9.0	17:04	00:18	07:33
Barnard44a	DkNeb	Sco	16h 44m 45s	-40° 20.0'		20:39	00:19	03:58
NGC6204	Open	Ara	16h 46m 09s	-47° 01.0'	8.2	21:27	00:20	03:13
M12	Globular	Oph	16h 47m 14s	-01° 56.8'	8.0	18:24	00:21	06:18
NGC6231	Open	Sco	16h 54m 00s	-41° 48.0'	2.6	20:57	00:28	03:59
IC4628	Neb	Sco	16h 56m 58s	-40° 27.3'		20:52	00:31	04:10
NGC6254	Globular	Oph	16h 57m 09s	-04° 05.9'	6.6	18:40	00:31	06:22
Barnard47	DkNeb	Oph	16h 59m 42s	-22° 38.0'		19:38	00:34	05:29
M62	Globular	Oph	17h 01m 13s	-30° 06.7'	8.0	20:07	00:35	05:03
M19	Globular	Oph	17h 02m 38s	-26° 16.0'	8.5	19:53	00:36	05:20
Barnard51	DkNeb	Oph	17h 04m 44s	-22° 15.0'		19:42	00:39	05:36
IC4637	P Neb	Sco	17h 05m 10s	-40° 53.1'	14.0	21:02	00:39	04:16
Barnard56	DkNeb	Sco	17h 08m 48s	-32° 05.0'		20:22	00:43	05:03
Barnard59	DkNeb	Oph	17h 11m 23s	-27° 29.0'		20:07	00:45	05:24
NGC6302	P Neb	Sco	17h 13m 42s	-37° 06.0'	9.6	20:50	00:48	04:45
Barnard251	DkNeb	Oph	17h 13m 48s	-20° 09.0'		19:44	00:48	05:52
Barnard63	DkNeb	Oph	17h 16m 00s	-21° 28.0'		19:50	00:50	05:49
M92	Globular	Her	17h 17m 07s	+43° 08.1'	7.5	16:03	00:51	09:39
M9	Globular	Oph	17h 19m 12s	-18° 31.0'	9.0	19:44	00:53	06:02
NGC6326	P Neb	Ara	17h 20m 46s	-51° 45.2'	12.0	22:53	00:55	02:56
Barnard256	DkNeb	Oph	17h 22m 12s	-28° 49.0'		20:23	00:56	05:30
Barnard67a	DkNeb	Oph	17h 22m 30s	-21° 53.0'		19:58	00:56	05:55
Barnard71	DkNeb	Oph	17h 23m 02s	-24° 00.0'		20:06	00:57	05:48
NGC6357	Neb	Sco	17h 24m 43s	-34° 12.1'		20:48	00:59	05:10
IC4651	Open	Ara	17h 24m 52s	-49° 56.5'	6.9	22:34	00:59	03:23
Abell41	P Neb	Ser	17h 29m 04s	-15° 13.3'	13.9	19:44	01:03	06:22
Abell42	P Neb	Oph	17h 31m 31s	-08° 19.1'	14.6	19:26	01:05	06:45
Barnard78	DkNeb	Oph	17h 32m 00s	-25° 35.0'		20:20	01:06	05:51
NGC6388	Globular	Sco	17h 36m 17s	-44° 44.1'	6.9	21:59	01:10	04:21
M14	Globular	Oph	17h 37m 36s	-03° 14.7'	9.5	19:18	01:11	07:05
Barnard276	DkNeb	Oph	17h 39m 39s	-19° 49.0'		20:09	01:14	06:19
M6	Open	Sco	17h 40m 20s	-32° 15.2'	4.5	20:55	01:14	05:34
NGC6397	Globular	Ara	17h 40m 42s	-53° 40.0'	5.6	23:45	01:15	02:44
NGC6426	Globular	Oph	17h 44m 55s	+03° 10.1'	11.2	19:07	01:19	07:30
Barnard83a	DkNeb	Sgr	17h 45m 18s	-20° 00.0'		20:15	01:19	06:24

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