

Volume 42.4

April 2022

# Desert Sky Observer

Antelope Valley Astronomy Club





# Desert Sky Observer

[www.avastronomyclub.org](http://www.avastronomyclub.org)

April 2022

## Upcoming Events

April 2: Messier Marathon @ Saddleback Butte SP

April 8: Club Meeting

April 9: Moonwalk 7:30 pm @ PDW

April 22-24: Poppy Festival @ AV Fairgrounds

April 30: DSSP @ Chuchupate

Every clear night: Personal Star Party

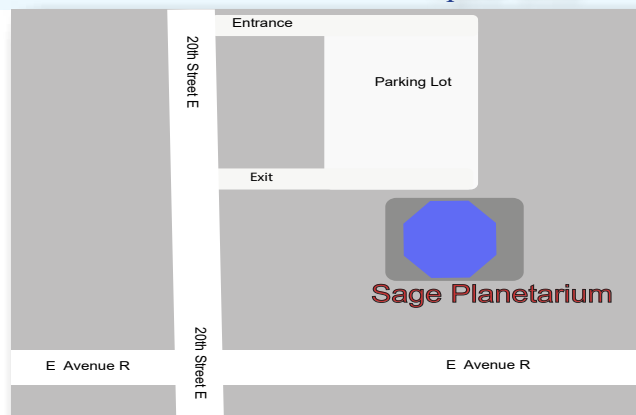
May 13: Club Meeting

May 21: Moonwalk 8:30 pm @ PDW

May 27 - 30: DSSP @ Red Rock Canyon SP



AVAC Calendar



## Board Members

**President:** Phil Wriedt (661) 917-4874

[president@avastronomyclub.org](mailto:president@avastronomyclub.org)

**Vice-President:** Gail Lofdahl 661-722-5833

[vice-president@avastronomyclub.org](mailto:vice-president@avastronomyclub.org)

**Secretary:** Rose Moore (661) 972-1953

[secretary@avastronomyclub.org](mailto:secretary@avastronomyclub.org)

**Treasurer:** Rod Girard (661) 803-7838

[treasurer@avastronomyclub.org](mailto:treasurer@avastronomyclub.org)

## Appointed Positions

**Newsletter Editor:** Phil Wriedt (661) 917-4874

[dso@avastronomyclub.org](mailto:dso@avastronomyclub.org)

### Equipment & Library:

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**Club Historian:** vacant

[history@avastronomyclub.org](mailto:history@avastronomyclub.org)

**Webmaster:** Steve Trotta (661) 269-5428

[webmaster@avastronomyclub.org](mailto:webmaster@avastronomyclub.org)

**Astronomical League Coordinator:**

Frank Moore (661) 972-4775

[al@avastronomyclub.org](mailto: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 20<sup>th</sup> 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/](http://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](http://www.avastronomyclub.org)

## President's Message

By Phil Wriedt

Hi there everyone,

March was the month for Moonwalks. Thanks to the City of Lancaster's coordinator we ended up with two Moonwalks back to back on the 19th and 26th of March. While the 19th had a disappointing turnout (a mother with two kids under 3) probably because it was not advertised anywhere except on our website. There were four members there with telescopes and the effort was not wasted, the 3 year old wanted to know all about black holes, and another amateur astronomer was encouraged. The Moonwalk of 26th had about 120 in attendance, plus the four members and three telescopes.

We had a Messier Marathon scheduled for Saturday April 2, but with high winds and mostly clouding skies, it was canceled. We will try again at the end of the month. The next Deep Sky Star Party is scheduled for April 30 at Chuchupate. Sunset is at 7:36 pm, hopefully the weather will cooperate.

The next meeting is this Friday the 8th at 7pm in the SAGE Planetarium, please come and join us.

The next Moonwalk will be on Saturday the 9th. Come with your telescope, set up by about 6 pm and be ready for the main show at 7:30 pm. (Hopefully the weather will be cloudless and remain calm)

Since the pandemic our Club membership and attendance has dwindled. If anybody has an ideas on how to increase our membership, please let someone know; I would suggest a board member, but... Let's face it, events are more fun when there are more in attendance. Bring a friend, a neighbor, Let's put the *Party* back in Star Party!

See you on Friday, Keep looking up,

Phil

## On The Cover

This striking new NASA/ESA Hubble Space Telescope image shows a glittering bauble named Messier 92. Located in the northern constellation of Hercules, this globular cluster — a ball of stars that orbits a galactic core like a satellite — was first discovered by astronomer Johann Elert Bode in 1777.

Messier 92 is one of the brightest globular clusters in the Milky Way, and is visible to the naked eye under good observing conditions. It is very tightly packed with stars, containing some 330 000 stars in total. As is characteristic of globular clusters, the predominant elements within Messier 92 are hydrogen and helium, with only traces of others. It is actually what is known as an Oosterhoff type II (OoII) globular cluster, meaning that it belongs to a group of metal-poor clusters — to astronomers, metals are all elements heavier than hydrogen and helium.

By exploring the composition of globulars like Messier 92, astronomers can figure out how old these clusters are. As well as being bright, Messier 92 is also old, being one of the oldest star clusters in the Milky Way, with an age almost the same as the age of the Universe.

A version of this image was entered into the Hubble's Hidden Treasures image processing competition by contestant Gilles Chapdelaine.

Links: Gilles Chapdelaine's Hidden Treasures entry on Flickr

Credit: ESA/Hubble & NASA Acknowledgement: Gilles Chapdelaine

## From the Secretary

By Rose Moore

### Members:

Our club has reserved a spot for observing on the 60 inch scope at Mt. Wilson for Friday June 24th. Everyone should have received my email with information and instructions; if you haven't, please let me know. We still have spots available for this trip. Contact me for information or to confirm a spot. The cost is \$40 per person, and an additional \$15 per person if you want to take the pre-tour. We have to have a minimum of 10 members (for the pre-tour). You may pay at our next club meetings in April or May, deadline will be about May 15th. We will have a PayPal link via the website when we know we have enough members signed up.

We are going to be at Red Rock Canyon State Park for Memorial Day weekend, for our dark sky star party. This event will be open to other campers in the park and the public. We do set up telescopes for solar observing during the day as well. Matt Leone will be giving an astronomy presentation in the amphitheater on Saturday night. Our club will be at campsites #1 through 4. More information coming on the use of the campsites. If you can attend and bring a telescope to help at this event at any time during the weekend, please let me know. There are some of us who will be staying at least until Sunday.

We have a Prime Desert Moon Walk with Jeremy on Saturday April 9th at 7:30pm. Weather permitting. We need members with telescopes to help out at this event. Please come out to share the night sky with the public or take the walk with Jeremy!

Remember we have our club meetings on the 2nd Friday each month at 7:00pm. Our next meeting is on April 8th. Please come out and support your club!!

A big shout out and many thanks to Phil, Rod and Darrell for bringing their telescopes and supporting our outreach and Jeremy at Prime Desert Woodlands each month!

Rose

## AVAC Membership Renewal

Please remember that we are able to have our monthly meetings again. 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. So PLEASE come to the meeting.

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

## Advanced Catspotting: Lynx and Leo Minor

by David Prosper, NASA Night Sky Network



*Map of the sky around Lynx and Leo Minor. Notice the prevalence of animal-themed constellations in this area, making it a sort of celestial menagerie. If you are having difficulty locating the fainter stars of Leo Minor and Lynx, don't fret; they are indeed a challenge. Hevelius even named the constellation as reference to the quality of eyesight one needs in order to discern these faint stars, since supposedly one would need eyes as sharp as a Lynx to see it! Darker skies will indeed make your search easier; light pollution, even a relatively bright Moon, will overwhelm the faint stars for both of these celestial wildcats. While you will be able to see NGC 2419 with a backyard telescope, Hanny's Voorwerp is far too faint, but its location is still marked. A few fainter constellation labels and diagrams in this region have been omitted for clarity.*

*Image created with assistance from Stellarium*

Many constellations are bright, big, and fairly easy to spot. Others can be surprisingly small and faint, but with practice even these challenging star patterns become easier to discern. A couple of fun fainter constellations can be found in between the brighter stars of Ursa Major, Leo, and Gemini: **Lynx** and **Leo Minor**, two wild cats hunting among the menagerie of animal-themed northern star patterns!

**Lynx**, named for the species of wild cat, is seen as a faint zigzag pattern found between Ursa Major, Gemini, and Auriga. Grab a telescope and try to spot the remote starry orb of globular cluster NGC 2419. As it is so distant compared to other globular clusters - 300,000 light years from both our solar system and the center of the Milky Way - it was thought that this cluster may be the remnants of a dwarf galaxy consumed by our own. Additional studies have muddled the waters concerning its possible origins, revealing two distinct populations of stars residing in NGC 2419, which is unusual for normally-homogenous globular clusters and marks it as a fascinating object for further research.



*Hanny's Voorwerp and the neighboring galaxy IC 2497, as imaged by Hubble.*

*Credits: NASA, ESA, W. Keel (University of Alabama), and the Galaxy Zoo Team*

*Source: <https://hubblesite.org/contents/news-releases/2011/news-2011-01.html>*

Leo Minor is a faint and diminutive set of stars. Its “triangle” is most noticeable, tucked in between Leo and Ursa Major. Leo Minor is the cub of Leo the Lion, similar to Ursa Minor being the cub to the Great Bear of Ursa Major. While home to some interesting galaxies that can be observed from large amateur scopes under dark skies, perhaps the most intriguing object found within Leo Minor’s borders is Hanny’s Voorwerp. This unusual deep-space object is thought to be a possible “light echo” of a quasar in neighboring galaxy IC 2497 that has recently “switched off.” It was found by Hanny van Arkel, a Dutch schoolteacher, via her participation in the Galaxy Zoo citizen science project. Since then a few more intriguing objects similar to Hanny’s discovery have been found, called “Voorwerpjes.”

Lynx and Leo Minor are relatively “new” constellations, as they were both created by the legendarily sharp-eyed European astronomer Johannes Hevelius in the late 1600s. A few other constellations originated by Hevelius are still in official use: Canes Venatici, Lacerta, Scutum, Sextans, and Vulpecula. What if your eyes aren’t quite as sharp as Johannes Hevelius – or if your weather and light pollution make searching for fainter stars more difficult than enjoyable? See if you can spot the next Voorwerp by participating in one of the many citizen science programs offered by NASA at [science.nasa.gov/citizenscience](https://science.nasa.gov/citizenscience)! And of course, you can find the latest updates and observations of even more dim and distant objects at [nasa.gov](https://nasa.gov).

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](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!



## Space News

News from around the Net

### Starlink Satellite Streaks: How Big Of A Problem Are They?

By now you have heard about the SpaceX Starlink satellite constellation currently being launched into low Earth orbit (LEO). Already, more than 2,000 satellites have arrived in their 340-mile-high (550 kilometers) orbits, with another 2,400 to be added to this Generation-1 constellation in the next few years. Furthermore, the U.S. Federal Communications Commission (FCC) has already given SpaceX approval for the 40,000-satellite. . . (continued at <https://astronomy.com/news/2022/03/starlink-satellite-streaks-how-big-a-problem-are-they> )



### Scientists Solve Solar Secret

The further we move away from a heat source, the cooler the air gets. Bizarrely, the same can't be said for the Sun, but University of Otago scientists may have just explained a key part of why. Study lead Dr Jonathan Squire, of the Department of Physics, says the surface of the Sun starts at 6000 degree C, but over a short distance of only a few hundred kilometers, it suddenly heats up to more than a million degrees, becoming its atmosphere, or corona. . . ( continued at <https://www.sciencedaily.com/releases/2022/03/220324122555.htm> )



### Look! Up In The Sky! Is It A Planet? Nope, Just A Star

In a study appearing in the Astronomical Journal, MIT astronomers report that three, and potentially four, planets that were originally discovered by NASA's Kepler Space Telescope are in fact misclassified. Instead, these suspected planets are likely small stars. The team used updated measurements of planet-hosting stars to double-check the size of the planets, and identified three that are simply too big to be planets. . . . (continued at <https://www.sciencedaily.com/releases/2022/03/220315150113.htm> )



### Next-Generation Telescopes Could Search For Intelligent Civilizations Directly

We're still in the early days of searching for life elsewhere. The Perseverance rover is on its way to a paleo-delta on Mars to look for fossilized signs of ancient bacterial life. SETI's been watching the sky with radio dishes, listening for signals from distant worlds. Our telescopes are beginning to scan the atmospheres of distant exoplanets for biosignatures. Soon, we'll take a . . . (continued at <https://phys.org/news/2022-03-next-generation-telescopes-intelligent-civilizations.html> )



### Astronomers Find Protoplanetary Disks In Orion Molecular Clouds

Astronomers using NSF's Karl G. Jansky Very Large Array and the Atacama Large Millimeter/submillimeter Array have detected 97 disks of gas and dust around young protostars in the constellation of Orion, which is home to the closest star-forming regions to Earth. "Stars form from clouds of gas and dust that collapse under the force of their own gravity," said lead author Dr. Patrick Sheehan, an astronomer at Northwestern University and the National Radio Astronomy Observatory, . . . . (continued at <http://www.sci-news.com/astronomy/protoplanetary-disks-orion-molecular-clouds-10653.html> )



### Astronomers Discover A Huge Expanding Debris Cloud From Two Colliding Protoplanets!

In a planet-forming disk of gas and dust around a young, nearby star, two huge objects recently collided at high speed. The colossal impact was positively apocalyptic in size, vaporizing enough material to make a small planet — at least. Even better, the huge dust cloud created in the event passed between us and the star, eclipsing it twice, allowing astronomers to learn more about this catastrophe. . . . (continued at <https://www.syfy.com/syfy-wire/bad-astronomy-two-colliding-protoplanets-make-a-huge-dust-cloud> )



## Space News

News from around the Net

### **James Webb releases sharpest IR image ever taken from space**

In early February, NASA engineers began to remotely align the 18 hexagonal segments of the James Webb Space Telescope's primary mirror, which had been folded away for launch. The goal of this meticulous, three-month-long process is to perfectly position the mirror segments relative to each other, creating a single, smooth, 6.5-meter-wide surface that can gather and focus light from the distant cosmos. . . . (continued at <https://astronomy.com/news/2022/03/james-webb-releases-sharpest-ir-image-ever-taken-from-space> )



### **Pulsar Shoots 7-Light-Year-Long Phaser Blast**

Nature proves truth is still stranger than fiction: A pulsar has shot energetic particles in a thin, straight line that extends for light-years into space. The discovery might explain how antimatter makes its way to Earth. Star Trek can keep its ray guns — pulsars make far more powerful beams of radiation. Crushed stellar cores, left behind when a massive star goes supernova, are among nature's own particle accelerators. . . . (continued at <https://skyandtelescope.org/astronomy-news/pulsar-shoots-7-light-year-long-phaser-blast/> )



### **101 Must-See Cosmic Objects: The Bug Nebula**

Amateur astronomers named the Bug Nebula (NGC 6302) for its insectlike shape. But because the Bug's apparent size is only 2', that shape is all they saw. Recent pictures taken with the Hubble Space Telescope have revealed much more detail. Now NGC 6302 is often called the Butterfly Nebula. . . . (continued at <https://astronomy.com/magazine/news/2022/03/101-must-see-cosmic-objects-the-bug-nebula> )



### **First Look At An Unusual Exoplanet's Atmosphere**

Astronomers have discovered a curious exoplanet with an extremely low bulk density — nearly 15 times less dense than Jupiter and 60 times less dense than Earth. The first spectrum of this planet's atmosphere gives clues to the cause of this unusual quality. IP 41378 f is one of the least dense exoplanets known, floating in at just 0.09 grams per cubic centimeter, but it's not yet clear why this planet is so loosely packed.. . . (continued at <https://skyandtelescope.org/astronomy-news/first-look-at-an-unusual-exoplanets-atmosphere/> )



### **Astronomers Discover Largest Molecule Yet In A Planet-Forming Disc**

Using the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile, researchers at Leiden Observatory in the Netherlands have for the first time detected dimethyl ether in a planet-forming disc. With nine atoms, this is the largest molecule identified in such a disc to date. It is also a precursor of larger organic molecules that can lead to the emergence of life. . . . (continued at <https://www.eso.org/public/news/eso2205/?lang> )



### **Tiny Satellites Are Changing The Way We Explore Our Planet And Beyond**

Want to go to space? It could cost you. This month, the SpaceX Crew Dragon spacecraft will make the first fully-private, crewed flight to the International Space Station. The going price for a seat is US\$55 million. The ticket comes with an eight-day stay on the space station, including room and board — and unrivalled views. . . . But if you're happy to keep your feet on the ground, things start to look more affordable. Over the past 20 years, advances in tiny satellite technology have brought Earth orbit within reach for small countries, private companies, university researchers, and even do-it-yourself hobbyists. . . . (continued at <https://astronomy.com/news/2022/03/tiny-satellites-are-changing-the-way-we-explore-our-planet-and-beyond> )

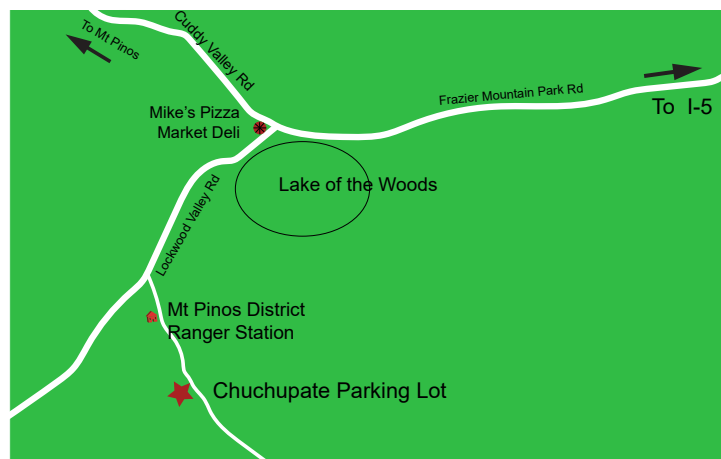




## Dark Sky Observing Sites

**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).

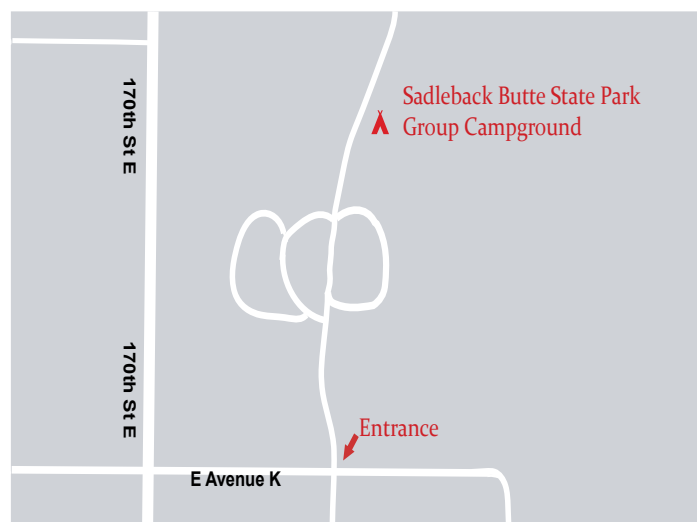
To get there, take the Frazier Mountain Park RD east about 7 miles from I-5, to Lake Of The Woods, Turn left on Lockwood Valley Rd. ( If you see Mike's Pizza on your left you missed the turn) In less than a mile there is a road to the left, go past the ranger station, the parking lot is on the right. 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 mid-month. On April 30, if you're in southern South American there will be a partial Solar eclipse.

**Mercury** starts the month at solar conjunction on the 2nd. By mid-month it's visible in the evening twilight and as in conjunction with Uranus less than 2° south. On the 29th the Pleiades are 1.5° north.

**Venus** begins the month in Capricorn, rising an hour ahead of the Sun, in the company of Mars and Saturn. By the end of the month it almost collides with Jupiter (less than 1/2°)

**Mars** begins the month the month Capricorn. On the morning of the 5th Saturn will be just 25 arc-minutes north. By the end of month, Mars is in the middle of Aquarius.

**Jupiter** in Aquarius, is in conjunction with the Neptune on the morning of the 12th. By the end of the month Jupiter is in conjunction with Venus (24 arc-secs)

**Saturn** begins the month in the eastern corner of Capricorn sandwiched between Venus and Mars. On the morning of the 4th a 1/2° conjunction with Mars occurs. The 33% waning Moon slides passed in the afternoon of the 24th.

**Uranus** continues moving east in central Aries at mag 5.8. On the 3th the 6% waxing Moon passes 1° to the south. By the middle of April it will be very hard to see Uranus in the setting Sun.

**Neptune** will be in the emerging from the morning twilight slowly. On the 12th passes by Jupiter 12 arc-minutes to the south. On the 27th Venus passes just 28 arc-seconds south

**Pluto** spends the month slowing moving east in Sagittarius at mag 14.4.

## Moon Phases



First Qtr  
April 8

Full  
April 16

Third Qtr  
April 23

New  
April 30

## Sun and Moon Rise and Set\*

Date	Moonrise	Moonset	Sunrise	Sunset
4/1/2022	07:07	19:56	06:39	19:13
4/5/2022	09:08	23:55	06:34	19:17
4/10/2022	13:17	03:16	06:27	19:21
4/15/2022	18:32	05:56	06:20	19:24
4/20/2022	23:22	09:07	06:14	19:28
4/25/2022	03:43	14:37	06:08	19:32
4/30/2022	06:03	19:45	06:03	19:36

## Planet Data\*

### April 1

	Rise	Transit	Set	Mag	Phase%
Mercury	06:42	12:54	19:07	-1.86	9.7
Venus	04:35	10:04	15:33	-4.29	55.5
Mars	04:27	09:43	15:00	1.07	91.6
Jupiter	05:53	11:42	17:35	-2.06	99.8
Saturn	04:32	09:52	15:11	0.85	99.8

### April 15

	Rise	Transit	Set	Mag	Phase%
Mercury	06:55	13:44	20:33	-1.18	82.9
Venus	04:27	10:08	15:49	-4.19	61.6
Mars	04:03	09:29	14:57	0.98	90.6
Jupiter	05:06	10:59	16:52	-2.09	99.7
Saturn	03:41	09:01	14:22	0.86	99.8

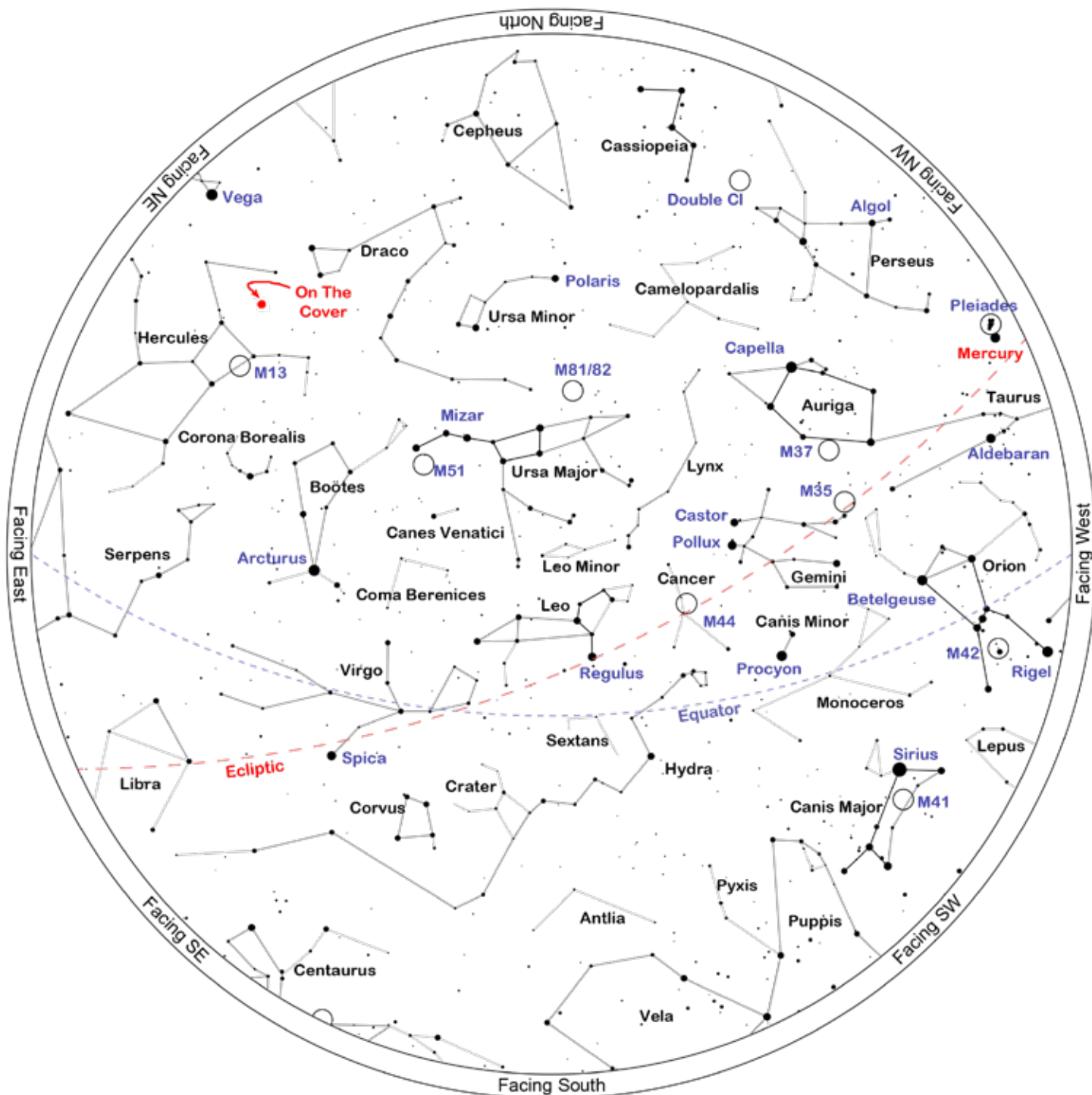
### April 30

	Rise	Transit	Set	Mag	Phase%
Mercury	06:59	14:10	21:21	0.48	34.2
Venus	04:15	10:12	16:10	-4.10	67.4
Mars	03:35	09:13	14:52	0.88	89.5
Jupiter	04:15	10:12	16:09	-2.15	99.5
Saturn	02:45	08:06	13:27	0.84	99.7

\*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 April 30, 21:00 (UTC -07:00)

Powered by: Heavens-Above.com



# Desert Sky Observer

www.avastronomyclub.org

April 2022

## Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Deep Sky Star Party or the Saturday nearest the New Moon, in this case April 30, 2022. The list is sorted by the transit time of the object.

ID	Common Name	Type		RA	Dec	Mag	Rise	Transit	Set
M45	Pleiades, Seven Sisters	Open	Tau	03h 47m 30s	+24° 07.0'	1.6	06:56	14:12	21:28
Barnard5	B5	DkNeb	Per	03h 47m 53s	+32° 53.0'		06:22	14:12	22:03
NGC1461		Galaxy	Eri	03h 48m 27s	-16° 23.5'	11.7	08:57	14:13	19:29
IC353		Neb	Tau	03h 53m 00s	+25° 48.0'		06:56	14:17	21:39
IC2003		P Neb	Per	03h 56m 22s	+33° 52.5'	13.0	06:26	14:21	22:16
NGC1499	California Nebula	Neb	Per	04h 03m 14s	+36° 22.0'		06:20	14:28	22:35
NGC1515		Galaxy	Dor	04h 04m 03s	-54° 06.0'	11.0	13:08	14:28	15:48
NGC1496		Open	Per	04h 04m 32s	+52° 39.7'	10.0	03:54	14:29	01:03
NGC1502		Open	Cam	04h 07m 50s	+62° 19.8'	5.7	Circ	14:32	Circ
IC360		Neb	Tau	04h 09m 00s	+26° 06.0'		07:10	14:33	21:56
NGC1514	Crystal Ball Nebula	P Neb	Tau	04h 09m 17s	+30° 46.5'	10.0	06:52	14:34	22:15
NGC1513		Open	Per	04h 09m 57s	+49° 30.8'	8.4	04:49	14:34	00:20
IC359		Neb	Tau	04h 12m 28s	+27° 42.1'		07:08	14:37	22:06
NGC1535		P Neb	Eri	04h 14m 16s	-12° 44.3'	10.0	09:12	14:39	20:05
Barnard10	B10	DkNeb	Tau	04h 18m 41s	+28° 16.0'		07:12	14:43	22:14
NGC1545		Open	Per	04h 20m 57s	+50° 15.2'	6.2	04:50	14:45	00:40
NGC1569		Galaxy	Cam	04h 30m 49s	+64° 50.8'	11.2	Circ	14:55	Circ
Barnard18	B18	DkNeb	Tau	04h 31m 13s	+24° 21.0'		07:39	14:56	22:12
NGC1582		Open	Per	04h 31m 53s	+43° 49.0'	7.0	06:04	14:56	23:49
NGC1560		Galaxy	Cam	04h 32m 48s	+71° 52.7'	11.5	Circum	14:57	Cir-cum
Barnard19	B19	DkNeb	Tau	04h 33m 00s	+26° 16.0'		07:34	14:57	22:21
Barnard20	B20	DkNeb	Per	04h 37m 04s	+50° 58.0'		04:57	15:01	01:06
Barnard22	B22	DkNeb	Tau	04h 38m 00s	+26° 03.0'		07:40	15:02	22:25
Barnard14	B14	DkNeb	Tau	04h 39m 59s	+25° 44.0'		07:43	15:04	22:26
IC2087		Neb	Tau	04h 40m 00s	+25° 44.5'		07:43	15:04	22:26
Barnard23	B23	DkNeb	Tau	04h 40m 33s	+29° 52.0'		07:27	15:05	22:42
NGC1624		Open	Per	04h 40m 36s	+50° 27.6'	10.4	05:07	15:05	01:03
NGC1640		Galaxy	Eri	04h 42m 14s	-20° 26.0'	11.7	10:04	15:07	20:10
NGC1647		Open	Tau	04h 45m 55s	+19° 06.8'	6.4	08:11	15:10	22:09
IC2118	Witch Head Nebula	Neb	Eri	05h 04m 54s	-07° 15.0'		09:47	15:29	21:12
NGC1851	C73	Globular	Col	05h 14m 06s	-40° 03.0'	7.3	11:57	15:38	19:20
IC405	Flaming Star Nebula	Neb	Aur	05h 16m 29s	+34° 21.3'		07:44	15:41	23:38
M79	NGC1904	Globular	Lep	05h 24m 11s	-24° 31.4'	8.5	10:59	15:49	20:38
M38	Starfish Cluster	Open	Aur	05h 28m 40s	+35° 50.8'	7.0	07:48	15:53	23:58
M1	Crab Nebula	SNR	Tau	05h 34m 32s	+22° 00.8'	8.4	08:50	15:59	23:07

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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	10:12	16:00	21:47
M43	De Mairan's Nebula	D Neb	Ori	05h 35m 31s	-05° 16.0'	9.0	10:12	16:00	21:48
M36	Pinwheel Cluster	Open	Aur	05h 36m 18s	+34° 08.3'	6.5	08:04	16:01	23:57
M78	NGC2068	D Neb	Ori	05h 46m 45s	+00° 04.8'	8.0	10:08	16:11	22:14
M37	Salt-and-pepper Cluster	Open	Aur	05h 52m 18s	+32° 33.2'	6.0	08:28	16:17	00:06
M35	NGC2168	Open	Gem	06h 09m 00s	+24° 21.0'	5.5	09:17	16:33	23:50
M41	Little Beehive	Open	CMa	06h 46m 01s	-20° 45.3'	5.0	12:08	17:10	22:12
M50	Heart-shaped Cluster	Open	Mon	07h 02m 42s	-08° 23.0'	7.0	11:48	17:27	23:06
M47	NGC2422	Open	Pup	07h 36m 35s	-14° 29.0'	4.5	12:39	18:01	23:22
M46	NGC2437	Open	Pup	07h 41m 46s	-14° 48.6'	6.5	12:46	18:06	23:27
M93	NGC2447	Open	Pup	07h 44m 30s	-23° 51.4'	6.5	13:17	18:09	23:00
M48	NGC2548	Open	Hya	08h 13m 43s	-05° 45.0'	5.5	12:51	18:38	00:25
M44	Beehive Cluster	Open	Cnc	08h 40m 24s	+19° 40.0'	4.0	12:04	19:05	02:05
M67	King Cobra	Open	Cnc	08h 51m 18s	+11° 48.0'	7.5	12:39	19:16	01:52
M81	Bode's Galaxy	Galaxy	UMa	09h 55m 33s	+69° 03.9'	7.8	Circ	20:20	Circ
M82	Cigar Galaxy	Galaxy	UMa	09h 55m 53s	+69° 40.8'	9.2	Circ	20:20	Circ
M95	NGC3351	Galaxy	Leo	10h 43m 58s	+11° 42.2'	10.6	14:32	21:08	03:44
M96	NGC3368	Galaxy	Leo	10h 46m 46s	+11° 49.2'	10.1	14:35	21:11	03:47
M105	NGC3379	Galaxy	Leo	10h 47m 50s	+12° 34.9'	10.5	14:34	21:12	03:51
M108	NGC3556	Galaxy	UMa	11h 11m 31s	+55° 40.4'	10.6	Circ	21:36	Circ
M97	Owl Nebula	P Neb	UMa	11h 14m 48s	+55° 01.1'	12.0	Circ	21:39	Circ
M65	Leo Triplet	Galaxy	Leo	11h 18m 56s	+13° 05.5'	10.1	15:03	21:43	04:23
M66	Leo Triplet	Galaxy	Leo	11h 20m 15s	+12° 59.4'	9.7	15:05	21:45	04:24
M109	NGC3992,UGC6937	Galaxy	UMa	11h 57m 36s	+53° 22.4'	10.6	11:31	22:22	09:13
M98	NGC4192	Galaxy	Com	12h 13m 48s	+14° 54.0'	10.9	15:53	22:38	05:24
M99	Virgo Cluster Pinwheel	Galaxy	Com	12h 18m 50s	+14° 25.0'	10.4	15:59	22:43	05:27
M106	NGC4258	Galaxy	CVn	12h 18m 58s	+47° 18.2'	9.1	13:21	22:43	08:05
M61	Swelling Spiral	Galaxy	Vir	12h 21m 55s	+04° 28.3'	10.1	16:31	22:46	05:02
M40	Winnecke 4	Dbl+Asterism	UMa	12h 22m 12s	+58° 05.0'	8.7	Circ	22:47	Circ
M100	Mirror of M99	Galaxy	Com	12h 22m 55s	+15° 49.3'	10.1	15:59	22:47	05:36
M84	NGC4374	Galaxy	Vir	12h 25m 04s	+12° 53.2'	10.2	16:10	22:49	05:29
M85	NGC4382	Galaxy	Com	12h 25m 24s	+18° 11.4'	10.0	15:54	22:50	05:46
M86	NGC4406	Galaxy	Vir	12h 26m 12s	+12° 56.7'	9.9	16:11	22:51	05:30
M49	NGC4472	Galaxy	Vir	12h 29m 47s	+08° 00.0'	9.3	16:29	22:54	05:19
M87	Virgo A	Galaxy	Vir	12h 30m 49s	+12° 23.4'	9.6	16:17	22:55	05:33
M88	NGC4501	Galaxy	Com	12h 31m 59s	+14° 25.2'	10.2	16:12	22:56	05:40
M91	Missing Messier Object	Galaxy	Com	12h 35m 27s	+14° 29.7'	10.9	16:15	23:00	05:44
M89	NGC4552	Galaxy	Vir	12h 35m 40s	+12° 33.3'	10.9	16:22	23:00	05:39
M90	NGC4569	Galaxy	Vir	12h 36m 50s	+13° 09.7'	10.2	16:21	23:01	05:41

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ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
M58	NGC4579	Galaxy	Vir	12h 37m 44s	+11° 49.1'	10.4	16:26	23:02	05:38
M68	NGC4590	Globular	Hya	12h 39m 28s	-26° 44.5'	9.0	18:23	23:04	03:45
M104	Sombrero Galaxy	Galaxy	Vir	12h 39m 59s	-11° 37.3'	9.2	17:34	23:04	04:34
M59	NGC4621	Galaxy	Vir	12h 42m 02s	+11° 38.7'	10.7	16:31	23:06	05:42
M60	NGC4649	Galaxy	Vir	12h 43m 40s	+11° 33.1'	9.8	16:32	23:08	05:44
M94	Croc's Eye Galaxy	Galaxy	CVn	12h 50m 53s	+41° 07.1'	8.9	14:41	23:15	07:49
M64	Black Eye Galaxy,	Galaxy	Com	12h 56m 44s	+21° 41.0'	9.3	16:14	23:21	06:28
M53	NGC5024	Globular	Com	13h 12m 55s	+18° 10.1'	8.5	16:42	23:37	06:33
M63	Sunflower Galaxy	Galaxy	CVn	13h 15m 49s	+42° 01.7'	9.3	15:00	23:40	08:20
NGC5139	Omega Centauri	Globular	Cen	13h 26m 48s	-47° 29.0'	3.6	21:02	23:51	02:40
NGC5169		Galaxy	CVn	13h 28m 10s	+46° 40.3'	14.0	14:37	23:53	09:08
NGC5204		Galaxy	UMa	13h 29m 36s	+58° 25.1'	11.3	Circ	23:54	Circ
M51	Whirlpool Galaxy,	Galaxy	CVn	13h 29m 52s	+47° 11.7'	8.9	14:33	23:54	09:15
Arp85	M51B	Galaxy	CVn	13h 29m 58s	+47° 16.0'	9.6	14:33	23:54	09:16
NGC5182		Galaxy	Hya	13h 30m 41s	-28° 09.0'	13.0	19:19	23:55	04:31
NGC5214		Galaxy	CVn	13h 32m 49s	+41° 52.3'	14.0	15:18	23:57	08:36
M83	Southern Pinwheel Galaxy	Galaxy	Hya	13h 37m 00s	-29° 51.8'	8.0	19:32	00:01	04:31
HR5144	SAO82942	Triple	Boo	13h 40m 40s	+19° 57.3'	5.8	17:04	00:05	07:07
NGC5283		Galaxy	Dra	13h 41m 06s	+67° 40.3'	14.0	Circ	00:05	Circ
M3	NGC5272	Globular	CVn	13h 42m 11s	+28° 22.5'	7.0	16:35	00:07	07:38
NGC5286	C84	Globular	Cen	13h 46m 24s	-51° 22.0'	7.6	22:04	00:11	02:18
NGC5292		Galaxy	Cen	13h 47m 40s	-30° 56.4'	14.0	19:47	00:12	04:37
NGC5356		Galaxy	Vir	13h 54m 59s	+05° 20.0'	14.0	18:02	00:19	06:37
NGC5363		Galaxy	Vir	13h 56m 07s	+05° 15.2'	10.2	18:03	00:20	06:38
NGC5447	III-787	Neb	UMa	14h 02m 29s	+54° 16.3'		13:04	00:27	11:50
M101	Pinwheel Galaxy	Galaxy	UMa	14h 03m 13s	+54° 20.9'	8.2	13:00	00:28	11:55
NGC5461	III-788	Neb	UMa	14h 03m 42s	+54° 19.0'		13:03	00:28	11:53
NGC5485		Galaxy	UMa	14h 07m 11s	+55° 00.0'	11.5	Circ	00:32	Circ
NGC5460		Open	Cen	14h 07m 27s	-48° 20.6'	5.6	21:51	00:32	03:13
NGC5500		Galaxy	Boo	14h 10m 15s	+48° 32.7'	14.0	15:00	00:35	10:09
IC991		Galaxy	Vir	14h 17m 48s	-13° 52.3'	13.0	19:19	00:42	06:06
HR5362	SAO224838,	Dbl	Lup	14h 20m 10s	-43° 03.5'	5.6	21:22	00:45	04:07
IC4406	Retina Nebula	P Neb	Lup	14h 22m 26s	-44° 09.0'	11.0	21:31	00:47	04:02
HR5409	Phi Vir	Triple	Vir	14h 28m 12s	-02° 13.6'	4.8	18:56	00:53	06:49
NGC5669		Galaxy	Boo	14h 32m 44s	+09° 53.4'	12.0	18:26	00:57	07:28
NGC5689		Galaxy	Boo	14h 35m 30s	+48° 44.5'	11.9	15:23	01:00	10:36
M102	Spindle Galaxy	Galaxy	Dra	15h 06m 30s	+55° 45.7'	10.8	Circ	01:31	Circ
NGC5875		Galaxy	Boo	15h 09m 13s	+52° 31.6'	13.0	15:02	01:34	12:05
NGC5907	Splinter Galaxy	Galaxy	Dra	15h 15m 54s	+56° 19.7'	11.4	Circ	01:40	Circ



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ID	Common Name	Type	Const	RA	Dec	Mag	Rise	Transit	Set
NGC5882		P Neb	Lup	15h 16m 50s	-45° 38.9'	11.0	22:37	01:41	04:45
NGC5897		Globular	Lib	15h 17m 24s	-21° 00.6'	8.6	20:41	01:42	06:43
M5	NGC5904	Globular	Ser	15h 18m 33s	+02° 04.9'	7.0	19:34	01:43	07:51
Barnard228	B228	DkNeb	Lup	15h 44m 00s	-34° 30.0'		21:59	02:08	06:18
IC4593	White Eyed Pea	P Neb	Her	16h 11m 44s	+12° 04.3'	11.0	19:59	02:36	09:13
IC4592	Jabbah	Neb	Sco	16h 11m 59s	-19° 27.4'		21:30	02:36	07:42
M80	NGC6093	Globular	Sco	16h 17m 03s	-22° 58.5'	8.5	21:47	02:41	07:36
IC4601		Neb	Sco	16h 20m 18s	-20° 04.9'		21:41	02:45	07:49
Abell38		P Neb	Sco	16h 23m 17s	-31° 44.9'	11.7	22:26	02:48	07:09
M4	Cat's Eye, NGC6121	Globular	Sco	16h 23m 35s	-26° 31.5'	7.5	22:06	02:48	07:30
IC4603	Rho Ophiuchi Complex [1]	Neb	Oph	16h 25m 24s	-24° 28.0'		22:00	02:50	07:39
IC4604	Rho Ophiuchi Complex [2]	Neb	Oph	16h 25m 33s	-23° 26.5'		21:57	02:50	07:43
NGC6124	C75	Open	Sco	16h 25m 36s	-40° 40.0'	5.8	23:12	02:50	06:28
Abell39		P Neb	Her	16h 27m 33s	+27° 54.5'	12.9	19:22	02:52	10:22
IC4605		Neb	Sco	16h 30m 12s	-25° 06.8'		22:07	02:55	07:42
NGC6153		P Neb	Sco	16h 31m 31s	-40° 15.2'	12.0	23:16	02:56	06:36
NGC6181		Galaxy	Her	16h 32m 21s	+19° 49.5'	11.9	19:56	02:57	09:58
NGC6171		Globular	Oph	16h 32m 32s	-13° 03.1'	8.1	21:31	02:57	08:23
NGC6178		Open	Sco	16h 35m 47s	-45° 38.6'	7.2	23:56	03:00	06:04
NGC6193	C82	Open	Ara	16h 41m 18s	-48° 46.0'	5.2	00:29	03:06	05:43
M13	Hercules Globular Cluster	Globular	Her	16h 41m 41s	+36° 27.5'	7.0	18:58	03:06	11:14
NGC6210	Turtle Planetary Nebula	P Neb	Her	16h 44m 30s	+23° 48.0'	9.0	19:54	03:09	10:23
Barnard44a	B44a	DkNeb	Sco	16h 44m 45s	-40° 20.0'		23:29	03:09	06:49
NGC6204		Open	Ara	16h 46m 09s	-47° 01.0'	8.2	00:17	03:10	06:04
M12	Gumball Globular	Globular	Oph	16h 47m 14s	-01° 56.8'	8.0	21:14	03:12	09:09
NGC6231	Table of Scorpius	Open	Sco	16h 54m 00s	-41° 48.0'	2.6	23:47	03:18	06:49
IC4628	Prawn Nebula	Neb	Sco	16h 56m 58s	-40° 27.3'		23:42	03:21	07:00
NGC6254		Globular	Oph	16h 57m 09s	-04° 05.9'	6.6	21:30	03:22	09:13
M62	Flickering Globular	Globular	Oph	17h 01m 13s	-30° 06.7'	8.0	22:57	03:26	07:54

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  
Australis  
Tri - Triangulum  
Tuc - Tucana  
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Vel - Vela  
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