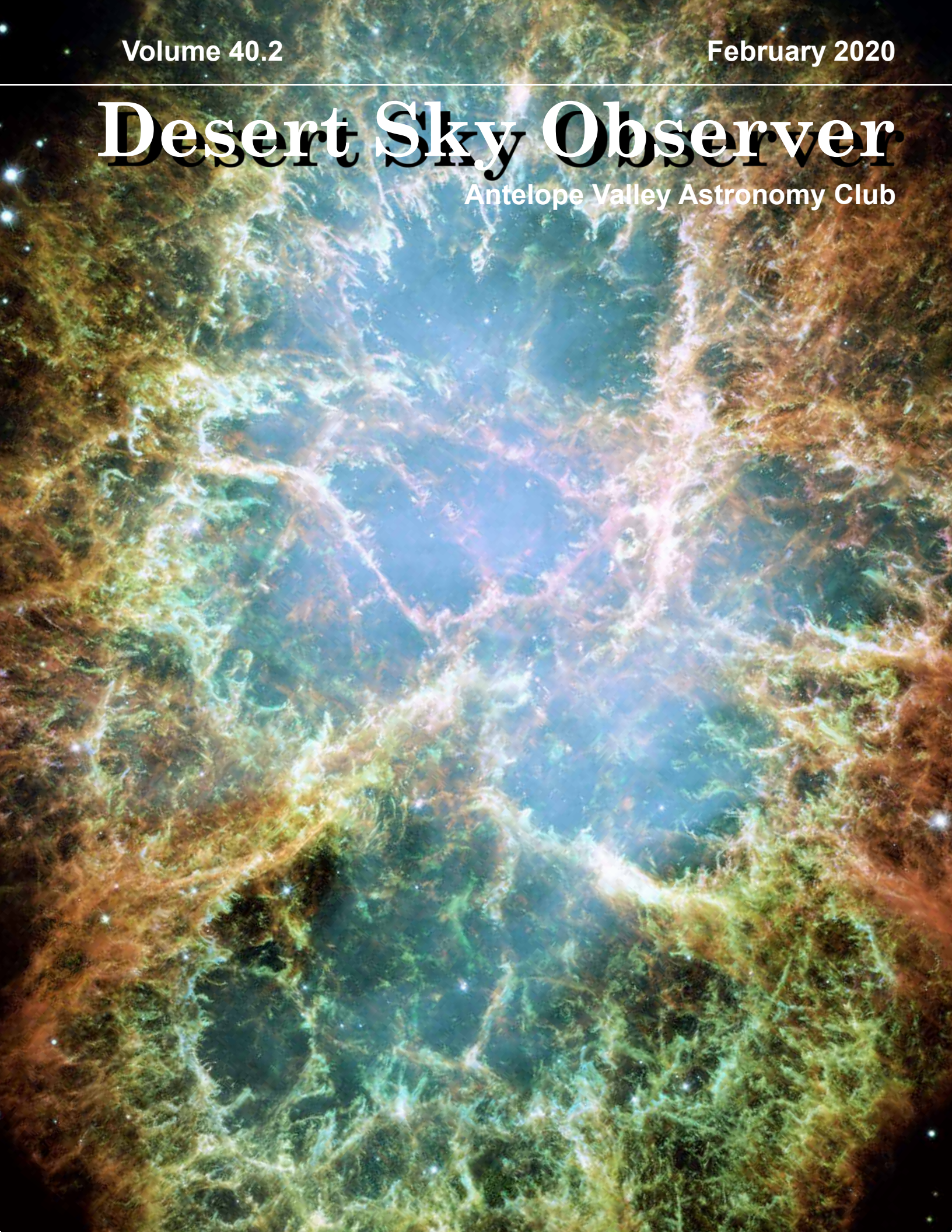
Volume 40.2 February 2020

# Desert Sky Observer

Antelope Valley Astronomy Club



## Upcoming Events

February 8: Club Meeting
February 29: Class -- How to set up a telescope
February 29: Prime Desert Woodland Moonwalk

March 3: Primary Election, Get Out and Vote
March 13: Club Meeting
March 21: Messier Marathon
March 28: PDW Moonwalk

AVAC Calendar

## Board Members

**President:** Darrel Bennet (661) 220-0122
president@avastronomyclub.org

**Vice-President:** Matt Leone (661) 713-1894
vice-president@avastronomyclub.org

**Secretary:** Rose Moore (661) 972-1953
secretary@avastronomyclub@org

**Treasurer:** Rod Girard (661) 803-7838
treasurer@avastronomyclub@org

## Appointed Positions

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

**Equipment & Library:**
John VanEvera 661-754-1819
library@avastronomyclub.org

**Club Historian:** vacant
history@avastronomyclub.org

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

**Astronomical League Coordinator:**
Frank Moore (661) 972-4775
al@avastronomyclub.org

www.avastronomyclub.org
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 Darrel Bennet

Well, not much has happened in January. We had a Prime Desert Woodland Moon Walk on the 11th. It was too windy and cold to set up any telescopes, but Jeremy still had a few people to take on the walk.

On January 19th we had a Board Meeting at my house to go over this year's calendar. We talked about Star parties, Messier Marathon, Mt. Wilson, the Club picnic and the Club Christmas party. We also talked about upcoming speakers.

On February 29th Jeremy, Rod and I will be doing a beginner class at the SAGE Planetarium at 2pm. We will teach anyone how to use the club's telescopes and how to read star charts. If you have a telescope and want some pointers how to use it then bring it to the class and we will help you out with it later that day.

We will have our next Prime Desert Woodland Moon Walk at 6:30pm. We will keep you informed of upcoming dates.

But until then, keep looking up.

## On The Cover

This Hubble image gives the most detailed view of the entire Crab Nebula ever. The Crab is among the most interesting and well studied objects in astronomy.

This image is the largest image ever taken with Hubble's WFPC2 camera. It was assembled from 24 individual exposures taken with the NASA/ESA Hubble Space Telescope and is the highest resolution image of the entire Crab Nebula ever made.

Credit:
NASA, ESA and Allison Loll/Jeff Hester (Arizona State University). Acknowledgement: Davide De Martin (ESA/Hubble)

Note: Cover image has been cropped and rotated from the original.

## From the Secretary

By Rose Moore

February is upon us, and we have a meeting on Friday Feb. 14th at the SAGE! Happy Valentine's Day! Jeremy will be doing a planetarium show for us on the dome. I'll send out further information as we get closer to the date.

On February 29th Saturday, Jeremy and Darrell will be presenting a Beginner's Class for new members and any other members that would like to attend. The start time is 2pm and it will be held at the SAGE Planetarium. This will be more of a 'hands on' class on setting up telescopes and associated equipment. If you plan on attending, please let one of the Board members or Jeremy know.

Also on Saturday Feb. 29th at 6:30pm is a Prime Desert Moon Walk at the Prime Desert Woodland Preserve: 43201 35th St. West, Lancaster, 93536. We'll need members with telescopes for this event. Set up time is 1/2-1 hour prior to the event. Weather permitting!

At the club meeting on March 13th, we will have member Frank Moore giving a presentation on many of the Messier Objects! This is in preparation for our Messier Marathon coming up! Come on out and learn a thing or two, and show your support!

On Saturday March 21st we will be having our Messier Marathon! This year we are having this event at Red Cliffs Natural Area on the CA-14. An email with directions and a link for a map will be sent before the event. The club will supply charcoal for grilling, but members are responsible for bringing their own food to grill. You may bring a snack or side dish to share with other members. The club will supply some drinks. There are 2 or 3 tables and benches to sit on, but you may want to also bring a chair or two. There are vault toilets. There is no running water. Cell signal is poor and unreliable. Arrival time is approximately 4pm. This site is reserved for us overnight via special permit, until Sunday at 8am.

We will be starting an order at our next meeting for Bee's Embroidery in Lancaster. Phil will be placing a sample of the order sheet in this DSO. We have several t-shirts, a kid t-shirt, hats, and a hoodie available with our club logo. Do not use this sample sheet in the DSO to order on your own!! We will be taking orders soon and it will be sent in all at once to Bee's. Money must be given at the time of ordering, either check or cash to our Treasurer Rod, at our next club meeting or upcoming events. You will need to add tax to your order. If you want your name added it will be $5 additional. We will take orders for several weeks so that members ordering may be able to attend either a club meeting or outreach event to place their order. If any questions please email me!

We have some speakers scheduled as follows: April/Tim Thompson, May/Dr. Eric Becklin, June/Tom Hames.

Some possible events coming up: Mt. Wilson, College of the Canyons, Lunar Club meetings, trip to Griffith Park, trip to JPL. There will be no trip to SOFIA this year as they are restructuring their outreach program.

Stay tuned!! Rose

### Member Scope for Sale

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

## Space News

News from around the Net

**Betelgeuse continues to dim, diminishes to 1.506 magnitude**

Betelgeuse keeps getting dimmer, and everyone is wondering what exactly that means. The star will go supernova at the end of its life, but that's not projected to happen for tens of thousands of years or so. So what's causing the dimming? . . . . (continued at https://phys.org/news/2020-01-betelgeuse-dim-diminishes-magnitude.html )

**Trump unveils new Space Force logo (yes, it looks like something from 'Star Trek')**

But there's more to the story**.** President Donald Trump on Friday (Jan. 24) officially unveiled the logo for the U.S. Space Force and the reaction has been strong. It might just be because the logo, which draws heavily on the new military branch's Air Force heritage, bears a striking similarity to a "Star Trek" insignia. . . . . (continued at https://www.space.com/space-force-logo-star-trek-insignia.html )

**To find intelligent alien life, humans may need to start thinking like an extraterrestrial**

We need to make the normal strange. Our hunt for aliens has a potentially fatal flaw — we're the ones searching for them. That's a problem because we're a unique species, and alien-seeking scientists are an even stranger and more specialized bunch. As a result, their all-too human assumptions may get in the way of their alien-listening endeavors. . . . . (Continued at https://www.space.com/seti-extraterrestrial-search-human-biases-can-cloud-research.html )

**Comets to Catch in 2020**

Comets have long been my favorite type of sky object. I'm a soft touch for their beauty and changeability. I like surprises, too. You never know exactly what to expect when you point telescope at one. Changes in brightness, color and tail length reveal just how dynamic these objects are. Fragilely composed of honeycombed dust and ice, a comet is liable to crumble into a beautiful mess at any moment, especially when passing near its nemesis, the Sun.. . . . . (Continued at https://www.skyandtelescope.com/observing/comets-to-catch-in-2020/ )

**Solar and Lunar Eclipses in 2020**

Up to seven eclipses of the Sun and Moon can take place in one year, though the last time that happened was 1982, and the fewest possible is four. The mix of six events occurring in 2020 is especially interesting: The two solar eclipses will be "central" events (one total and one annular), yet all four of the lunar eclipses will be penumbral and therefore hardly noticeable. North Americans will be disappointed to learn that they'll have a chance to see only two of the penumbral events. . . . . (Continued at https://www.skyandtelescope.com/observing/eclipses-in-2020/ )

**NASA's TESS mission uncovers its first world with two stars**
NASA's Transiting Exoplanet Survey Satellite has found its first circumbinary planet, a world orbiting two stars. Called TOI 1338 b, the planet lies 1,300 light-years away and is 6.9 times larger than Earth . . . . (Continued at https://www.sciencedaily.com/releases/2020/01/200107104907.htm )

**These are the universe's five strangest stars**
Some 70 percent of all stars in the universe are tiny red dwarfs, so faint and dim and seemingly humdrum the casual observer might think stellar physics suffers from a lack of imagination. But the "average star" belies the true breadth and sheer weirdness of the universe's stellar catalogue. . . . . (Continued at http://www.astronomy.com/news/2020/01/these-are-the-universes-five-strangest-stars )

**The two main types of exoplanets: Small and rocky or big and gassy**
An astrophysicist explains why planets only come in two main flavors. An astrophysicist explains why planets only come in two main flavors. Scientists have discovered over 4,000 exoplanets outside of our Solar System, according to NASA's Exoplanet Archive. Some of these planets orbit multiple stars at the same time. Certain planets are so close to their star that it takes only a handful of days to make one revolution, compared to the Earth which takes 365.25 days. . . . . .(Continued at http://www.astronomy.com/news/2020/01/why-have-we-found-so-few-super-earth-exoplanets )

**In a rare sighting, astronomers observe burst of activity as a massive star forms**
Here on Earth, we pay quite a lot of attention to the sun. It's visible to us, after all, and central to our lives. But it is only one of the billions of stars in our galaxy, the Milky Way. It's also quite small compared to other stars—many are at least eight times more massive. These massive stars influence the structure, shape and chemical content of a galaxy. (Continued at https://phys.org/news/2020-01-rare-sighting-astronomers-massive-star.html )

**A Quick Tour of Orion, the Hunter**
The evening sky this week is Moon-free, presenting a near-perfect opportunity to explore the marquee winter constellation, Orion. Given the season's frequently chilly weather, your observing sessions are likely to be shorter than at other times of year. But if you plan carefully, you can see a lot in a little time — especially if you utilize the unparalleled grab-and-go convenience of binoculars or a small telescope. (Continued at https://www.skyandtelescope.com/observing/a-quick-tour-of-orion-the-hunter/ )

# Betelgeuse and the Crab Nebula: Stellar Death and Rebirth

David Prosper, NASA Night Sky Network

What happens when a star dies? Stargazers are paying close attention to the red giant star Betelgeuse since it recently dimmed in brightness, causing speculation that it may soon end in a brilliant supernova. While it likely won't explode quite yet, we can preview its fate by observing the nearby **Crab Nebula**.

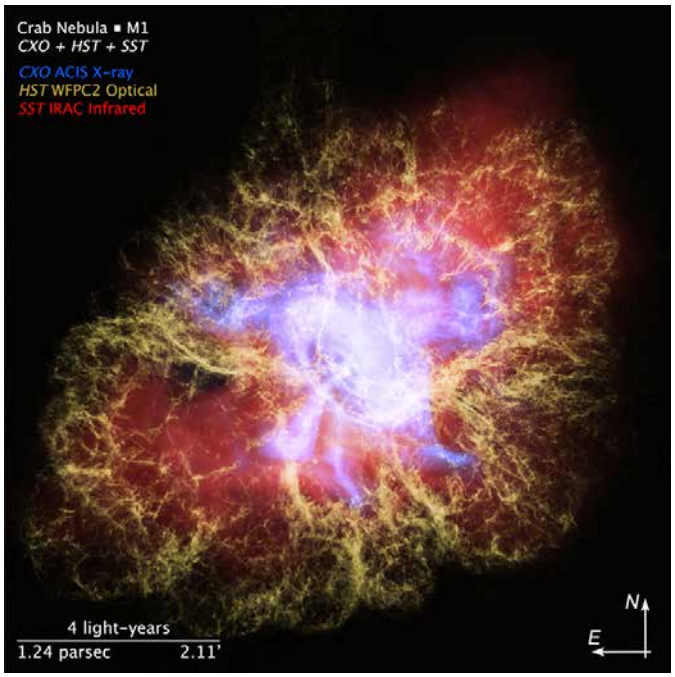
**Betelgeuse**, despite its recent dimming, is still easy to find as the red-hued shoulder star of Orion. A known variable star, Betelgeuse usually competes for the position of the brightest star in Orion with brilliant blue-white Rigel, but recently its brightness has faded to below that of nearby Aldebaran, in Taurus. Betelgeuse is a young star, estimated to be a few million years old, but due to its giant size it leads a fast and furious life. This massive star, known as a supergiant, exhausted the hydrogen fuel in its core and began to fuse helium instead, which caused the outer layers of the star to cool and swell dramatically in size. Betelgeuse is one of the only stars for which we have any kind of detailed surface observations due to its huge size – somewhere between the diameter of the orbits of Mars and Jupiter - and relatively close distance of about 642 light-years. Betelgeuse is also a "runaway star," with its remarkable speed possibly triggered by merging with a smaller companion star. If that is the case, Betelgeuse may actually have millions of years left! So, Betelgeuse may not explode soon after all; or it might explode tomorrow! We have much more to learn about this intriguing star.

The Crab Nebula (M1) is relatively close to Betelgeuse in the sky, in the nearby constellation of Taurus. Its ghostly, spidery gas clouds result from a massive explosion; a supernova observed by astronomers in 1054! A backyard telescope allows you to see some details, but only advanced telescopes reveal the rapidly spinning neutron star found in its center: the last stellar remnant from that cataclysmic event. These gas clouds were created during the giant star's violent demise and expand ever outward to enrich the universe with heavy elements like silicon, iron, and nickel. These element-rich clouds are like a cosmic fertilizer, making rocky planets like our own Earth possible. Supernova also send out powerful shock waves that help trigger star formation. In fact, if it wasn't for a long-ago supernova, our solar system - along with all of us - wouldn't exist! You can learn much more about the Crab Nebula and its neutron star in a new video from NASA's Universe of Learning, created from observations by the Great Observatories of Hubble, Chandra, and Spitzer: bit.ly/CrabNebulaVisual

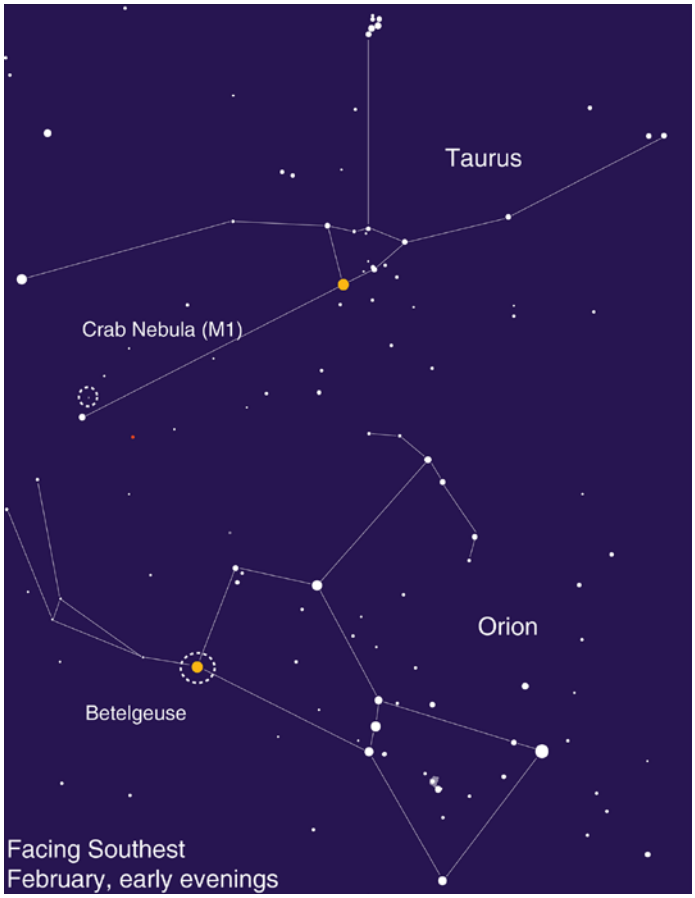
Our last three articles covered the life cycle of stars from observing two neighboring constellations: Orion and Taurus! Our stargazing took us to the "baby stars" found in the stellar nursery of the Orion Nebula, onwards to the teenage stars of the Pleiades and young adult stars of the Hyades, and ended with dying Betelgeuse and the stellar corpse of the Crab Nebula. Want to know more about the life cycle of stars? Explore stellar evolution with "The Lives of Stars" activity and handout: bit.ly/starlifeanddeath .

Check out NASA's most up to date observations of supernova and their remains at nasa.gov

(Continued on next page)




This image of the Crab Nebula combines X-ray observations from Chandra, optical observations from Hubble, and infrared observations from Spitzer to reveal intricate detail. Notice how the violent energy radiates out from the rapidly spinning neutron star in the center of the nebula (also known as a pulsar) and heats up the surrounding gas. More about this incredible "pulsar wind nebula" can be found at bit.ly/Crab3D Credit: NASA, ESA, F. Summers, J. Olmsted, L. Hustak, J. DePasquale and G. Bacon (STScI), N. Wolk (CfA), and R. Hurt (Caltech/IPAC)




Spot Betelgeuse and the Crab Nebula after sunset! A telescope is needed to spot the ghostly Crab.

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!

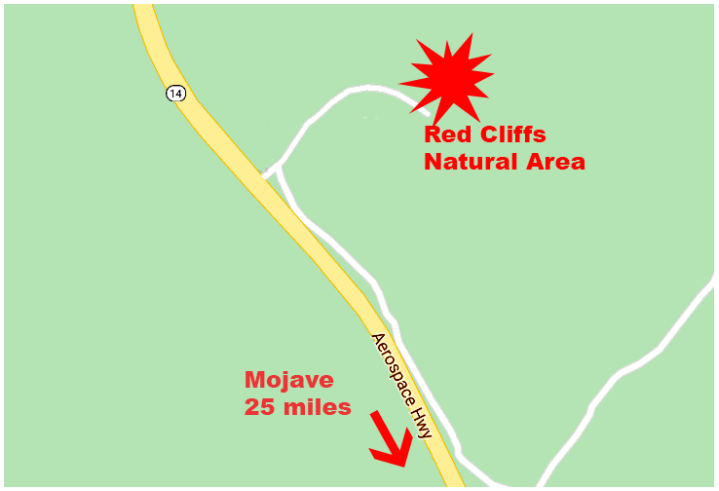
## Dark Sky Observing Sites

**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 the group campsite is used. Individual campsites cost $20 per night. Enter off Avenue K.



The **Chuchupate** parking lot is a half a mile beyond the Mt Pions 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.



## Planet Summary

The **Sun** starts the month in Capricorn and moves into Aquarius by the end of the month

**Mercury** achieves its maximum eastern elongation on the 10th, two days before its perihelion and 18° from the Sun. Mercury shines brighter than 0.0 until the 14th fading quickly until inferior conjunction on the 26th.

**Venus** begins the year in Capricorn in the evening sky some 35° east of the Sun. On the 27th Venus and Neptune are in conjunction in Aquarius.

**Mars** is very low in the morning twilight among the stars of Sagittarius . The waning crescent Moon has a close encounter on the morning of the 18th.

**Jupiter** rises before the Sun in the morning twilight, starting at a 20° and finishing the month almost 50° west of the Sun. On the 19th the 13% waning Moon is 1 1/2° south, yes it's at 1pm.

**Saturn** like Jupiter rises before the Sun and is east of Jupiter by 11° on the 1st. By the end of the month it's 8° Jupiter and Saturn spend the rest of the year getting closer and closer. The 8% waning Moon passes 2° to the south on the 20th in the morning twilight .

**Uranus** will spend 2020 in southern Aries at magnitude 5.76.

**Neptune** will spend 2020 in northeast Aquarius at mag. 7.93.

**Pluto** spends the month in eastern Sagittarius between Jupiter and Saturn, getting closer to Saturn as the month closes.

## Sun and Moon Rise and Set

First Qtr Feb 1 | Full Feb 8 | Third Qtr Feb 15 | New Feb 23

## Sun and Moon Rise and Set*

| Date | Moonrise | Moonset | Sunrise | Sunset |
|---|---|---|---|---|
| 2/1/2020 | 11:12 | 00:37 | 06:51 | 17:22 |
| 2/5/2020 | 13:51 | 03:40 | 06:48 | 17:26 |
| 2/10/2020 | 19:26 | 07:59 | 06:44 | 17:31 |
| 2/15/2020 | 00:01 | 11:00 | 06:39 | 17:36 |
| 2/20/2020 | 04:56 | 15:04 | 06:33 | 17:40 |
| 2/25/2020 | 07:51 | 19:47 | 06:27 | 17:45 |

## Planet Data*

Feb 1

| | Rise | Transit | Set | Mag | Phase% |
|---|---|---|---|---|---|
| Mercury | 07:42 | 13:07 | 18:33 | -0.98 | 81.77 |
| Venus | 08:49 | 14:42 | 20:36 | -4.10 | 73.04 |
| Mars | 03:29 | 08:32 | 13:18 | 1.36 | 93.17 |
| Jupiter | 05:12 | 10:08 | 15:03 | -1.90 | 99.79 |
| Saturn | 05:55 | 10:55 | 15:56 | 0.59 | 99.98 |

Feb15

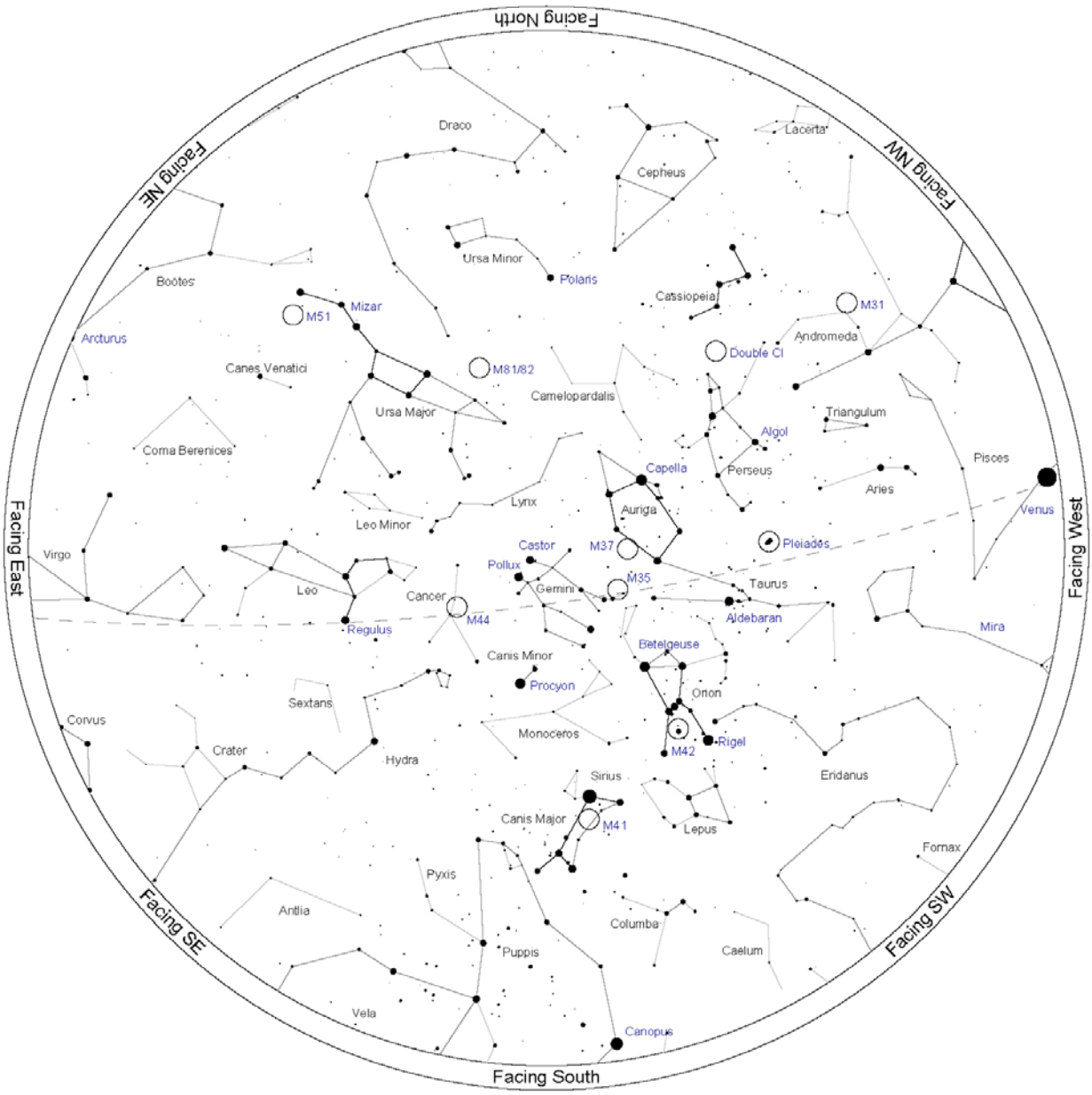
| | Rise | Transit | Set | Mag | Phase% |
|---|---|---|---|---|---|
| Mercury | 07:16 | 13:05 | 18:53 | 0.63 | 25.11 |
| Venus | 08:33 | 14:46 | 21:00 | -4.16 | 68.17 |
| Mars | 03:17 | 08:10 | 13:02 | 1.24 | 92.04 |
| Jupiter | 04:29 | 09:25 | 14:21 | -1.95 | 99.62 |
| Saturn | 05:06 | 10:07 | 15:08 | 0.64 | 99.94 |

Feb 28

| | Rise | Transit | Set | Mag | Phase% |
|---|---|---|---|---|---|
| Mercury | 05:56 | 11:39 | 17:21 | 3.70 | 3.10 |
| Venus | 08:17 | 14:48 | 21:20 | -4.22 | 63.02 |
| Mars | 03:05 | 07:58 | 12:51 | 1.12 | 90.97 |
| Jupiter | 03:48 | 08:12 | 13:42 | -2.01 | 99.45 |
| Saturn | 04:19 | 09:22 | 14:24 | 0.66 | 99.89 |

*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: 2020 February 22, 21:00 (UTC -08:00)

Powered by: Heavens-Above.com

## Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Deep Sky Star Party or the Saturday nearest the New Moon. In this case February 22, 2020. The list is sorted by the transit time of the object.

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| M31 | Galaxy | And | 00h 42m 44s | +41° 16.1' | 4.3 | 05:56 | 14:30 | 23:04 |
| NGC246 | P Neb | Cet | 00h 47m 00s | -11° 53.0' | 10.9 | 09:05 | 14:34 | 20:04 |
| NGC253 | S Gal | Scl | 00h 47m 36s | -25° 17.0' | 7.1 | 09:48 | 14:35 | 19:22 |
| NGC288 | Globular | Scl | 00h 52m 45s | -26° 35.0' | 8.1 | 09:58 | 14:40 | 19:22 |
| NGC584 | Galaxy | Cet | 01h 31m 21s | -06° 52.0' | 10.4 | 09:35 | 15:19 | 21:02 |
| M33 | Galaxy | Tri | 01h 33m 51s | +30° 39.6' | 6.2 | 07:41 | 15:21 | 23:01 |
| M76 | P Neb | Per | 01h 42m 18s | +51° 34.2' | 12.0 | 05:18 | 15:30 | 01:41 |
| NGC663 | Open | Cas | 01h 46m 00s | +61° 15.0' | 7.1 | Circum | 15:33 | Circum |
| NGC752 | Open | And | 01h 57m 48s | +37° 41.0' | 5.7 | 07:32 | 15:45 | 23:58 |
| NGC869 | Open | Per | 02h 20m 00s | +57° 08.0' | 4.3 | Circum | 16:07 | Circum |
| NGC884 | Open | Per | 02h 22m 18s | +57° 08.1' | 4.0 | Circum | 16:10 | Circum |
| NGC908 | Galaxy | Cet | 02h 23m 05s | -21° 14.0' | 10.2 | 11:10 | 16:10 | 21:11 |
| NGC896 | Neb | Cas | 02h 25m 28s | +62° 01.1' | | Circum | 16:13 | Circum |
| NGC896 | Neb | Cas | 02h 25m 28s | +62° 01.1' | | Circum | 16:13 | Circum |
| NGC1027 | Open | Cas | 02h 42m 40s | +61° 35.7' | 6.7 | Circum | 16:30 | Circum |
| NGC1097 | S Gal | For | 02h 46m 18s | -30° 17.0' | 9.2 | 12:05 | 16:34 | 21:02 |
| HR963 | Dbl | For | 03h 12m 04s | -28° 59.2' | 3.9 | 12:26 | 16:59 | 21:33 |
| HR963 | Dbl | For | 03h 12m 04s | -28° 59.2' | 3.9 | 12:26 | 16:59 | 21:33 |
| NGC1261 | Globular | Hor | 03h 12m 18s | -55° 13.0' | 8.4 | 16:07 | 17:00 | 17:52 |
| NGC1261 | Globular | Hor | 03h 12m 18s | -55° 13.0' | 8.4 | 16:07 | 17:00 | 17:52 |
| NGC1291 | Galaxy | Eri | 03h 17m 18s | -41° 06.4' | 8.5 | 13:28 | 17:05 | 20:41 |
| NGC1302 | Galaxy | For | 03h 19m 51s | -26° 03.6' | 11.0 | 12:23 | 17:07 | 21:51 |
| NGC1342 | Open | Per | 03h 31m 38s | +37° 22.6' | 6.7 | 09:07 | 17:19 | 01:31 |
| NGC1432 | Neb | Tau | 03h 45m 50s | +24° 22.1' | | 10:17 | 17:33 | 00:49 |
| NGC1435 | Neb | Tau | 03h 46m 10s | +23° 45.8' | | 10:19 | 17:34 | 00:48 |
| NGC1435 | Neb | Tau | 03h 46m 10s | +23° 45.8' | | 10:19 | 17:34 | 00:48 |
| M45 | Open | Tau | 03h 47m 30s | +24° 07.0' | 1.6 | 10:20 | 17:35 | 00:50 |
| NGC1499 | Neb | Per | 04h 03m 14s | +36° 22.0' | | 09:44 | 17:51 | 01:57 |
| NGC1502 | Open | Cam | 04h 07m 50s | +62° 19.8' | 5.7 | Circum | 17:55 | Circum |
| NGC1502 | Open | Cam | 04h 07m 50s | +62° 19.8' | 5.7 | Circum | 17:55 | Circum |
| NGC1514 | P Neb | Tau | 04h 09m 17s | +30° 46.5' | 10.0 | 10:16 | 17:57 | 01:37 |
| NGC1535 | P Neb | Eri | 04h 14m 16s | -12° 44.3' | 10.0 | 12:35 | 18:02 | 23:29 |
| NGC1528 | Open | Per | 04h 15m 23s | +51° 12.9' | 6.4 | 07:57 | 18:03 | 04:09 |
| NGC1579 | Neb | Per | 04h 30m 14s | +35° 16.7' | | 10:17 | 18:18 | 02:19 |
| NGC1579 | Neb | Per | 04h 30m 14s | +35° 16.7' | | 10:17 | 18:18 | 02:19 |
| NGC1600 | Galaxy | Eri | 04h 31m 40s | -05° 05.2' | 11.1 | 12:30 | 18:19 | 00:08 |
| NGC1662 | Open | Ori | 04h 48m 27s | +10° 56.1' | 6.4 | 12:02 | 18:36 | 01:09 |
| NGC1664 | Open | Aur | 04h 51m 06s | +43° 40.4' | 7.6 | 09:48 | 18:38 | 03:29 |
| NGC1784 | Galaxy | Lep | 05h 05m 27s | -11° 52.3' | 11.8 | 13:23 | 18:53 | 00:22 |

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| NGC1778 | Open | Aur | 05h 08m 04s | +37° 01.4' | 7.7 | 10:46 | 18:55 | 03:05 |
| NGC1807 | Open | Tau | 05h 10m 43s | +16° 31.3' | 7.0 | 12:08 | 18:58 | 01:48 |
| NGC1851 | Globular | Col | 05h 14m 06s | -40° 03.0' | 7.3 | 15:19 | 19:01 | 22:44 |
| C31 | BrNeb | Aur | 05h 16m 12s | +34° 16.0' | | 11:07 | 19:04 | 03:00 |
| C31 | BrNeb | Aur | 05h 16m 12s | +34° 16.0' | | 11:07 | 19:04 | 03:00 |
| NGC1893 | Open | Aur | 05h 22m 45s | +33° 24.7' | 7.5 | 11:18 | 19:10 | 03:02 |
| M79 | Globular | Lep | 05h 24m 11s | -24° 31.4' | 8.5 | 14:22 | 19:12 | 00:01 |
| M38 | Open | Aur | 05h 28m 40s | +35° 50.8' | 7.0 | 11:12 | 19:16 | 03:20 |
| NGC1981 | Open | Ori | 05h 35m 09s | -04° 25.9' | 4.6 | 13:32 | 19:23 | 01:13 |
| NGC1977 | Neb | Ori | 05h 35m 16s | -04° 49.2' | | 13:33 | 19:23 | 01:12 |
| NGC1977 | Neb | Ori | 05h 35m 16s | -04° 49.2' | | 13:33 | 19:23 | 01:12 |
| M42 | Open+D Neb | Ori | 05h 35m 16s | -05° 23.4' | 4.0 | 13:35 | 19:23 | 01:10 |
| NGC1976 | Neb | Ori | 05h 35m 16s | -05° 23.4' | 4.0 | 13:35 | 19:23 | 01:10 |
| NGC1975 | Neb | Ori | 05h 35m 18s | -04° 41.0' | | 13:33 | 19:23 | 01:12 |
| NGC1975 | Neb | Ori | 05h 35m 18s | -04° 41.0' | | 13:33 | 19:23 | 01:12 |
| NGC1980 | Neb | Ori | 05h 35m 25s | -05° 54.9' | | 13:36 | 19:23 | 01:09 |
| NGC1980 | Neb | Ori | 05h 35m 25s | -05° 54.9' | | 13:36 | 19:23 | 01:09 |
| M43 | D Neb | Ori | 05h 35m 31s | -05° 16.0' | 9.0 | 13:35 | 19:23 | 01:11 |
| NGC1990 | Neb | Ori | 05h 36m 13s | -01° 12.1' | | 13:24 | 19:24 | 01:23 |
| M36 | Open | Aur | 05h 36m 18s | +34° 08.3' | 6.5 | 11:28 | 19:24 | 03:19 |
| NGC1999 | Neb | Ori | 05h 36m 25s | -06° 43.0' | | 13:40 | 19:24 | 01:08 |
| NGC2023 | Neb | Ori | 05h 41m 38s | -02° 15.5' | | 13:32 | 19:29 | 01:26 |
| NGC2023 | Neb | Ori | 05h 41m 38s | -02° 15.5' | | 13:32 | 19:29 | 01:26 |
| NGC2024 | Neb | Ori | 05h 41m 42s | -01° 51.4' | | 13:31 | 19:29 | 01:27 |
| NGC2024 | Neb | Ori | 05h 41m 42s | -01° 51.4' | | 13:31 | 19:29 | 01:27 |
| NGC2022 | P Neb | Ori | 05h 42m 06s | +09° 05.2' | 12.0 | 13:01 | 19:29 | 01:58 |
| NGC2064 | Neb | Ori | 05h 46m 18s | +00° 00.3' | | 13:31 | 19:34 | 01:36 |
| M37 | Open | Aur | 05h 52m 18s | +32° 33.1' | 6.0 | 11:51 | 19:40 | 03:28 |
| NGC2169 | Open | Ori | 06h 08m 24s | +13° 57.9' | 5.9 | 13:13 | 19:56 | 02:38 |
| M35 | Open | Gem | 06h 09m 00s | +24° 21.0' | 5.5 | 12:40 | 19:56 | 03:12 |
| NGC2174 | Neb | Ori | 06h 09m 24s | +20° 39.5' | | 12:53 | 19:57 | 03:00 |
| NGC2174 | Neb | Ori | 06h 09m 24s | +20° 39.5' | | 12:53 | 19:57 | 03:00 |
| NGC2175 | Open | Ori | 06h 09m 40s | +20° 29.2' | 6.8 | 12:54 | 19:57 | 03:00 |
| NGC2217 | Galaxy | CMa | 06h 21m 40s | -27° 14.0' | 10.4 | 15:29 | 20:09 | 00:49 |
| NGC2232 | Open | Mon | 06h 28m 01s | -04° 50.8' | 3.9 | 14:26 | 20:15 | 02:05 |
| NGC2237 | BrNeb | Mon | 06h 32m 18s | +05° 03.0' | | 14:03 | 20:20 | 02:36 |
| NGC2244 | Open | Mon | 06h 32m 24s | +04° 52.0' | 4.8 | 14:03 | 20:20 | 02:36 |
| NGC2264 | Open | Mon | 06h 40m 58s | +09° 53.7' | 3.9 | 13:58 | 20:28 | 02:59 |
| M41 | Open | CMa | 06h 46m 01s | -20° 45.3' | 5.0 | 15:31 | 20:33 | 01:36 |
| NGC2281 | Open | Aur | 06h 48m 17s | +41° 04.7' | 5.4 | 12:03 | 20:36 | 05:08 |
| NGC2298 | Globular | Pup | 06h 48m 59s | -36° 00.2' | 9.4 | 16:33 | 20:36 | 00:40 |
| NGC2298 | Globular | Pup | 06h 48m 59s | -36° 00.2' | 9.4 | 16:33 | 20:36 | 00:40 |

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| M50 | Open | Mon | 07h 02m 42s | -08° 23.0' | 7.0 | 15:11 | 20:50 | 02:29 |
| NGC2343 | Open | Mon | 07h 08m 06s | -10° 37.0' | 6.7 | 15:22 | 20:55 | 02:29 |
| NGC2362 | Open | CMa | 07h 18m 48s | -24° 57.0' | 4.1 | 16:18 | 21:06 | 01:54 |
| NGC2384 | Open | CMa | 07h 25m 10s | -21° 01.3' | 7.4 | 16:11 | 21:13 | 02:14 |
| NGC2396 | Open | Pup | 07h 28m 00s | -11° 43.0' | 7.0 | 15:45 | 21:15 | 02:45 |
| NGC2392 | P Neb | Gem | 07h 29m 12s | +20° 55.0' | 9.2 | 14:12 | 21:17 | 04:21 |
| NGC2414 | Open | Pup | 07h 33m 12s | -15° 27.1' | 7.9 | 16:02 | 21:21 | 02:39 |
| M47 | Open | Pup | 07h 36m 35s | -14° 29.0' | 4.5 | 16:02 | 21:24 | 02:46 |
| NGC2438 | P Neb | Pup | 07h 41m 50s | -14° 44.1' | 10.0 | 16:08 | 21:29 | 02:50 |
| NGC2440 | P Neb | Pup | 07h 41m 55s | -18° 12.5' | 11.0 | 16:19 | 21:29 | 02:40 |
| NGC2451 | Open | Pup | 07h 45m 15s | -37° 58.0' | 2.8 | 17:39 | 21:33 | 01:26 |
| NGC2477 | Open | Pup | 07h 52m 18s | -38° 33.0' | 5.8 | 17:49 | 21:40 | 01:30 |
| NGC2527 | Open | Pup | 08h 04m 58s | -28° 08.8' | 6.5 | 17:16 | 21:52 | 02:29 |
| NGC2547 | Open | Vel | 08h 10m 09s | -49° 12.9' | 4.7 | 19:24 | 21:58 | 00:31 |
| NGC2539 | Open | Pup | 08h 10m 37s | -12° 49.1' | 6.5 | 16:31 | 21:58 | 03:25 |
| NGC2546 | Open | Pup | 08h 12m 15s | -37° 35.7' | 6.3 | 18:04 | 22:00 | 01:55 |
| M48 | Open | Hya | 08h 13m 43s | -05° 45.0' | 5.5 | 16:14 | 22:01 | 03:48 |
| NGC2541 | Galaxy | Lyn | 08h 14m 40s | +49° 03.7' | 11.8 | 12:24 | 22:02 | 07:40 |
| NGC2567 | Open | Pup | 08h 18m 32s | -30° 38.3' | 7.4 | 17:39 | 22:06 | 02:33 |
| C85 | Open | Vel | 08h 40m 12s | -53° 04.0' | 2.5 | 20:44 | 22:28 | 00:11 |
| M44 | Open | Cnc | 08h 40m 24s | +19° 40.0' | 4.0 | 15:28 | 22:28 | 05:28 |
| NGC2781 | Galaxy | Hya | 09h 11m 28s | -14° 49.0' | 11.5 | 17:38 | 22:59 | 04:20 |
| NGC2768 | Galaxy | UMa | 09h 11m 37s | +60° 02.2' | 10.0 | Circum | 22:59 | Circum |
| NGC2910 | Open | Vel | 09h 30m 30s | -52° 55.1' | 7.2 | 21:32 | 23:18 | 01:04 |
| NGC2968 | Galaxy | Leo | 09h 43m 12s | +31° 55.7' | 11.8 | 15:45 | 23:31 | 07:16 |
| NGC2986 | Galaxy | Hya | 09h 44m 16s | -21° 16.7' | 10.9 | 18:31 | 23:32 | 04:32 |
| NGC3132 | P Neb | Vel | 10h 07m 42s | -40° 26.0' | 9.4 | 20:15 | 23:55 | 03:35 |
| NGC3201 | Globular | Vel | 10h 17m 36s | -46° 25.0' | 6.7 | 21:05 | 00:05 | 03:04 |
| NGC3242 | P Neb | Hya | 10h 24m 48s | -18° 38.0' | 7.8 | 19:03 | 00:12 | 05:21 |
| NGC3277 | Galaxy | LMi | 10h 32m 55s | +28° 30.6' | 11.7 | 16:49 | 00:20 | 07:52 |
| NGC3330 | Open | Vel | 10h 38m 46s | -54° 07.3' | 7.4 | 23:03 | 00:26 | 01:49 |
| NGC3448 | Galaxy | UMa | 10h 54m 39s | +54° 18.3' | 11.7 | 13:25 | 00:42 | 11:59 |
| M97 | P Neb | UMa | 11h 14m 48s | +55° 01.1' | 12.0 | Circum | 01:02 | Circum |
| NGC3599 | Galaxy | Leo | 11h 15m 27s | +18° 06.5' | 11.9 | 18:08 | 01:03 | 07:58 |
| NGC3607 | Galaxy | Leo | 11h 16m 55s | +18° 03.0' | 10.0 | 18:09 | 01:04 | 07:59 |
| NGC3610 | Galaxy | UMa | 11h 18m 25s | +58° 47.1' | 10.8 | Circum | 01:06 | Circum |
| NGC3672 | Galaxy | Crt | 11h 25m 02s | -09° 47.7' | 11.0 | 19:37 | 01:12 | 06:48 |
| NGC3705 | Galaxy | Leo | 11h 30m 07s | +09° 16.5' | 11.0 | 18:49 | 01:17 | 07:46 |
| NGC3953 | Galaxy | UMa | 11h 53m 49s | +52° 19.6' | 10.1 | 15:16 | 01:41 | 12:06 |
| NGC4036 | Galaxy | UMa | 12h 01m 27s | +61° 53.7' | 10.6 | Circum | 01:49 | Circum |
| NGC4147 | Globular | Com | 12h 10m 06s | +18° 32.5' | 10.3 | 19:01 | 01:57 | 08:54 |
| NGC4236 | S Gal | Dra | 12h 16m 42s | +69° 28.0' | 9.7 | Circum | 02:04 | Circum |
| NGC4233 | Galaxy | Vir | 12h 17m 08s | +07° 37.4' | 11.9 | 19:40 | 02:04 | 08:29 |

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| M106 | Galaxy | CVn | 12h 18m 58s | +47° 18.2' | 9.1 | 16:46 | 02:06 | 11:27 |
| NGC4274 | Galaxy | Com | 12h 19m 51s | +29° 36.8' | 10.4 | 18:31 | 02:07 | 09:43 |
| M100 | Galaxy | Com | 12h 22m 55s | +15° 49.3' | 10.1 | 19:22 | 02:10 | 08:58 |
| NGC4340 | Galaxy | Com | 12h 23m 35s | +16° 43.3' | 11.0 | 19:20 | 02:11 | 09:02 |
| NGC4361 | P Neb | Crv | 12h 24m 31s | -18° 47.0' | 10.0 | 21:03 | 02:12 | 07:20 |
| M86 | Galaxy | Vir | 12h 26m 12s | +12° 56.7' | 9.9 | 19:34 | 02:14 | 08:53 |
| M87 | Galaxy | Vir | 12h 30m 49s | +12° 23.4' | 9.6 | 19:40 | 02:18 | 08:56 |
| NGC4528 | Galaxy | Vir | 12h 34m 06s | +11° 19.2' | 11.7 | 19:47 | 02:21 | 08:56 |
| M91 | Galaxy | Com | 12h 35m 27s | +14° 29.7' | 10.9 | 19:39 | 02:23 | 09:07 |
| NGC4546 | Galaxy | Vir | 12h 35m 29s | -03° 47.5' | 10.3 | 20:31 | 02:23 | 08:15 |
| M68 | Globular | Hya | 12h 39m 28s | -26° 44.5' | 9.0 | 21:45 | 02:27 | 07:09 |
| NGC4691 | Galaxy | Vir | 12h 48m 14s | -03° 20.0' | 11.2 | 20:42 | 02:36 | 08:29 |
| NGC4753 | Galaxy | Vir | 12h 52m 22s | -01° 12.0' | 9.9 | 20:40 | 02:40 | 08:39 |
| NGC4762 | Galaxy | Vir | 12h 52m 56s | +11° 13.8' | 10.2 | 20:06 | 02:40 | 09:15 |
| NGC4936 | Galaxy | Cen | 13h 04m 17s | -30° 31.5' | 11.3 | 22:24 | 02:52 | 07:19 |
| M53 | Globular | Com | 13h 12m 55s | +18° 10.1' | 8.5 | 20:05 | 03:00 | 09:56 |
| NGC5018 | Galaxy | Vir | 13h 13m 01s | -19° 31.1' | 10.8 | 21:54 | 03:00 | 08:07 |
| NGC5053 | Globular | Com | 13h 16m 27s | +17° 41.8' | 9.8 | 20:10 | 03:04 | 09:58 |
| NGC5053 | Globular | Com | 13h 16m 27s | +17° 41.8' | 9.8 | 20:10 | 03:04 | 09:58 |
| NGC5139 | Globular | Cen | 13h 26m 48s | -47° 29.0' | 3.6 | 00:24 | 03:14 | 06:05 |
| HR5144 | Triple | Boo | 13h 40m 40s | +19° 57.3' | 5.8 | 20:27 | 03:28 | 10:29 |
| HR5144 | Triple | Boo | 13h 40m 40s | +19° 57.3' | 5.8 | 20:27 | 03:28 | 10:29 |
| M3 | Globular | CVn | 13h 42m 11s | +28° 22.5' | 7.0 | 19:58 | 03:30 | 11:01 |
| NGC5286 | Globular | Cen | 13h 46m 24s | -51° 22.0' | 7.6 | 01:25 | 03:34 | 05:43 |
| NGC5307 | P Neb | Cen | 13h 51m 03s | -51° 12.3' | 12.0 | 01:27 | 03:38 | 05:50 |
| NGC5354 | Galaxy | CVn | 13h 53m 27s | +40° 18.1' | 11.5 | 19:13 | 03:41 | 12:09 |
| NGC5427 | Galaxy | Vir | 14h 03m 26s | -06° 01.8' | 11.4 | 22:05 | 03:51 | 09:37 |
| NGC5474 | Galaxy | UMa | 14h 05m 02s | +53° 39.7' | 10.9 | 16:58 | 03:52 | 14:47 |
| NGC5466 | Globular | Boo | 14h 05m 28s | +28° 31.9' | 9.1 | 20:21 | 03:53 | 11:25 |
| NGC5466 | Globular | Boo | 14h 05m 28s | +28° 31.9' | 9.1 | 20:21 | 03:53 | 11:25 |
| NGC5460 | Open | Cen | 14h 07m 27s | -48° 20.6' | 5.6 | 01:12 | 03:55 | 06:37 |
| HR5362 | Dbl | Lup | 14h 20m 10s | -43° 03.5' | 5.6 | 00:44 | 04:08 | 07:32 |
| HR5362 | Dbl | Lup | 14h 20m 10s | -43° 03.5' | 5.6 | 00:44 | 04:08 | 07:32 |
| HR5409 | Triple | Vir | 14h 28m 12s | -02° 13.6' | 4.8 | 22:19 | 04:16 | 10:12 |
| HR5409 | Triple | Vir | 14h 28m 12s | -02° 13.6' | 4.8 | 22:19 | 04:16 | 10:12 |
| NGC5634 | Globular | Vir | 14h 29m 37s | -05° 58.6' | 9.6 | 22:31 | 04:17 | 10:03 |
| NGC5660 | Galaxy | Boo | 14h 29m 50s | +49° 37.3' | 11.8 | 18:32 | 04:17 | 14:02 |
| NGC5668 | Galaxy | Vir | 14h 33m 24s | +04° 27.0' | 11.5 | 22:06 | 04:21 | 10:36 |
| NGC5694 | Globular | Hya | 14h 39m 36s | -26° 32.0' | 10.2 | 23:44 | 04:27 | 09:09 |
| NGC5713 | Galaxy | Vir | 14h 40m 11s | -00° 17.4' | 11.4 | 22:26 | 04:28 | 10:30 |
| NGC5806 | Galaxy | Vir | 15h 00m 00s | +01° 53.4' | 11.6 | 22:39 | 04:47 | 10:55 |
| NGC5812 | Galaxy | Lib | 15h 00m 56s | -07° 27.4' | 11.2 | 23:06 | 04:48 | 10:30 |
| NGC5824 | Globular | Lup | 15h 03m 59s | -33° 04.1' | 9.0 | 00:35 | 04:51 | 09:08 |

| ID | Type | Const | RA | Dec | Mag | Rise | Transit | Set |
|---|---|---|---|---|---|---|---|---|
| NGC5824 | Globular | Lup | 15h 03m 59s | -33° 04.1' | 9.0 | 00:35 | 04:51 | 09:08 |
| NGC5885 | Galaxy | Lib | 15h 15m 04s | -10° 05.1' | 11.7 | 23:28 | 05:02 | 10:37 |
| NGC5882 | P Neb | Lup | 15h 16m 50s | -45° 38.9' | 11.0 | 01:59 | 05:04 | 08:10 |
| NGC5897 | Globular | Lib | 15h 17m 24s | -21° 00.6' | 8.6 | 00:03 | 05:05 | 10:06 |
| M5 | Globular | Ser | 15h 18m 33s | +02° 04.9' | 7.0 | 22:57 | 05:06 | 11:14 |
| NGC5927 | Globular | Lup | 15h 28m 00s | -50° 40.3' | 8.3 | 02:58 | 05:15 | 07:33 |
| NGC5927 | Globular | Lup | 15h 28m 00s | -50° 40.3' | 8.3 | 02:58 | 05:15 | 07:33 |
| NGC5946 | Globular | Nor | 15h 35m 28s | -50° 39.5' | 9.6 | 03:05 | 05:23 | 07:41 |
| NGC5946 | Globular | Nor | 15h 35m 28s | -50° 39.5' | 9.6 | 03:05 | 05:23 | 07:41 |
| NGC5986 | Globular | Lup | 15h 46m 04s | -37° 47.1' | 7.1 | 01:39 | 05:33 | 09:28 |
| NGC6067 | Open | Nor | 16h 13m 11s | -54° 13.1' | 5.6 | 04:40 | 06:01 | 07:21 |
| NGC6067 | Open | Nor | 16h 13m 11s | -54° 13.1' | 5.6 | 04:40 | 06:01 | 07:21 |
| NGC6093 | Globular | Sco | 16h 17m 03s | -22° 58.5' | 7.2 | 01:09 | 06:04 | 10:59 |
| M80 | Globular | Sco | 16h 17m 03s | -22° 58.5' | 8.5 | 01:09 | 06:04 | 10:59 |
| NGC6093 | Globular | Sco | 16h 17m 03s | -22° 58.5' | 7.2 | 01:09 | 06:04 | 10:59 |
| M4 | Globular | Sco | 16h 23m 35s | -26° 31.5' | 7.5 | 01:28 | 06:11 | 10:54 |
| NGC6121 | Globular | Sco | 16h 23m 35s | -26° 31.5' | 5.9 | 01:28 | 06:11 | 10:54 |
| NGC6121 | Globular | Sco | 16h 23m 35s | -26° 31.5' | 5.9 | 01:28 | 06:11 | 10:54 |
| NGC6124 | Open | Sco | 16h 25m 36s | -40° 40.0' | 5.8 | 02:34 | 06:13 | 09:52 |

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