Reflections

The Newsletter of the Popular Astronomy Club

ESTABLISHED 1936

Affiliated with

February 2021

President's Corner February 2021

Alan Sheidler

Welcome to the February edition of Reflections. We are in the middle of winter, which should be obvious to everyone and especially for astronomers. We have had very few opportunities to view celestial objects and when we have, it has been too cold or snowy for most of us to get out under the stars.

For many of us, this is a time when we take a vacation from observing and do other things (like buy new telescopes or plan observing sessions when the weather improves this spring). For me, this is the time when my mind gets to wandering.

Over the last couple weeks, I became interested in black holes and in particular, about the size of black holes. In reality, a black hole is simply an object that has a gravitational field strong enough to curve nearby space so drastically that nothing, not even light, can escape. It is difficult to imagine how strong gravity has to be for this to happen. But essentially light is affected by gravity in the same way that physical objects are.

So, if one could shine a light beam up from the "surface" of a black hole, the beam would eventually be curved back down by the black hole's gravity. Simplistically, we can think of a black hole as having an escape velocity equal to or greater than the speed of light. The "surface of the black hole" in this case is a boundary known as the event horizon. If anything passes inside the black hole's event horizon, that object would have to travel faster than the speed of light to be able to escape and since nothing can exceed the speed of light, this means the object is trapped in the black hole.

(Continued in next column)

The escape velocity for a planet is the speed at which an object (like a rocket) would have to be launched from the surface of the planet so that it would fly up and completely escape from the planet and never fall back down again. A rocket could orbit a planet at a slightly slower speed and never fall back to the planet's surface, but in that case, the rocket would not have escaped, it would have been trapped in an orbit around the planet.

We can calculate the escape velocity for the Earth and other solar system objects using the fairly simple equation below. For those of you not wanting to bother doing the math, I created the following table showing the escape velocities for several solar system objects. Earth's escape velocity is slightly more than 25,000mph (11.18km/s). Recall in 1968, Apollo 8 reached this speed in order to escape from Earth to reach the Moon. The escape velocity for the Sun is nearly 1,382,000mph (618km/s) and for Deimos (one of the two Martian moons) it is only 14mph. If you are a fast runner, you could escape from Deimos simply by running!

I won't bore you with the math, but if you are good with algebra, you can solve the escape velocity equation for r. Using the velocity of light for the escape velocity and solving for r, you can find the size of a black hole corresponding to any planet's (or star's) mass. The radius r of a black hole is called the Schwarzschild Radius. For the Sun, this is just under 3 km. In other words, if you could crunch the Sun down to less than 6 km in diameter, it would be a black hole!

It would take a lot of pressure to do that! Interestingly, if you could compress the earth

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down to the size of a penny, it would also be a black hole! I'm not going to lay awake at night worrying about this happening, but it gives us a way to imagine the stupendous density of a black hole.

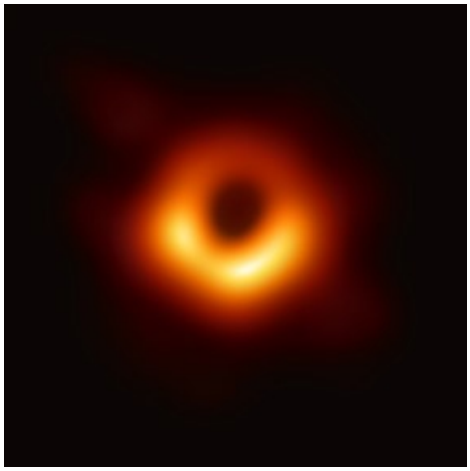
Recently, astronomers were able to obtain an image of the super massive black hole at the center of super giant elliptical galaxy M87. The mass of this black hole is estimated at 6.5 billion times the mass of our Sun. I will leave the math to you, but if you do it, you find the Schwarzschild radius of M87's black hole is 127 Astronomical Units (127 times the Earth-Sun distance). That's BIG!

Anyway, you see what happens when my mind gets to wandering. Let's hope for a break in the weather and keep looking up! Al.

	mass	radius	escape velocity		
object	kg	km	km/s	miles/s	mph
Earth	5.97E+24	6,378	11.18	6.95	25,016
Sun	1.99E+30	695,990	617.69	383.89	1,382,020
Jupiter	1.90E+27	71,492	59.54	37.00	133,209
Mars	6.42E+23	3,397	5.02	3.12	11,236
Moon	7.35E+22	1,738	2.38	1.48	5,315
Deimos	1.93E+15	6	0.0063	0.0039	14

$$v_{escape} = \sqrt{\frac{2Gm}{r}}$$

G = 6.673E-11 Nm^2/kg^2 (Universal Gravitational constant)
m = mass of object in kg
r = radius of object in meters



This image of a black hole—the first ever taken— was captured by an international team of researchers in April 2017. The black hole in located in the center of Galaxy M87.

ANNOUNCEMENTS / INFO

NCRAL Seasonal Messier Marathon Program

NCRAL's Seasonal Messier Marathon observing program is NOT designed to qualify observers for the Astronomical League's Messier Observing program; the two programs are unrelated and observing requirements are quite different. In the NCRAL program, the main requirement is to quickly observe and essentially check off items from one of four seasonal lists of Messier objects as noted in the section to follow.

NCRAL recognition will consist a suitable printed certificate and a 3⁄4-inch enameled star pin (a different color for each season). There will be no direct cost to the membership for participating in the award program; the cost of the program (pins, certificates, mailers, postage) will be borne by the Region as a benefit of affiliation. Relevant program documents are linked below

NCRAL Seasonal Messier Marathon Program Rules

NCRAL WINTER Seasonal Messier List

NCRAL SPRING Seasonal Messier List

NCRAL SUMMER Seasonal Messier List

NCRAL AUTUMN Seasonal Messier List

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ANNOUNCEMENTS / INFO

LOOKING FOR OLDER ISSUES OF REFLECTIONS NEWSLETTER?

HISTORY OF PAC?

Popular Astronomy Club on Facebook?

READY FOR MEMBERSHIP OR TO RENEW?

For PAC Documents Use "**Enrollment Form**"

SUBMISSIONS

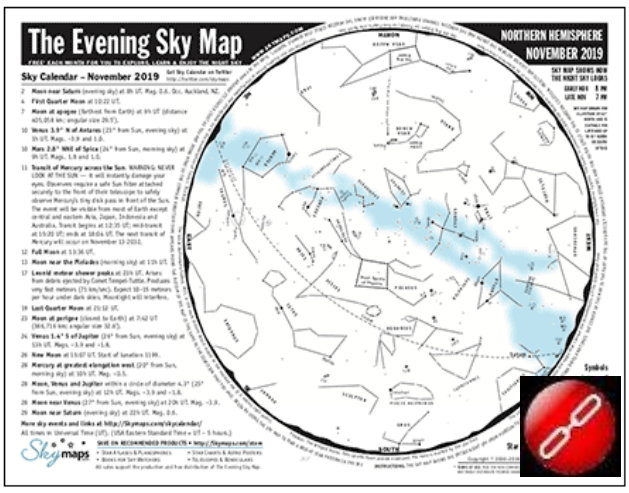
If you have an article or photos to submit or items of interest, we encourage you to send them in by the 25th of the month. Links to stories are welcome also.

Thank you!

Astronomical League Observing Programs

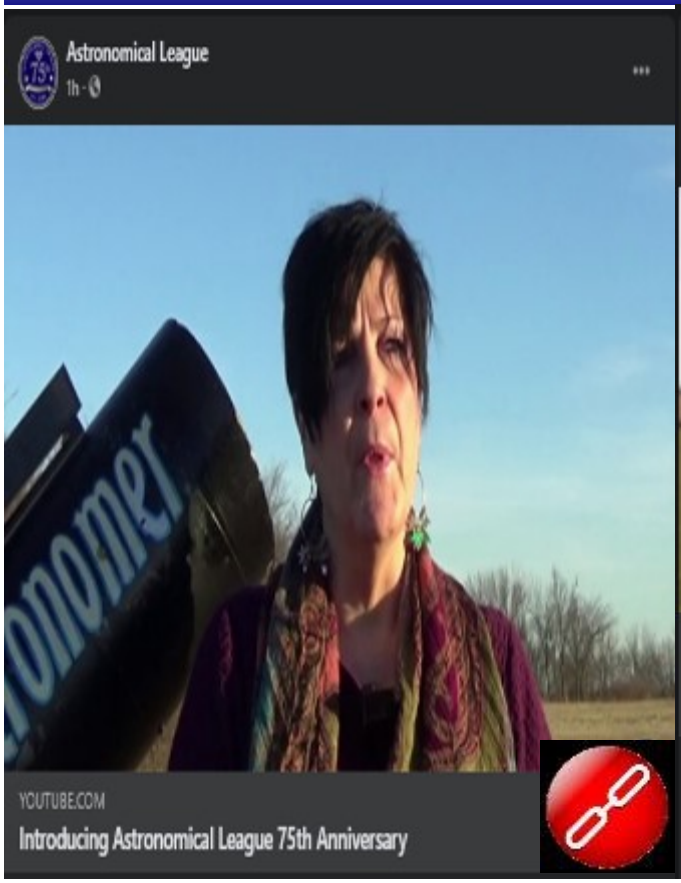
The Astronomical League provides many different Observing Programs. These Observing Programs are designed to provide a direction for your observations and to provide a goal. The Observing Programs have certificates and pins to recognize the observers' accomplishments and for demonstrating their observing skills with a variety of instruments and objects

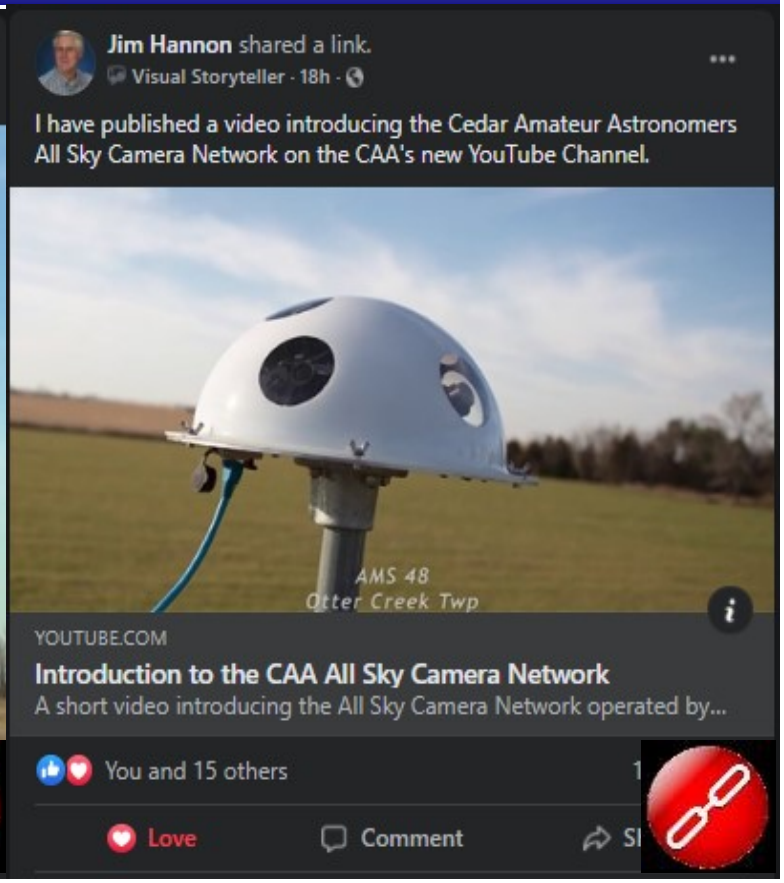
Check out the Astronomical League **ONLINE**!

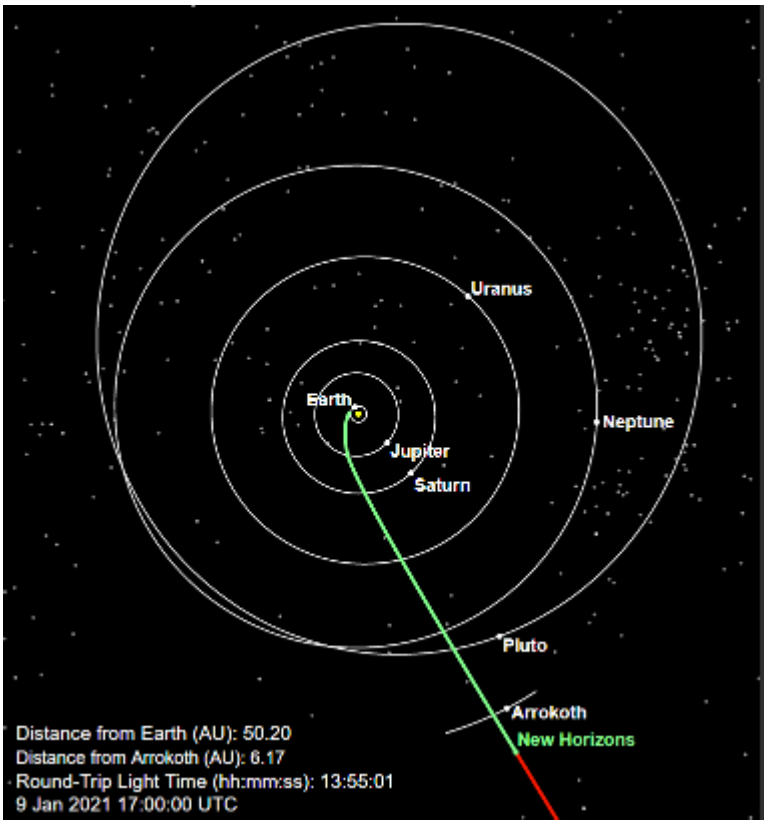


Check out the North Central Region of the Astronomical League (NCRAL) online

ANNOUNCEMENTS / INFO







Ever wonder Where New Horizons is right now and what it is up to ?

CONTRIBUTIONS

Conjunction of Jupiter & Saturn, December 2020 You Tube Video by al Sheidler

CONTRIBUTIONS

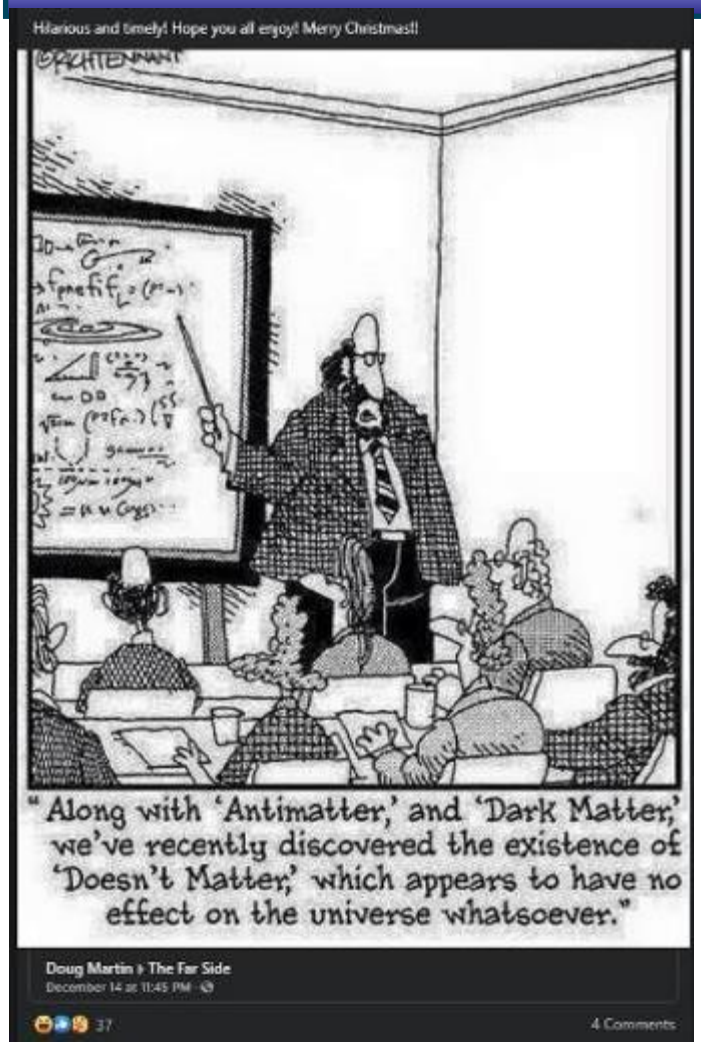
Make a Moon Phases Calendar and Calculator – NEW

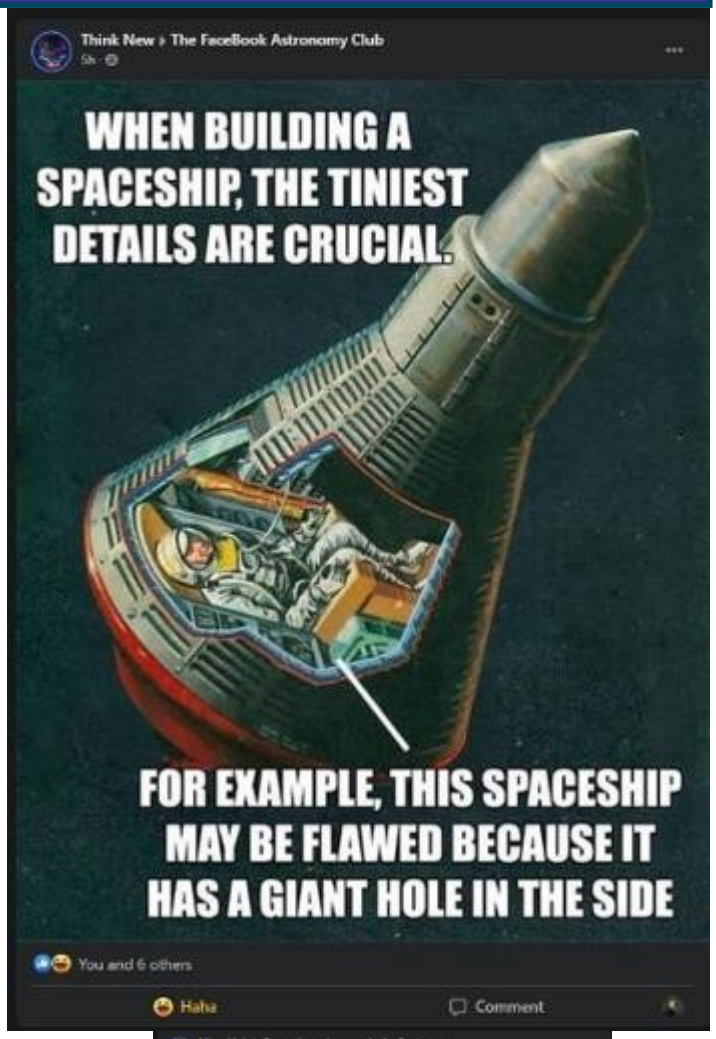
In this episode of Learning Space, you'll learn how to make a calendar that shows you when and where to spot the Moon for every day of the year! | Watch on YouTube

CONTRIBUTIONS

I wanted a close up picture of the Orion Nebula, so I went there in my Space Suit! Seriously, people can download an App called "NASA Selfies", put themselves in a space suit, and chose a bunch of backgrounds and save the images. Might be something our members can do when they are home because of COVID-19.

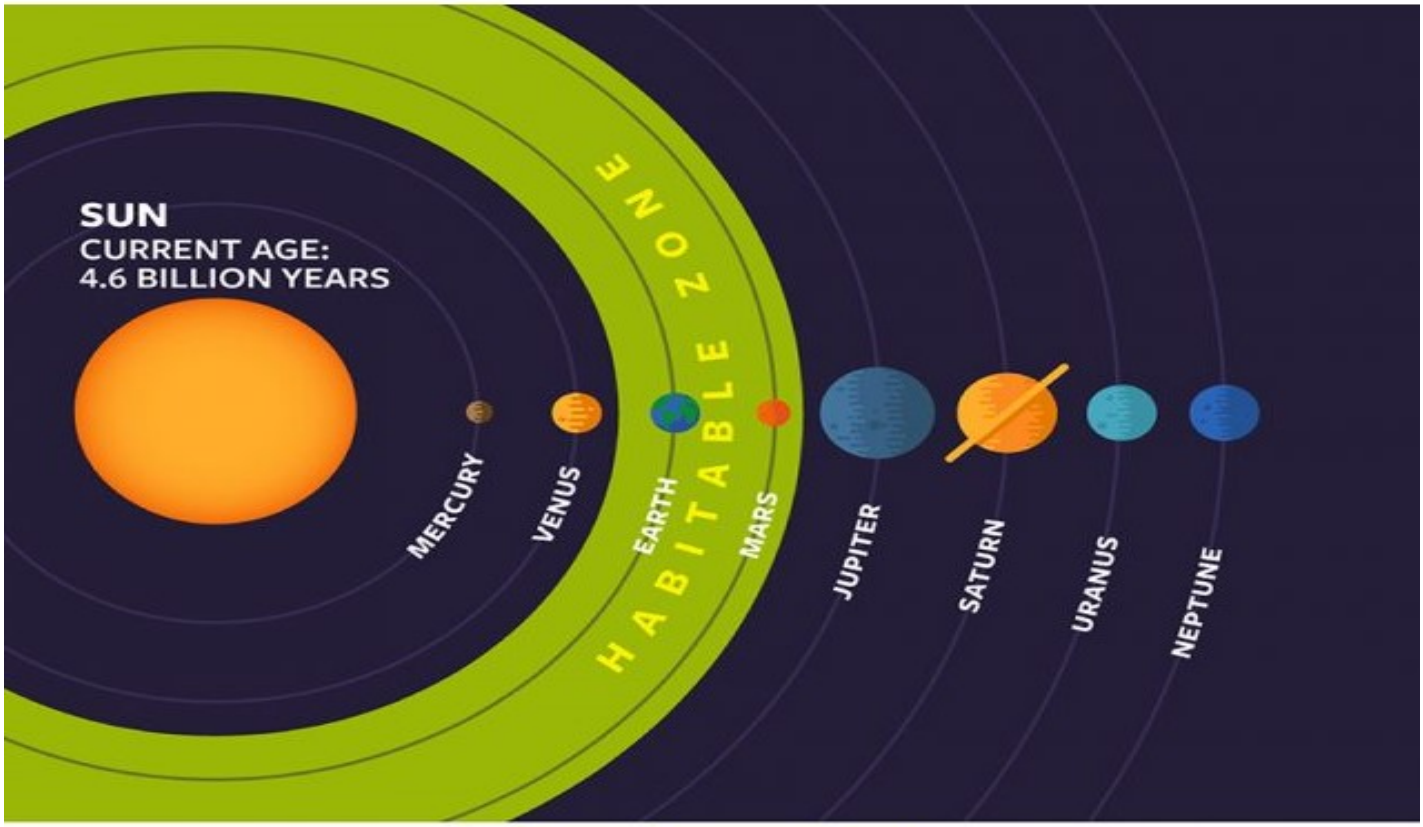
CONTRIBUTIONS

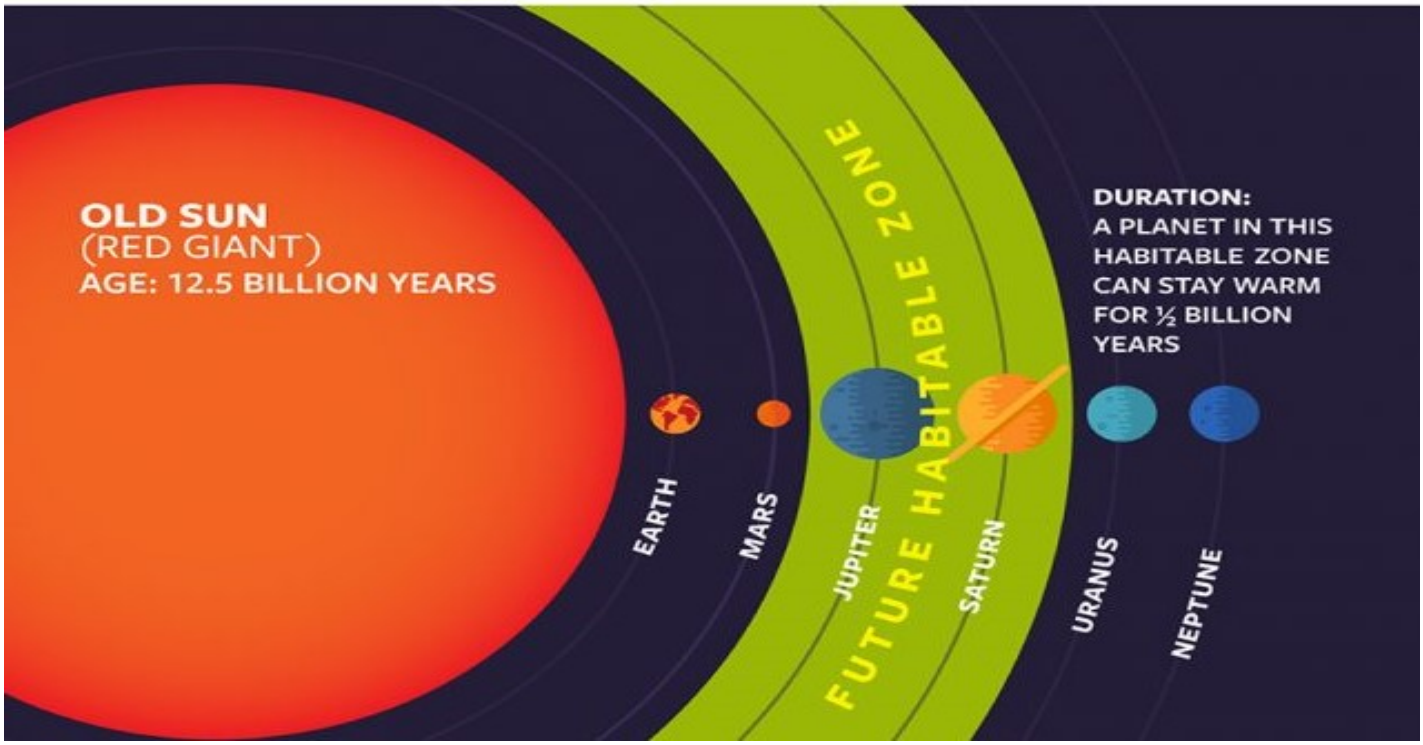




CONTRIBUTIONS

The habitable zone will move as the Sun ages. It will move so far that the Earth will not be in this zone in a few billion years. Jupiter and Saturn will be so, I am selling land deeds on some of their satellites now - buy now and avoid the rush and the price increase!! Contributed by Roy Gustafson (***contact for purchasing info***)

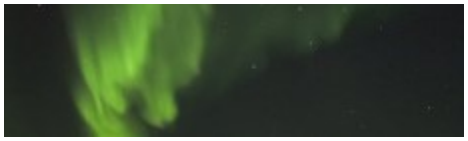




VIDEO CONTRIBUTIONS

*Some **You Tube** videos for you to view while being home bound*

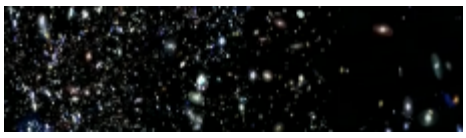
Geminid Meteor Shower 2020 through the Northern Lights - real-time HD



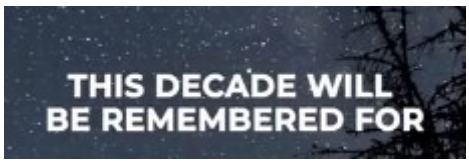
Interview: Is there life beyond Earth?

I Left the City to Photograph the Andromeda Galaxy

A Journey to the End of the Universe



This Decade Will Be Remembered For



Deep-Sky Astrophotography During a Full Moon?

The Starlight Xpress Oculus all-sky camera

These are the asteroids to worry about

My CALIFORNIA NEBULA Project is DONE! (CANON EOS Ra)

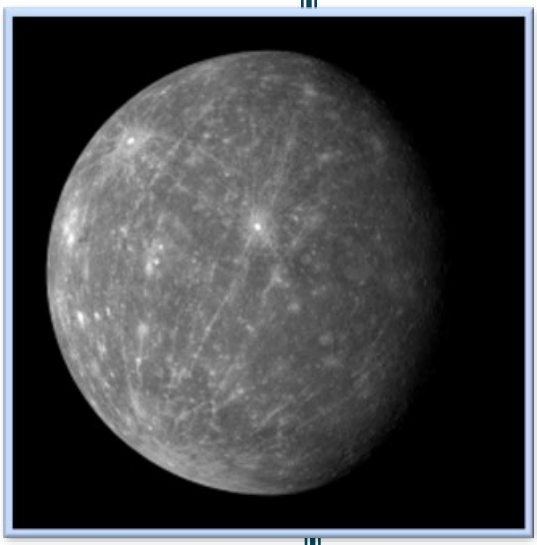
SKYWATCH

Planetary trio I great encore to December display

Chris Nordick

Popular Astronomy Club

This past December, the skies graced us with a vibrant conjunction of Saturn and Jupiter—just in time for the holiday celebrations. Since that time, Saturn and Jupiter have been creeping ever –ever so slowly toward the evenings south west horizon. Still beautiful and still bright and easily visible. But, if you thought two planets in conjunction were cool, imagine, imagine a three planetary conjunction. Between Jan 8th and 11th, sky watchers can catch a glimpse of a low horizon planetary trio in the western sky, best viewed about 30 minutes after sunset. , Saturn and our solar systems smallest planet, Mercury, will be in conjunction. It is a sight not seen in almost six years and a great encore o Decembers planetary display.



Mercury well– known to astronomers for thousands of years and named after the Roman messenger god, is the smallest planet in the solar system and the closest to the Sun. It is a rocky dense planet with a disproportionally large metallic core measuring 2400 miles of its 3032-mile diameter. Only slightly larger than Earth moon, it is similar in color. With tremendously large craters and basins. For example, Caloris Basin is 960 miles wide and is one of the largest in the solar system. And you thought the Grand Canyon was large, the largest cliffs on Mercury are hundreds of miles long and a mile high, whereas the lowest points on this small planet are found in the Rachmaninoff Basin- 3.34 miles below the average landscape. Did you catch that name? Yes, many of the features on Mercury are named after deceased AUTHORS, musicians and artists, Even Dr. Seuss has a named crater.

Mercury has a wildly eccentric orbit. At perihelion when it is closest to the sun Mercury s approximately 36 million miles from the sun. At aphelion when it is farthest from the sun Mercury 43,380,000,00 miles away. And it is fast. It travels through space at 29 miles a second (112,000 mph) and takes only 88 days for one revolution around the sun. That means your Age on mercury is nearly 3 times that on Earth. Mercury also has a slow rotation making a day on Mercury 59 days long. Yet a full day-night cycle (solar day) is 176 days, Confused? Think about it like this: As the planet rotates ever so slowly), and speeds swiftly around the Sun, the time that a certain place on Mercury experience day, night and day would take 176 days. Each Mercury day lasts for about 2 Mercury years. Now that is a long day at the office. There are two other interesting facts about Mercury, if you thought our summer and winter temperature changes were amazing here in the Midwest, consider this: Mercury's daily temperature fluctuates from 800^{o} during the day to-290^{o} at night. That's an 1100-degree swing. The other interesting Feature OF Mercury is its magnetic field. The magnetic field I is about 1.1% as strong as Earth's. Although that does not seem like much, this small magnetic field sometimes interacts with the solar wind- those tiny particles and plasma which continue to stream from the Sun into space. When this interaction occurs magnetic tornadoes of plasma are formed that then reach Mercury's surface. Heat, frigid cold plasma TORNADOS- Earth is sounding better all the time.

Ake a look on January 9th or 10th in the western sky just after dark. Locate the trio of bright lights Jupiter will be the r brightest. Followed by Saturn and Mercury. If you have a pair of binoculars all three planets should be in your field of vision at once. And if you missed the conjunction, do not worry. Will l get higher in the sky later in the evening throughout January peaking in brightness between January 24th during its greatest eastern elongation. In the meantime, consider naming the craters with your favorite artist, musicians or authors, What might you call them.

(Continued in next column)

January
2021

A Great Conjunction, and the Christmas Star
By David H. Levy.

Said the night wind to the little lamb:
"Do you see what I see?
Way up in the sky, little lamb
Do you see what I see?
A star, a star, dancing in the night
With a tail as big as a kite
With a tail as big as a kite"
Noel Regney and Gloria Shayne, 1962

In the words of this beautiful Christmas carol, written during the Cuban missile crisis of 1962, we are reminded of Christmas, the biblical Book of Matthew, and the Star of Bethlehem. Famous as it is, this story appears but once in the Gospel according to Matthew::

Now when Jesus was born in Bethlehem of Judea in the days of Herod the king, behold, wise men from the East came to Jerusalem, saying,

"Where is he who has been born king of the Jews? For we have seen his star in the East, and have come to worship him."

When they had heard the king they went their way; and lo, the star which they had seen in the East went before them, till it came to rest over the place where the child was.

When they saw the star, they rejoiced exceedingly with great joy; and going into the house they saw the child with Mary his mother, and they fell down and worshiped him. Then, opening their treasures, they offered him gifts, gold and frankincense and myrrh.

For more than two thousand years, people have tried to attach some astronomical meaning to the star. From books and planetarium shows, I have gathered several; possible interpretations:

The star was Halley's comet. Unlikely, because Halley's comet returned in October of the year 11 BCE.

An exploding star; a nova or a supernova. Although we have no evidence of such an event in those years, there could have been one.

A planetary conjunction. The Moon did pass close to Venus in the eastern sky (the location in the east appears twice in the biblical account). My personal favorite is a conjunction between Jupiter and Venus, on June 17, 2 BCE. However, 4this conjunction happened after the death of King Herod in 4 BCE, and it would have led the Magi in the wrong direction.

However, there was a Great Conjunction in 6 BCE. (Great conjunctions involve only Jupiter and Saturn and take place roughly every twenty years.) A subset of this series involved the Moon passing close to Jupiter on April 17, 6 BCE. True to the biblical account, Jupiter was in the east over Israel at this time, and King Herod was still living.

One thing I like about the planetary conjunction theory is that astrologers in those ancient days4, more than the general population, paid attention to these events. One possible translation of "wise men" is "astrologers", people versed in how the stars and planets influence humanity. They would have paid attention to planetary conjunctions more than the general population.

It could have been a miracle. In my own life, I consider every night out under the stars as a miracle, so why not? Whatever the Christmas star was, we got to see it again as a "Great Con-

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junction" on Monday, December 21st. It is the closest that Jupiter and Saturn have been close to each other since 1623, that long-ago year that also saw the first publication of the First Folio of Shakespeare's plays. On that day in 1623, the conjunction took placed in daylight, so no one would have paid attention to it. But the one in 2020 was visible in the early evening! Therefore, millions of people were definitely paying attention to it, and it reminds us of the Star of Bethlehem. Whatever it was, we shall never know. But for those of us who were able to gaze in wonder at this fabulous event, it acted to increase the nightly miracle of the magnificent sky.

Even in our postmodern age, the chance close alignment of the solar system's two biggest planets is not a big scientific event. However, it is a big astrological happening. While no true scientist follows astrology these days, two thousand years ago the night sky was all about astrology. And were it not for ancient astrology, we would not enjoy today's comprehension of the night sky. Even in 1623, the last time Jupiter and Saturn were this close, most people were more interested in astrology. I quote from Shakespeare, who was did not follow judicial in astrology. The two opening lines of Sonnet 14 state clearly that

Not from the stars do I my judgment pluck,
And yet methinks I have astronomy…

I believe that Shakespeare used astrology a lot in his plays because he knew his audience followed it. And now at the close of 2020, we have that rare opportunity to reflect on an astrological event, the joining together of two planets, a simple event that helps us to go outside, look towards the southwest, and revel in the beauty of the night sky.

(Continued in next column)

UPCOMING EVENTS

Date: February 8th, 2021

Event: Regular Meeting

Location: Zoom (*details to follow)*

- **Program** : "Space: Year in Review" by Larry Boyle Chicago Society for Space Studies (see below)

All these dates and times are Tentative due to conditions! Please check your emails for any up-dates as to whether the Event will Occur!

Program "Space: Year in Review"

Mr. Larry Boyle

The *Space: Year in Review* presentation provides an overview of the global space activities, both manned and robotic, that occurred during 2020. It is estimated that globally over $380 billion was spent on public and private space activities. With 72 nations having space programs and hundreds of private entities and companies working on exploring space and developing new products, 2020 was an exciting year. Some of the topics that will be addressed in Larry's presentation include:

- developments with the NASA Artemis program
- the successes of the SpaceX Commercial Crew missions
- creation of the United States Space Force
- India's plan for a crewed Earth orbital mission

- China's plans for a new space station
- Russia's new rocket center

robotic missions to the Moon

Bio: Mr. Larry Boyle was President of the Chicago Society for Space Studies from 1989-2002. He is currently Vice-President. The Society was founded in 1977. He is a retired reference librarian from the Franklin Park Public Library and has had a life long interest in Space. He witnessed the Apollo 17 launch in 1972 and has seen a Space Shuttle launch. Larry is a graduate of Rosary College and Loyola University.

- **March 8th,2021** PAC Business Meeting at Butterworth Center at 7:00 PM Presentation: Smorgasbord
- **March 20th, 2021** Outreach Niabi Zoo: sunset
- **April 12th, 2021** PAC Regular Meeting at the Butterworth Center at 7:00 pm: Presentation: "Skies and Skywatchers of Ancient North America" Bill Iseminger
- **April 17th, 2021** Outreach Niabi Zoo Sunset
- **May 10th, 2021** PAC Regular Meeting at the Butterworth Center: Presentation: NASA Solar Missions", program by Dr. Therese Kucera

Mark your calendars and watch upcoming e-mails for more information!

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SIGN UP REPORT

MONTH	NEWSPAPER ARTICLES	CONSTELLATION REPORT	PROGRAM
JAN 2021	Chris Nordick	None Scheduled	Presentation: Cosmic Horizons - Chuck Allen, Vice President, Astronomical League via Zoom
FEB 2021	Wayland Bauer	None Scheduled	"Space: Year in Review" program by Larry Boyle, Chicago Society for Space Studies, via Zoom.
MAR 2021	Paul Levesque	Ally Nordick (Orion)	SMORGASBORD (SEE BELOW)
APR 2021	Roy Gustafson	None Scheduled	Presentation: "Sky watchers of Ancient North America" Bill Iseminger, Cahokia Mounds State Historic Site via Zoom
MAY 2021	Dave Smith	None Scheduled	"NASA Solar Missions", program by Dr. Therese Kucera, NASA Goddard, via Zoom
JUN 2021		None Scheduled	"Association of Lunar and Planetary Observers", program by Matthew Will, Secretary & Treasurer ALPO, via Zoom
JUL 2021		None Scheduled	Green Bank Observatory - Virtual Tour and Current Projects
AUG 2021			PICNIC
SEPT 2021			SMORGASBORD (SEE BELOW)
OCT 2021			BANQUET
NOV 2021			
DEC 2021			

Editors Note:
Paul Levesque is willing to review and edit any newspaper article submissions. Thank you

All these dates and times are Tentative due to conditions! Please check your emails for any updates as to whether the Event will Occur!

SMORGASBORD

MARCH

JUNE

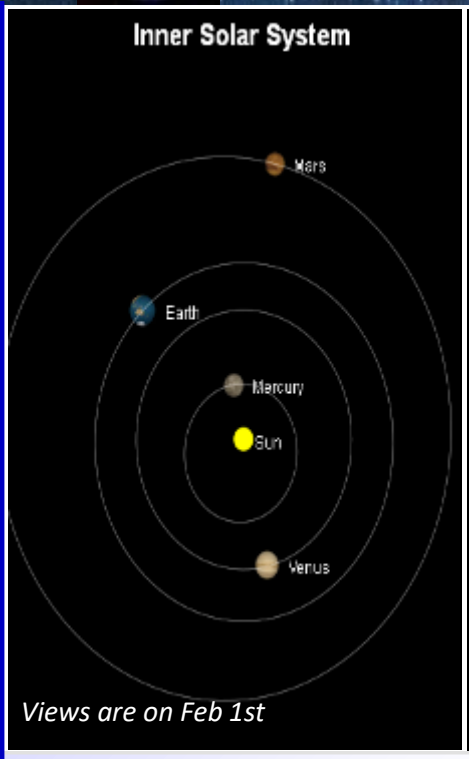
SEPTEMBER

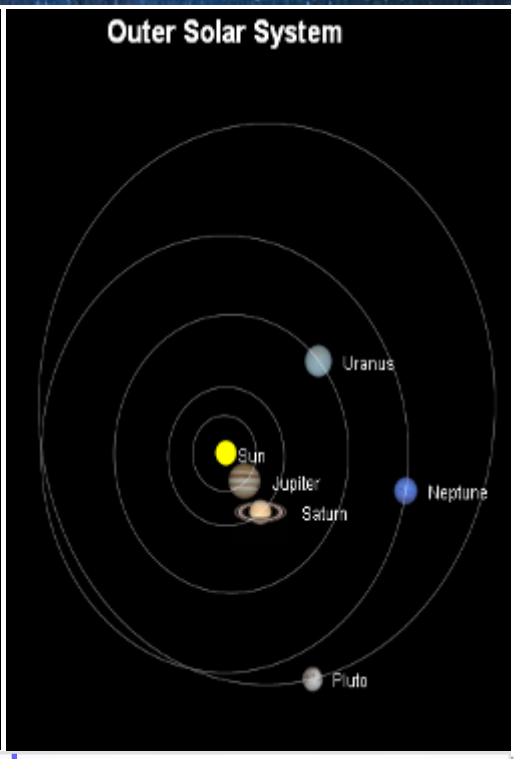
ASTRONOMICAL CALENDAR OF EVENTS

THE PLANETS February 2021

February

03 13:33 Moon at Perigee: 370127 km
04 11:37 **LAST QUARTER MOON**
06 02:33 Antares 5.5°S of Moon
06 18:29 Moon at Descending Node
08 08:00 Mercury at Inferior Conjunction
11 13:06 **NEW MOON**
15 08 Mercury 3.8° of Jupiter
18 04:22 Moon at Apogee: 404467 km
18 16:47 Mars 3.7°N of Moon
19 12:47 **FIRST QUARTER MOON**
19 23:00 Venus at Aphelion
20 07:15 Aldebaran 5.0°S of Moon
20 19:44 Moon at Ascending Node
23 02:00 Mercury 4.0° of Saturn
23 19:10 Pollux 3.7°N of Moon
24 18:16 Beehive 2.4°S of Moon
26 08:04 Regulus 4.6°S of Moon
27 02:17 **FULL MOON**





The Sun starts off in Capricorn on February 1st moving into Aquarius on the 15th.

Mercury is in Capricorn on February 1st (mag: 1.51, dia: 9.11", illuminated 14.4%). The tiny planet is low in the W -SW. at about 4° 29'off the horizon, at 6:00 pm. Mercury moves toward inferior conjunction on the 8th. By the 28th, you can just catch the Mercury 5° off the eastern horizon. It is mag: .18 and 45.9% illuminated. And around 7 AM it can be found with Jupiter and Saturn which are just emerging from conjunction with the Sun.

Venus is in Capricorn on February 1 (mag: -3.87, dia:10.9", illum:97.6%). It exceptionally low in the east south-east at 7 AM. Only 3° off the horizon, the viewing only get worse the rest of the month as it moves into the Suns glare. The planet reaches Aphelion on the 19th.

Mars is in Aries n February 1st (mag: .46, dia: 7.79", Illum: 88.6%. The red planet is quite striking however in the evening sky at 6 pm, hanging 65° 26' above the southern horizon. The 6.7-day old Moon passes 3.7° south on the 18th. Mars retreats 1/3 AU from Earth in February.

Jupiter Is in Capricorn on February 1st (mag: -1.96, dia: 32.9") On the 24th, it is just emerging from the Suns glare and is 43' above the SE at 6 am. Catch it along with Mercury and Saturn at 7:00 am on the 28th (See sky views).

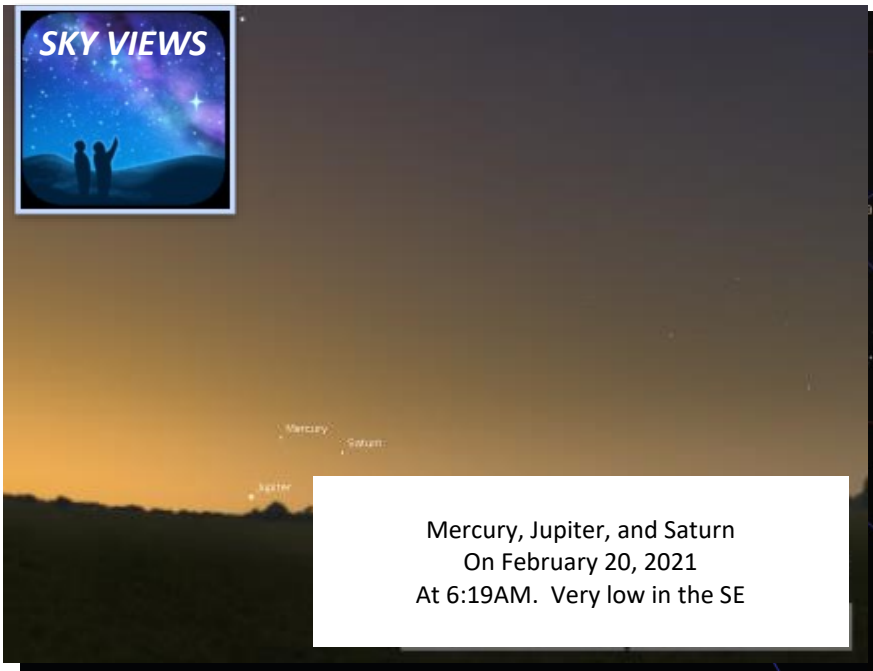
Saturn is in Capricorn on February 1st (mag:.68, dia: 15.27" (rings (35.47). It is just emerging from the Suns glare and is exceptionally low on the south-east horizon at 6 am. Catch it along with Mercury and Jupiter in the same position at 7:00 am on the 28th see Sky view.

Uranus is Aries on February 1st (mag: 5.78, dia: 13.57"). It is 6° 23' SW of Mars in the evening sky. The 5.8-day old Moon passes 4 ½ ° North of Uranus on the 17th.

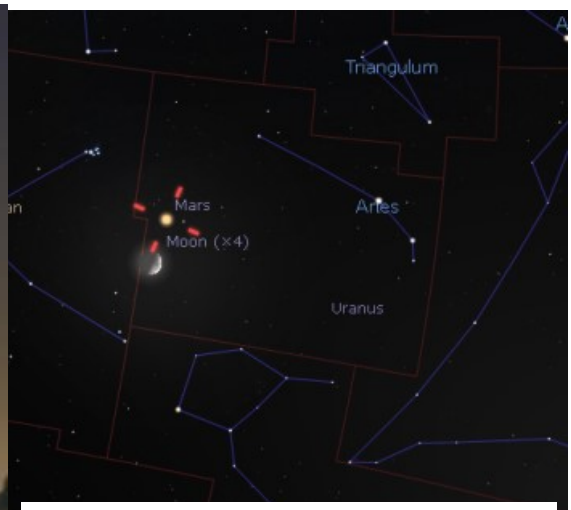
Neptune is in Aquarius (mag: 7.95, dia: 5.65"). It is exceptionally low on the SW horizon at 6 pm. You may be able to catch Mercury to the right of it on the 1st but that is about it. The Moon passes south of it on the 13" but the planet continues to slide into the Suns glare.

Ceres is in Aquarius (Mag:9.3) It is low in the SW at 6:00 pm.

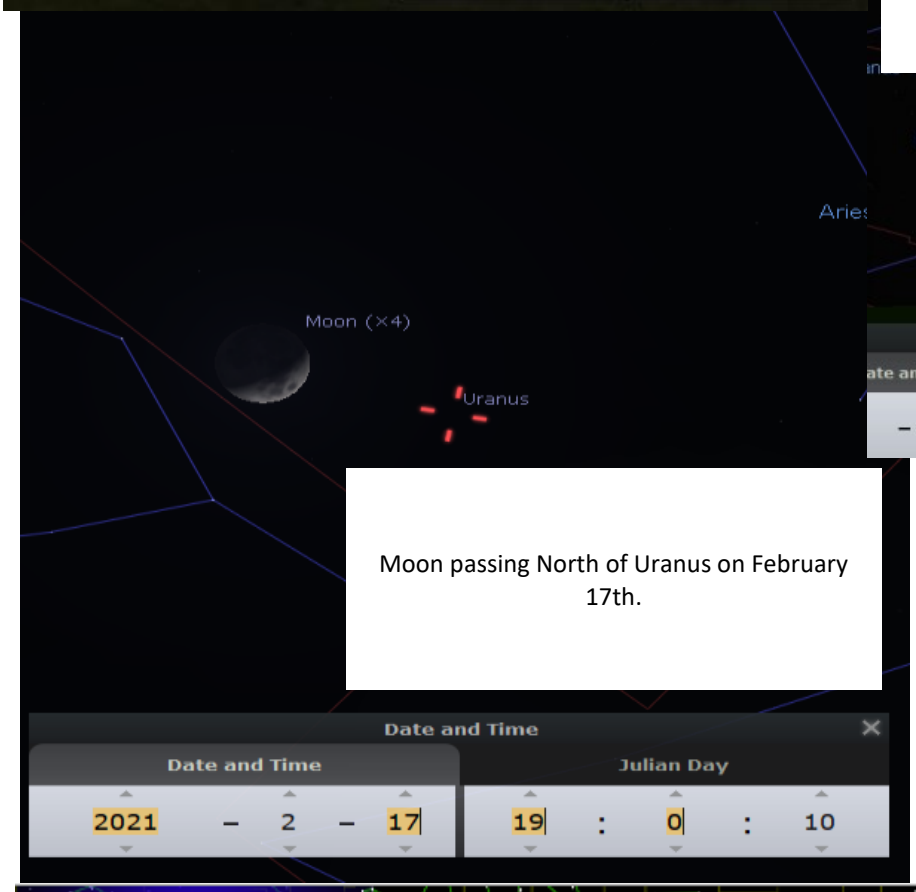
Vesta (mag: 6.7) is in western Virgo in the morning sky at 6 AM. The 18.6 day old Moon passes North of it on the 1st.



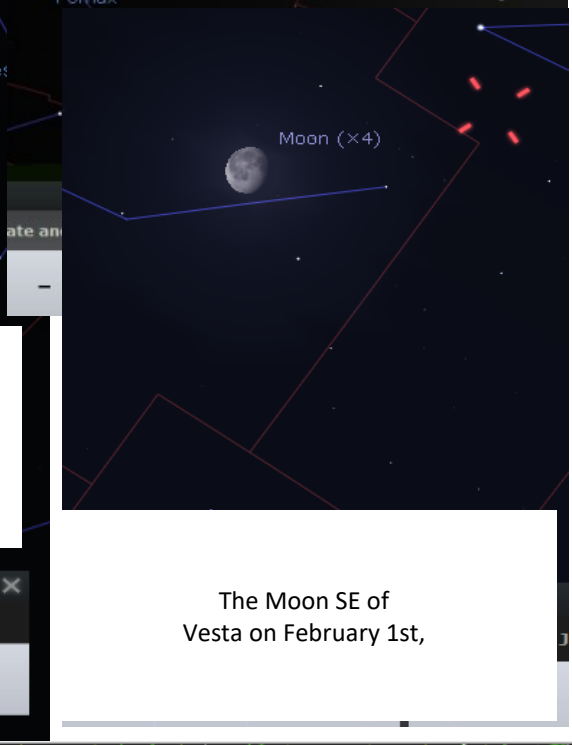
Mercury, Jupiter, and Saturn
On February 20, 2021
At 6:19AM. Very low in the SE



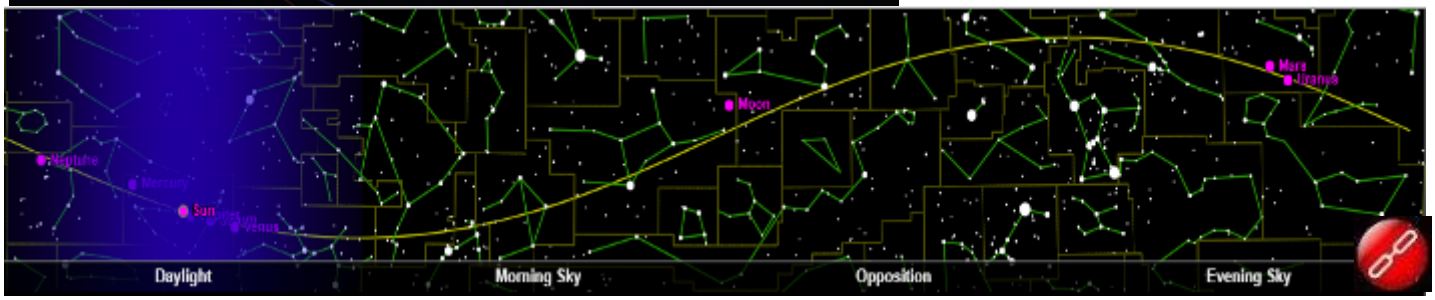
Moon South of Mars 3.7 ° on the 18th.



Moon passing North of Uranus on February 17th.



The Moon SE of
Vesta on February 1st,



From in the sky. org

Planetary Alignments February 2021

Phenomenon	Date and Time	Object 1	Object 2	Separation	Solar Elongation	Lunar Elongation
Conjunction	2021-02-11 08:40:45	Jupiter	Venus	+0°25'52.1"	+10°32'05.0"	+9°49'52.9"
Transit	2021-02-12 01:05:56	Jupiter	Callisto (JIV)	—	+11°03'51.5"	+17°36'44.5"
Occultation	2021-02-20 13:02:38	Jupiter	Callisto (JIV)	—	+17°39'02.0"	+119°15'12.7"
Conjunction	2021-02-12 16:20:40	Neptune	Proteus (NVIII)	+0°00'02.1"	+25°15'48.3"	+13°03'49.0"
Conjunction	2021-02-06 00:51:24	Saturn	Venus	+0°22'43.0"	+11°48'23.7"	+57°10'01.0"
Conjunction	2021-02-08 16:34:20	Saturn	Titan (SVI)	+0°00'48.8"	+14°10'56.7"	+22°18'28.0"
Conjunction	2021-02-06 00:07:28	Venus	Titan (SVI)	+0°23'50.3"	+11°50'42.9"	+57°35'19.4"
Conjunction	2021-02-06 00:51:24	Venus	Saturn	+0°22'43.0"	+11°50'17.4"	+57°09'40.0"
Conjunction	2021-02-11 07:19:53	Venus	Ganymede (JIII)	+0°25'40.1"	+10°35'30.4"	+9°07'39.0"
Conjunction	2021-02-11 08:40:45	Venus	Jupiter	+0°25'52.1"	+10°34'42.2"	+9°38'14.2"
Conjunction	2021-02-11 09:01:50	Venus	Io (JI)	+0°25'55.5"	+10°34'29.6"	+9°45'31.5"
Conjunction	2021-02-11 09:12:23	Venus	Europa (JII)	+0°25'57.7"	+10°34'23.3"	+9°49'04.3"
Conjunction	2021-02-11 09:22:56	Venus	Callisto (JIV)	+0°26'00.1"	+10°34'17.0"	+9°52'33.4"

From stellarium

Double Stars in February

Object	Right Ascension	Declination	Magnitude	Separation	Position Angle	Year
Eta Cassiopeiae	$00^h\ 49^m.1$	+57° 49'	3.5, 7.4	13.2"	323°	2012
65 Piscium	$00^h\ 49^m.9$	+27° 43'	6.3, 6.3	4.3"	115°	2013
Psi 1 Piscium	$01^h\ 05^m.6$	+21° 28'	5.3, 5.4	29.7"	159°	2012
Zeta Piscium	$01^h\ 13^m.7$	+07° 35'	5.2, 6.3	22.8"	63°	2012
Gamma Arietis	$01^h\ 53^m.5$	+19° 18'	4.5, 4.6	7.2"	2°	2013
Lambda Arietis	$01^h\ 57^m.9$	+23° 36'	4.8, 6.6	37.1"	48°	2012
Alpha Piscium	$02^h\ 02^m.0$	+02° 46'	4.1, 5.2	1.7"	266°	2012
Gamma Andromedae	$02^h\ 03^m.9$	+42° 20'	2.3, 5.0	9.4"	63°	2013
Iota Trianguli	$02^h\ 12^m.4$	+30° 18'	5.3, 6.7	3.8"	69°	2012
Alpha Ursa Minoris	$02^h\ 31^m.8$	+89° 16'	2.1, 9.1	18.1"	233°	2013
Gamma Ceti	$02^h\ 43^m.3$	+03° 14'	3.5, 6.2	2.1"	298°	2012
Eta Persei	$02^h\ 50^m.7$	+55° 54'	3.8, 8.5	31.4"	295°	2012
Struve 331	$03^h\ 00^m.9$	+52° 21'	5.2, 6.2	11.9"	85°	2012
32 Eridani	$03^h\ 54^m.3$	-02° 57'	4.8, 5.9	6.9"	348°	2013
Chi Tauri	$04^h\ 22^m.6$	+25° 38'	5.4, 8.5	20.4"	24°	2012
1 Camelopardalis	$04^h\ 32^m.0$	+53° 55'	5.8, 6.8	10.6"	308°	2012
55 Eridani	$04^h\ 43^m.6$	-08° 48'	6.7, 6.8	9.3"	318°	2011
Beta Orionis	$05^h\ 14^m.5$	-08° 12'	0.3, 6.8	9.3"	204°	2011
118 Tauri	$05^h\ 29^m.3$	+25° 09'	5.8, 6.7	4.7"	209°	2012
Delta Orionis	$05^h\ 32^m.0$	-00° 18'	2.4, 6.8	52.4"	0°	2012
Struve 747	$05^h\ 35^m.0$	-06° 00'	4.7, 5.5	35.9"	226°	2014
Lamda Orionis	$05^h\ 35^m.1$	+09° 56'	3.5, 5.5	4.2"	44°	2012
Theta 1 Orionis	$05^h\ 35^m.3$	-05° 23'	6.6, 7.5, 5.1, 6.4	8.9", 12.7", 21.4"	31°, 132°, 96°	2013
Iota Orionis	$05^h\ 35^m.4$	-05° 55'	2.8, 7.7	11.6"	141°	2012
Theta 2 Orionis	$05^h\ 35^m.4$	-05° 25'	5.0, 6.2	52"	93°	2012
Sigma Orionis	$05^h\ 38^m.7$	-02° 36'	3.8, 6.6, 3.8, 6.4	12.9", 41.3"	84°, 62°	2013
Zeta Orionis	$05^h\ 40^m.8$	-01° 57'	1.9, 3.7, 9.6	2.3", 58"	167°, 10°	2013
Gamma Leporis	$05^h\ 44^m.5$	-22° 27'	3.6, 6.3	95"	350°	2012
Theta Aurigae	$05^h\ 59^m.7$	+37° 13'	2.6, 7.2	4.0"	305°	2009

From the Astronomical League

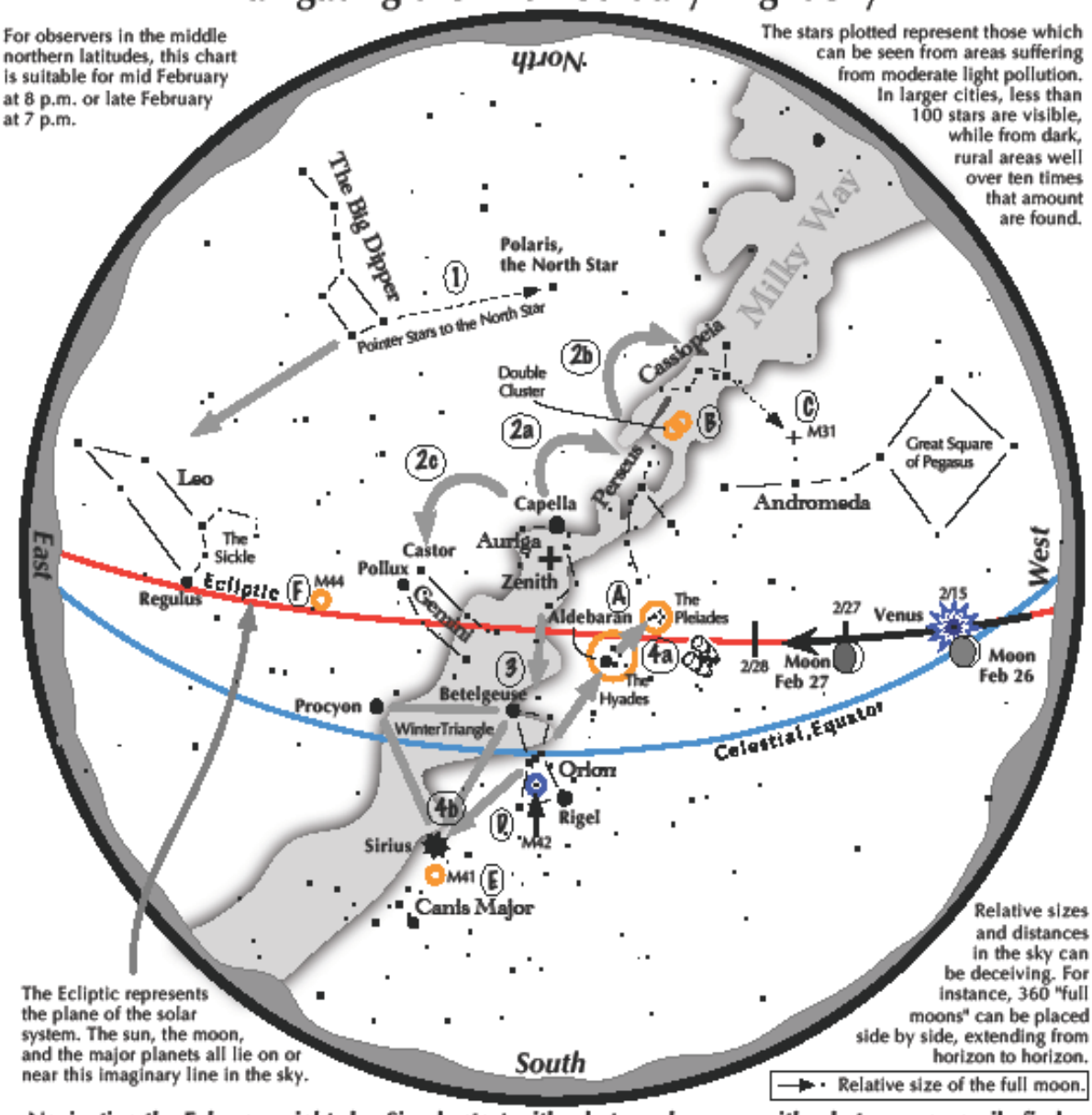
DEEP SKY WONDERS

For February Evening Skies

Name	RA (J2000)	Dec (J2000)	Mag.	A.S., '	Transit	Type
M 67 (Golden-Eye Cluster)	8h51m18.0s	+11°48'00.0"	7.32	25.000	0h05m	open star cluster
M 29 (Cooling Tower)	20h23m55.9s	+38°31'22.8"	7.21	10.000	11h36m	open star cluster
NGC 6946 (Fireworks Galaxy)	20h34m52.3s	+60°09'13.3"	9.88	21.300	11h46m	galaxy
M 15 (Pegasus Cluster)	21h29m58.3s	+12°10'01.2"	7.60	18.000	12h42m	globular star cluster
M 39	21h31m48.0s	+48°25'58.8"	4.88	31.000	12h44m	open star cluster
IC 1396 (Elephant's Trunk Nebula)	21h39m00.0s	+57°29'24.0"	3.74	16.000	12h51m	cluster associated with nebulosity
NGC 7129 (Small Cluster Nebula)	21h42m55.9s	+66°06'10.8"	11.72	4.000	12h54m	cluster associated with nebulosity
IC 5146 (Cocoon Nebula)	21h53m24.0s	+47°16'01.2"	7.46	24.000	13h05m	cluster associated with nebulosity
NGC 7331 (Deer Lick Group)	22h37m04.1s	+34°24'57.3"	9.73	14.200	13h49m	galaxy
NGC 7380 (The Wizard Nebula)	22h47m20.9s	+58°07'55.2"	7.39	45.000	13h59m	cluster associated with nebulosity
NGC 7479 (Superman Galaxy)	23h04m56.7s	+12°19'22.4"	11.18	7.200	14h17m	galaxy
NGC 7814 (The Little Sombrero Galaxy)	0h03m15.0s	+16°08'42.8"	11.82	7.800	15h16m	galaxy
IC 10 (Starburst Galaxy)	0h20m23.2s	+59°17'34.7"	9.66	10.000	15h33m	galaxy
NGC 404 (Mirach's Ghost)	1h09m27.1s	+35°43'05.2"	11.88	12.000	16h22m	active galaxy
NGC 488 (Whirligig Galaxy)	1h21m46.9s	+5°15'24.2"	11.15	8.290	16h35m	galaxy
M 103	1h33m23.0s	+60°39'00.0"	7.55	6.000	16h46m	open star cluster
M 33 (Triangulum Galaxy)	1h33m50.9s	+30°39'35.8"	5.87	110.300	16h47m	galaxy
M 33 (Triangulum Galaxy)	1h33m50.9s	+30°39'35.8"	5.87	110.300	16h47m	galaxy
M 74 (Phantom Galaxy)	1h36m41.8s	+15°47'00.5"	9.55	20.000	16h50m	galaxy
M 76 (Little Dumbbell Nebula)	1h42m20.0s	+51°34'31.1"	10.24	5.427	16h55m	planetary nebula
NGC 936 (Darth Vader's Starfighter)	2h27m37.5s	-1°09'22.6"	11.00	7.252	17h41m	galaxy
NGC 1023 (Perseus Lenticular Galaxy)	2h40m24.0s	+39°03'47.7"	9.48	7.963	17h54m	interacting galaxy
M 34 (Spiral Cluster)	2h42m05.0s	+42°45'43.2"	5.33	25.000	17h55m	open star cluster
M 77 (Cetus A)	2h42m40.8s	-0°00'47.8"	9.05	13.100	17h56m	galaxy
M 77 (Cetus A)	2h42m40.8s	-0°00'47.8"	9.05	13.100	17h56m	galaxy
IC 1848 (Soul Nebula)	2h51m06.5s	+60°24'36.0"	6.64	50.000	18h05m	open star cluster
NGC 1325 (Holmberg VI)	3h24m25.6s	-21°32'38.6"	11.84	6.355	18h37m	galaxy
NGC 1350 (The Colossal Cosmic Eye)	3h31m08.1s	-33°37'43.1"	11.02	5.765	18h44m	galaxy
NGC 1407 (Eridanus A Group)	3h40m11.9s	-18°34'49.4"	9.93	7.338	18h53m	galaxy
NGC 1432 (Maia Nebula)	3h46m00.0s	+24°12'00.0"	4.02	100.000	18h59m	HII region
IC 342 (Maffei 1 Group)	3h46m48.5s	+68°05'46.0"	9.25	42.300	19h01m	galaxy
IC 342 (Maffei 1 Group)	3h46m48.5s	+68°05'46.0"	9.25	42.300	19h01m	galaxy
NGC 1579 (Northern Trifid Nebula)	4h30m11.0s	+35°16'44.4"	8.63	6.000	19h44m	HII region
NGC 1624	4h40m36.0s	+50°27'42.1"	11.93	10.000	19h54m	cluster associated with nebulosity
M 81 (Bode's Galaxy)	9h55m33.2s	+69°03'55.1"	7.15	41.000	1h10m	galaxy
M 82 (Cigar Galaxy)	9h55m52.4s	+69°40'46.9"	8.62	15.500	1h11m	galaxy
NGC 1909 (Witch Head Nebula)	5h02m00.0s	-7°54'00.0"	8.21	240.000	20h15m	reflection nebula
IC 405 (Flaming Star Nebula)	5h17m24.0s	+34°22'48.0"	6.14	80.000	20h31m	emission nebula
M 79	5h24m10.6s	-24°31'27.3"	8.93	9.600	20h37m	globular star cluster
M 38 (Starfish Cluster)	5h28m43.0s	+35°51'18.0"	6.54	15.000	20h42m	open star cluster
M 1 (Crab Nebula)	5h34m31.9s	+22°00'52.2"	8.55	12.000	20h48m	supernova remnant
NGC 1981 (Coal Car Cluster)	5h35m08.9s	-4°25'55.2"	4.41	25.000	20h49m	star cluster
M 42 (Great Orion Nebula)	5h35m17.3s	-5°23'28.0"	4.22	150.000	20h49m	HII region
M 43 (de Mairan's Nebula)	5h35m31.0s	-5°16'12.0"	9.22	35.000	20h49m	HII region
M 36 (Pinwheel Cluster)	5h36m18.0s	+34°08'24.0"	6.14	10.000	20h50m	open star cluster
M 78 (Casper the Friendly Ghost Nebula)	5h46m46.8s	+0°00'50.4"	8.50	14.000	21h00m	reflection nebula
M 37 (January Salt-and-Pepper Cluster)	5h52m18.0s	+32°33'10.8"	5.75	15.000	21h06m	open star cluster
M 35 (Shoe-Buckle Cluster)	6h08m54.0s	+24°19'58.8"	5.26	25.000	21h23m	open star cluster
NGC 2146 (Dusty Hand Galaxy)	6h18m37.7s	+78°21'25.3"	10.76	4.282	21h34m	active galaxy
NGC 2238 (Rosette Nebula)	6h30m28.8s	+5°03'00.0"	9.21	140.000	21h44m	HII region
M 41 (Little Beehive Cluster)	6h46m01.0s	-20°45'25.2"	4.99	39.000	21h59m	open star cluster
M 50 (Heart-Shaped Cluster)	7h02m47.5s	-8°20'16.1"	6.23	15.000	22h16m	open star cluster
M 47	7h36m35.0s	-14°28'58.8"	4.97	25.000	22h50m	open star cluster
M 46	7h41m46.1s	-14°48'36.0"	6.72	20.000	22h55m	open star cluster
M 93 (Butterfly Cluster)	7h44m30.0s	-23°51'25.2"	7.61	10.000	22h58m	open star cluster
NGC 2467 (Skull and Crossbones Nebula)	7h52m18.5s	-26°25'40.8"	9.81	15.000	23h06m	HII region
NGC 2537 (Bear's Paw Galaxy)	8h13m14.6s	+45°59'23.2"	11.88	4.103	23h28m	interacting galaxy
M 48 (Beehive Cluster)	8h13m43.0s	-5°45'00.0"	6.36	30.000	23h28m	open star cluster
M 44 (Beehive Cluster)	8h40m24.0s	+19°40'01.2"	3.41	70.000	23h54m	open star cluster
M 108 (Surfboard Galaxy)	11h11m31.0s	+55°40'26.8"	11.03	10.900	2h26m	galaxy
M 97 (Owl Nebula)	11h14m47.7s	+55°01'08.7"	10.24	6.700	2h29m	planetary nebula
M 109 (Vacuum Cleaner Galaxy)	11h57m36.0s	+53°22'28.3"	11.04	12.300	3h12m	galaxy
M 106	12h18m57.6s	+47°18'13.4"	9.14	25.800	3h33m	galaxy
M 94 (Croc's Eye Galaxy)	12h50m53.2s	+41°07'12.5"	10.84	20.300	4h05m	galaxy
M 51 (Whirlpool Galaxy)	13h29m52.7s	+47°11'42.9"	9.75	18.100	4h44m	galaxy
NGC 5195 (A Justifiable Replacement for M51)	13h29m59.6s	+47°15'58.1"	11.18	8.750	4h45m	interacting galaxy
M 101 (Pinwheel Galaxy)	14h03m12.6s	+54°20'55.5"	8.71	55.700	5h18m	galaxy
M 102 (Spindle Galaxy)	15h06m29.6s	+55°45'47.9"	10.81	9.600	6h21m	galaxy

** Data from Stellarium*

Navigating the mid February Night Sky

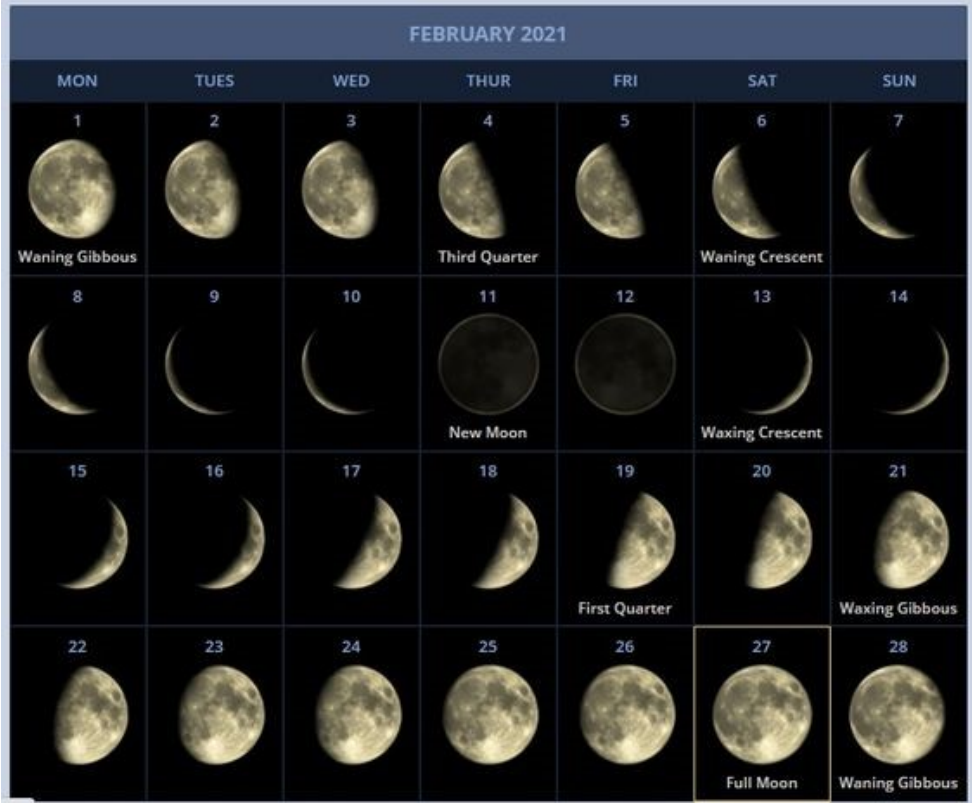


Navigating the February night sky: Simply start with what you know or with what you can easily find.

1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt stars, its bright red star Betelgeuse, and its bright blue-white star Rigel.
4. Use Orion's three Belt stars to point northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius, a member of the Winter Triangle.

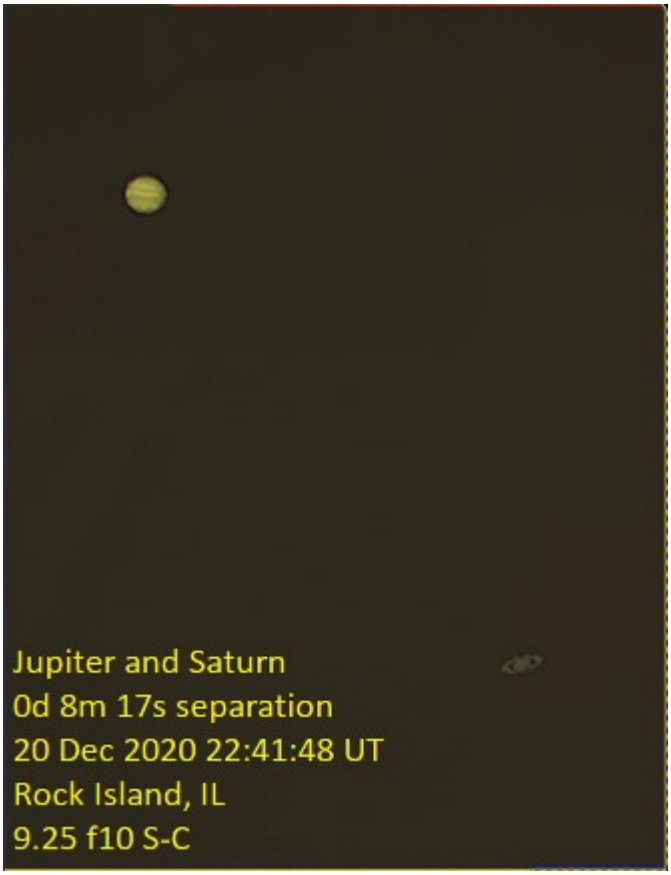
Binocular Highlights

A: Examine the stars of two naked eye star clusters, the Pleiades and the Hyades.
B: Between the "W" of Cassiopeia and Perseus lies the Double Cluster.
C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
D: M42 in Orion is a star forming nebula. **E:** Look south of Sirius for the star cluster M41. **F:** M44, a star cluster barely visible to the naked eye, lies southeast of Pollux.



On February 6, 1971, astronaut Alan Shepard, commander of Apollo 14, became the first—and so far only—person to hit a golf ball on the Moon.

Subject: FB Post - 12-21-20 - Ken Boquist
Conjunction picture tak-en 12-20, , 2020
Ken's picture may be a Facebook record for PAC.
1941 views
19 shares.



Spotlight: IC 405 Flaming Star Nebula

IC 405 (also known as the **Flaming Star Nebula**, **SH 2-229**, or **Caldwell 31**) is an emission and reflection nebula in the constellation Auriga, surrounding the bluish star AE Auriga. It shines at magnitude +6.0. Its celestial coordinates are RA 05^h 16.2^m dec +34° 28′. It surrounds the irregular variable star AE Auriga and is located near the emission nebula IC 410, the open clusters M38 and M36, and the K-class star Iota Auriga. The nebula measures approximately 37.0' x 19.0', and lies about 1,500 light-years away from Earth. It is believed that the proper motion of the central star can be traced back to the Orion's Belt area. The nebula is about 5 light-years across .

This article is distributed by NASA Night Sky Network
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Landing On Mars: A Tricky Feat!

David Prosper

The Perseverance rover and Ingenuity helicopter will land in Mars's Jezero crater on February 18, 2021, NASA's latest mission to explore the red planet. Landing on Mars is an incredibly difficult feat that has challenged engineers for decades: while missions like Curiosity have succeeded, its surface is littered with the wreckage of many failures as well. Why is landing on Mars so difficult?

Mars presents a unique problem to potential landers as it possesses a relatively large mass and a thin, but not insubstantial, atmosphere. The atmosphere is thick enough that spacecraft are stuffed inside a streamlined aeroshell sporting a protective heat shield to prevent burning up upon entry - but that same atmosphere is not thick enough to rely on parachutes alone for a safe landing, since they can't catch sufficient air to slow down quickly enough. This is even worse for larger explorers like Perseverance, weighing in at 2,260 lbs (1,025 kg). Fortunately, engineers have crafted some ingenious landing methods over the decades to allow their spacecraft to survive what is called *Entry, Descent, and Landing (EDL)*.

The Viking landers touched down on Mars in 1976 using heat shields, parachutes, and retrorockets. Despite using large parachutes, the large Viking landers fired retrorockets at the end to land at a safe speed.

(continued in next column)

This complex combination has been followed by almost every mission since, but subsequent missions have innovated in the landing segment. The 1997 Mars Pathfinder mission added airbags in conjunction with parachutes and retrorockets to safely bounce its way to a landing on the Martian surface. Then three sturdy "petals" ensured the lander was pushed into an upright position after landing on an ancient floodplain. The Opportunity and Spirit missions used a very similar method to place their rovers on the Martian surface in 2004. Phoenix (2008) and Insight (2018) actually utilized Viking-style landings. The large and heavy Curiosity rover required extra power at the end to safely land the car-sized rover, and so the daring "Sky Crane" deployment system was successfully used in 2012. After an initial descent using a massive heat shield and parachute, powerful retrorockets finished slowing down the spacecraft to about 2 miles per hour. The Sky Crane then safely lowered the rover down to the Martian surface using a strong cable. Its job done, the Sky Crane then flew off and crash-landed a safe distance away. Having proved the efficacy of the Sky Crane system, NASA will use this same method to attempt a safe landing for Perseverance this month!

(continued on next page)

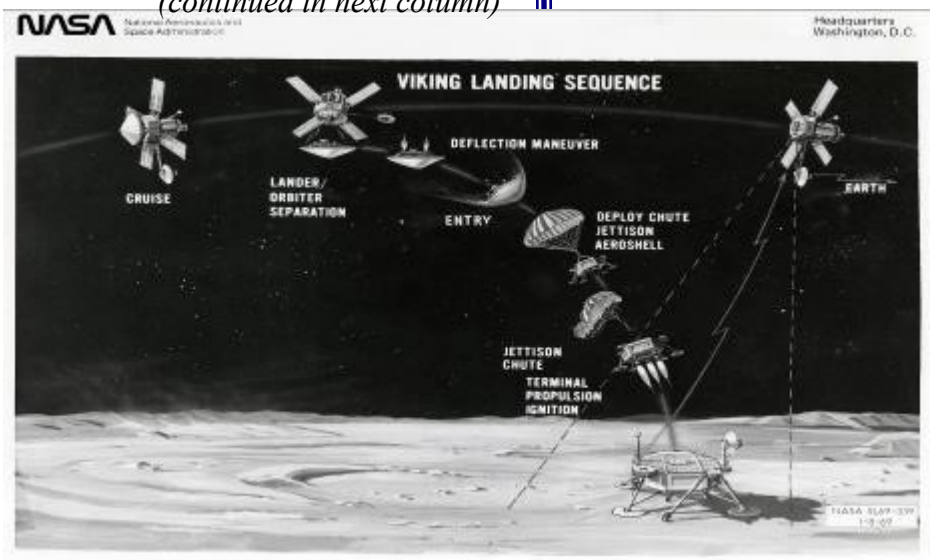
Check Your Sky's Quality with Orion!

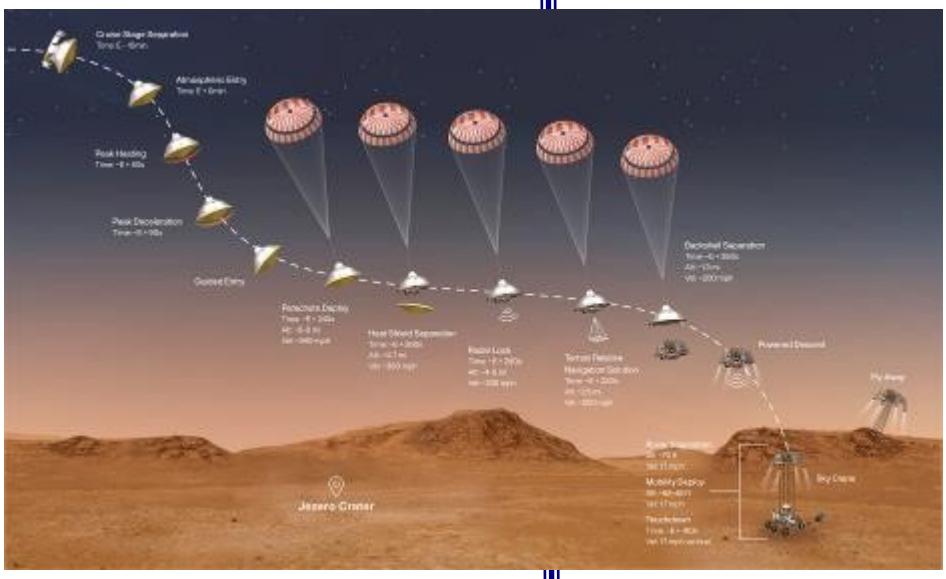
David Prosper

You can watch coverage of the Mars Perseverance landing starting at 11:00 AM PST (2:00 PM EST) on February 18 at nasa.gov/nasalive. Touchdown is expected around 12:55 PM PST (3:55 PM EST).

(continued in next column)

NASA has great resources about the Perseverance Rover and accompanying Ingenuity helicopter on mars.nasa.gov/mars2020 . And of course, find out how we plan to land on many different worlds at nasa.gov.





I(left and below) lustrations of the Entry, Descent, and Landing (EDL) sequences for Viking in 1976, and Perseverance in 2021. Despite the wide gap between these missions in terms of technology, they both performed their landing maneuvers automatically, since our planets are too far apart to allow Earth-based engineers to control them in real time! (NASA/JPL/Caltech)

Night Sky Network
Astronomy clubs bringing the wonders of the universe to the public

esa

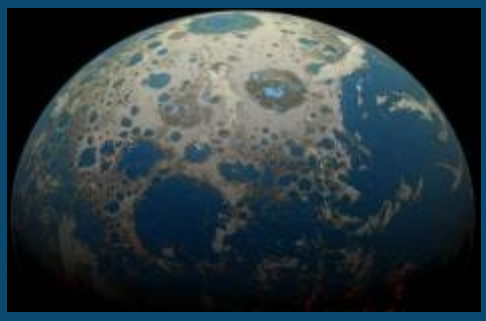
NEWS LINKS

Citizen astronomers map near-Earth asteroid

December 29th, 2020

I
f a planet has a lot of methane in its atmosphere, life is the most likely cause

December 24th, 2020



Japanese spacecraft's gifts: Asteroid chips like charcoal

December 24th, 2020

Chinese astronomers discover 591 high-velocity stars with LAMOST and Gaia

December 28th, 2020

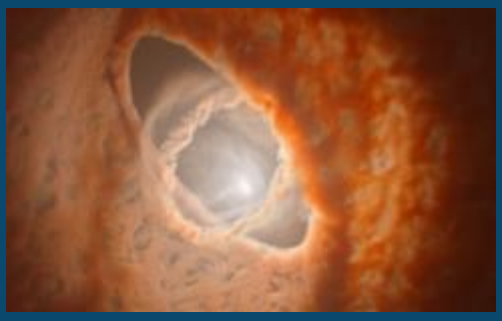
NEWS LINKS

The moon may have far more lunar craters than previously known

December 23rd, 2020

A weirdly warped planet-forming disk circles a distant trio of stars

September 3rd, 2020



December's stunning Geminid meteor shower is born from a humble asteroid

December 2nd, 2020

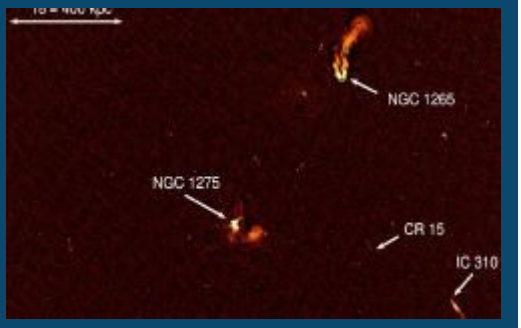
The Milky Way's central black hole may have turned nearby red giant stars blue

December 14th, 2020

NEWS LINKS

Astronomers Create Radio Map of Perseus Galaxy Cluster

January 4th, 2021

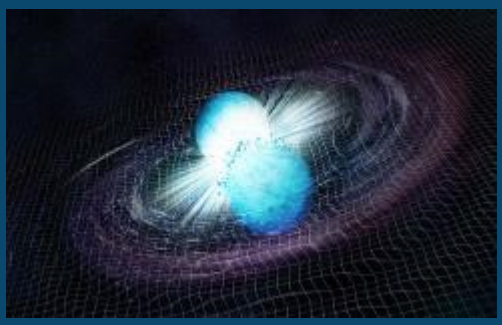


Hubble Looks at Face-On Spiral Galaxy NGC 6946

January 4th, 2021

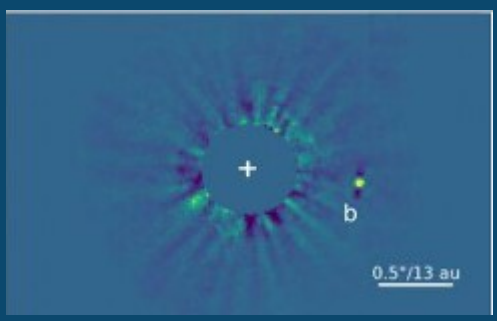
Gravitational Waves May Help Find Universe's Missing Components

December 31st 2020



Astronomers Capture a Direct Image of a Brown Dwarf

December 30th, 2021



NEWS LINKS

Asteroids Crashing Into Dead Stars are Helping Explain Where the Universe's Missing

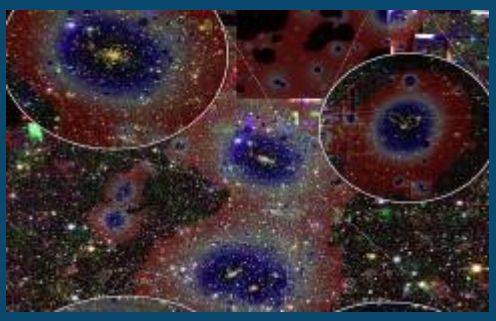
December 28th, 2020

Even the Outside of Hayabusa 2's Sample Capsule has Asteroid Debris on it

December 26th, 2020

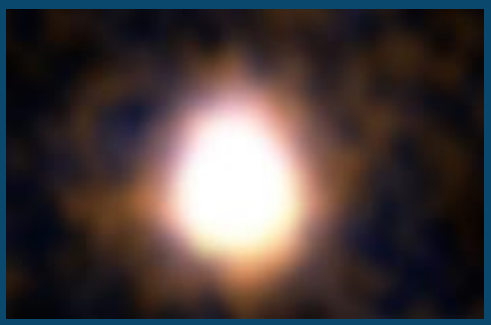
A Single Filament of Gas Has Been Discovered That Stretches 50 Million Light-Years

December 25th, 2020



This galaxy took only 500 million years to form

December 21st, 2020



NEWS LINKS

NASA Has Given Up on Trying to Deploy InSight's Mole

January 14th, 2021

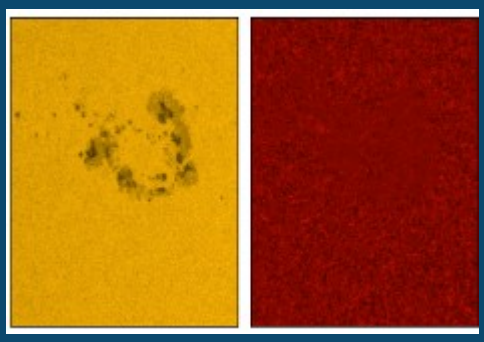
Winning Urban Farming Ideas for Mars!

January 9th, 2021

The Fireworks Galaxy. It's had ten Supernovae in the Last Century Alone

January 11th, 2021

The Mystery of Sunquakes is Deep; One Million Meters Deep!

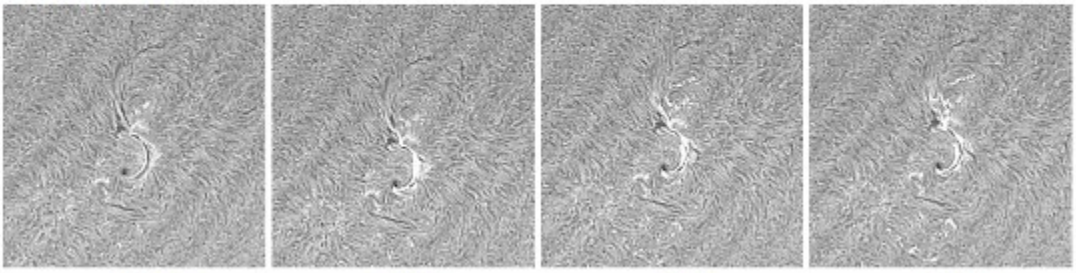


January 11th, 2021

MEMBER OBSERVATIONS

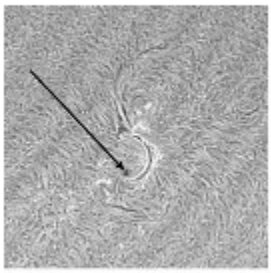
5 Dec 2020

The following pictures were shot in Rock Island, IL at the times indicated below. A Lunt 60mm hydrogen-alpha scope that was double-stacked for an effective aperture of 50mm was used. Seeing was estimated to be a 2 out of 10, and transparency was 6 out of 6 (transparency is based on the Astronomical Leagues' transparency scale for the hydrogen-alpha observing program, where 6 is best (deep clear blue sky), and 1 is worst (extremely hazy skies). All four images were exposed for the same amount of time and processed the same.

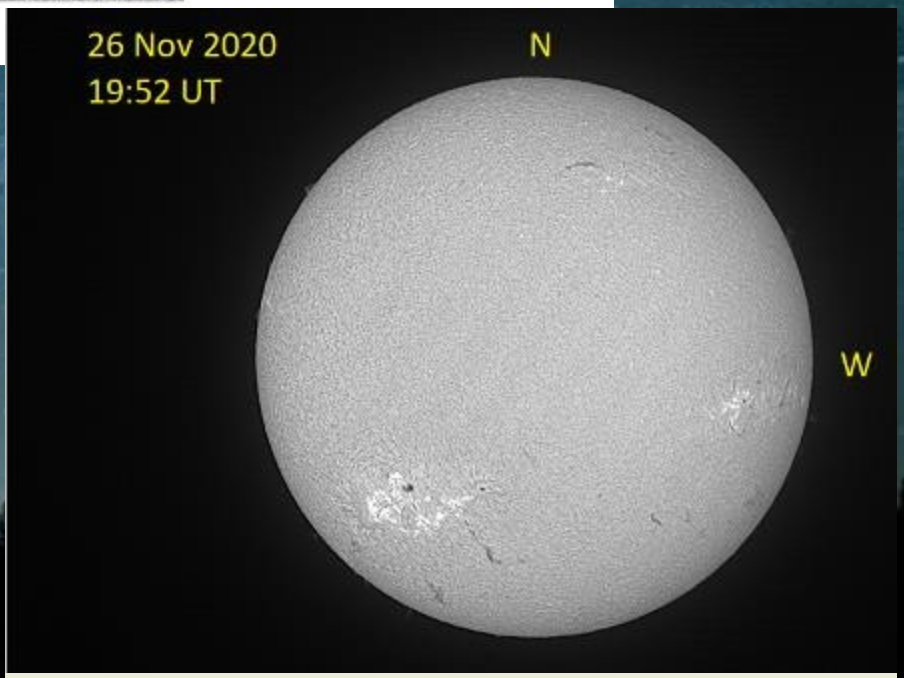


17:56 UT	18:02 UT	18:05 UT	18:09 UT

The following picture is a copy of the 17:56 UT image. The arrow is pointing to a sunspot, which is visible in all four of the images above. Seeing sunspots in a hydrogen-alpha image is not very common.



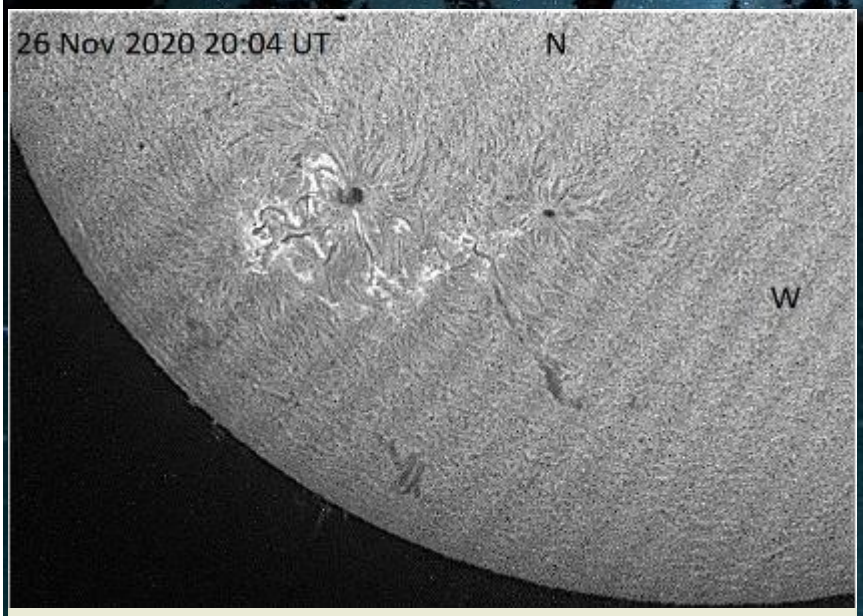
Photos by Ken Boquist



2020-11-26 1952U - Lunt H-Alpha Double Stack - DS287m Long reducer - Surface - 1X - G1 - Eo.813ms - Co - GM1 - S7 - T5 - 1500 of 6000 frames -

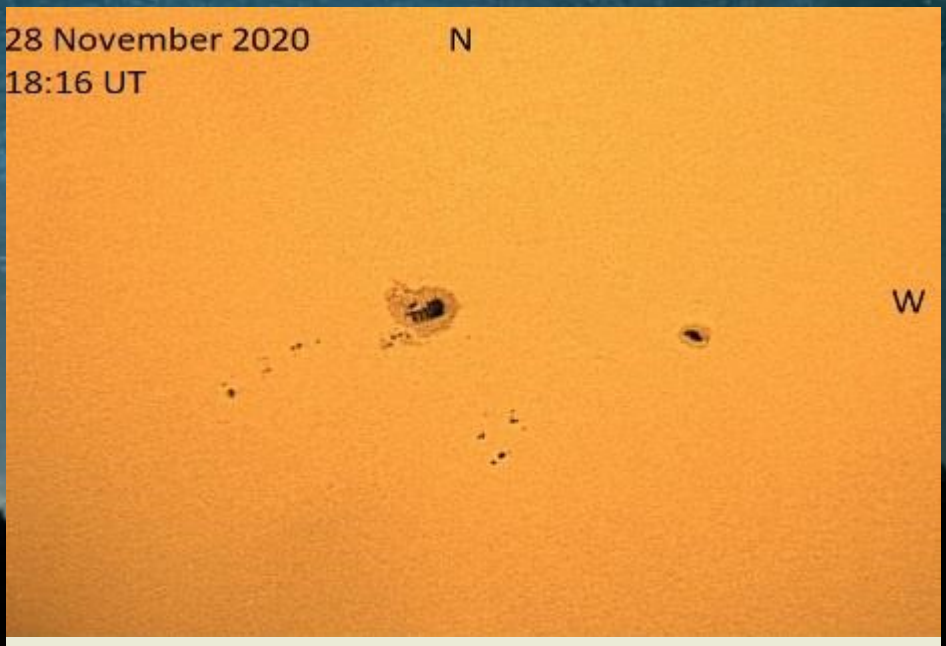
Ken Boquist

MEMBER OBSERVATIONS



2020-11-26 2004U - Lunt H-Alpha Double Stack - DS287m Long reducer - Surface Close-up - 2.5X - G1 - E1.191ms - Co - GM0.9 - S7 - T5 - 1500 of 6000 frames

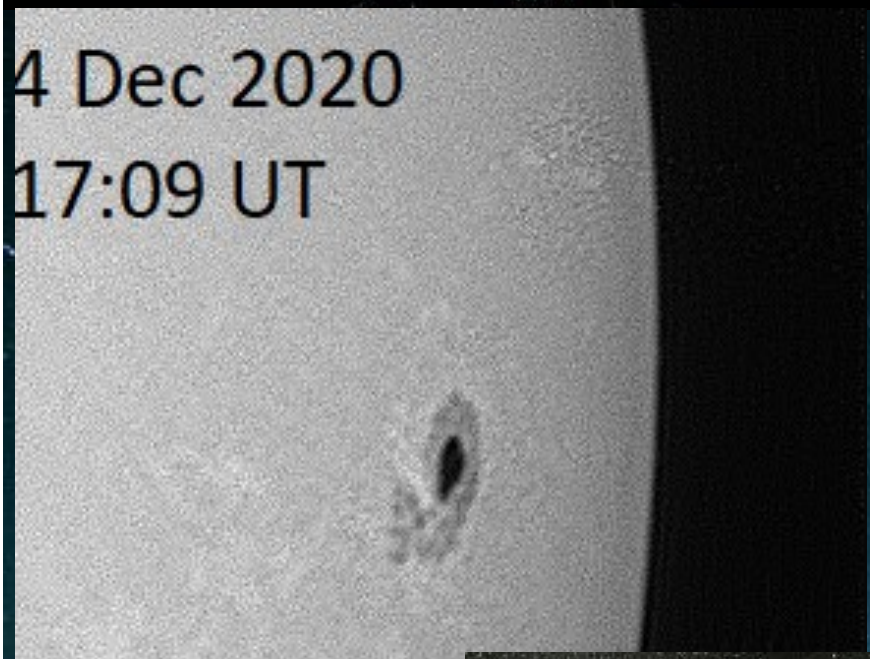
Ken Boquist



Picture caption2020-11-28 1816U - White Light - 38mm f14.3 Lens - DS287m Short + ext - 2.5X - G1.65 - E0.375ms - Co - GM1 - S4 - T5 - of 3000 frames

Ken Boquist

MEMBER OBSERVATIONS

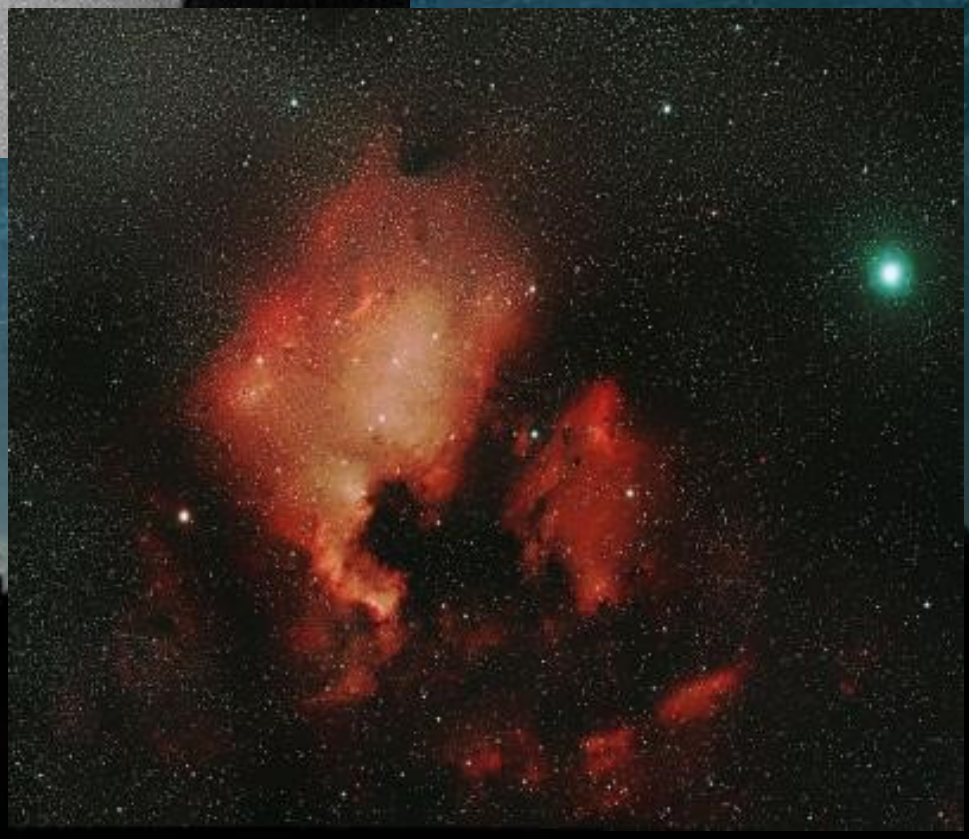


(Left) 2020-12-04 1709U - White Light - 38mm f14.3 Lens - DS287m No reducer - 2.5X - G7.89 - E0.1ms - C0 - GM1 - S2 - T6 - of 3000 frames

Ken Boquist

(right) This image was stitched together from nine separate frames that were taken on the night of November 7th, 2020 at Menke Observatory under decent transparency conditions. It took several tries to get the frames to stitch together properly, but I'm reasonably happy with this outcome. This is NGC 7000 (North American Nebula) and IC 5070 (Pelican Nebula). Each of the individual frames were shot with my 80mm f6.8 scope, and each individual frame was a live-stacked shot of 4 frames of 45 seconds each

Ken Boquist



MEMBER OBSERVATIONS

M027 (Dumbbell Nebula) - 2020-12-06 0058U - 9.25 f10 - E 40 Sec sec X 11 - G10 - DS10c - Baader filter - RI Processed

Ken Boquist

M033 - 2020-11-14 0351U - 9.25 f6.3 - E 5 Sec sec X 60 - G160 - DS10c - No filter - Menke
Ken Boquist

MEMBER OBSERVATIONS

M042 - 2020-11-20 0713U - 9.25 f6.3 - E Various sec X 149 - G40 - DS 10c - UHC filter - RI - Processed
Ken Boquist

NGC 0253 - 2020-12-05 0153U - 9.25 f10 - E 6 Sec sec X 40 - G80 - DS10c - None filter - Castle
Ken Boquist

MEMBER OBSERVATIONS

NGC 0891-2021-11-20 0626U-RI-9.25 f6.3-DS10c no red-UHC-G40-E20 secx12-C0-G0.86-Add 2-BP27 P55 WP200-DFC-B0-S0-See6 of 10-Tr3 Processed (2)
Ken Boquist

NGC 1499 (California Nebula) - 2020-12-26 0244U - 80mm f6.8 - E 48 Sec sec X 25 - G10 - DS10c - L-enhance filter - RI Compressed
Ken Boquist

MEMBER OBSERVATIONS

NGC 6814 - 2020-11-14
0142U - 9.25 f6.3 - E 2 to 5 sec X 80 - G40 to 160 - DS10c - No reducer or filter - Menke 2
Ken Boquist

NGC 6826 - 2020-12-10
0153U - 9.25 F10 - E 5 Sec sec X 36 - G40 - DS10c - UHC filter - RI - Processed - cropped (2)

MEMBER OBSERVATIONS

NGC 6946 - 2020-11-14
0331U - 9.25 f6.3 - E 5 sec X 30 - G40 - DS10c - No reducer or filter - Menke (2)
Ken Boquist

NGC 7293 - 2020-12-05
0034U - 9.25 F10 - E 20 sec sec X 30 - G80 - DS10c - L-enHance filter - Castle
Ken Boquist

MEMBER OBSERVATIONS

NGC 7331 - 2020-11-14
0318U - 9.25 f6.3 - E 5 Sec sec X 120 - G40 - DS10c - No filter - Menke (2)
Ken Boquist

NGC 7635 - 2020-11-18
0320U - 5.1 f8 - E 15 sec X 30 - G25 - DS287c - LenHance filter - RI - Processed
Ken Boquist

MEMBER OBSERVATIONS

Sh 2-101 - 2020-11-16
0124U - 5.1 f8 - E 25 Sec sec X 30 - G20 - DS10c - L-enHance filter - RI (2)
Ken Boquist

Sh 2-104 - 2020-11-16
0354U - 5.1 f8 - E 10 Sec sec X 10 - G40 - DS10c - L-enHance filter - RI (2)
Ken Boquist

MEMBER OBSERVATIONS

Sh 2-112 - 2020-10-07 0250U - 80mm f6.8 - E 15 sec X 24 - G40 - DS10c - L-enHance filter - RI - Processed (2)
Ken Boquist

Sh 2-155 (Cave Nebula) - 2020-11-16 0235U - 5.1 f8 - E 10 Sec sec X 25 - G40 - DS 10c - L-enHance filter - RI - Processed (2)
Ken Boquist

MEMBER OBSERVATIONS

Sh 2-190 (Heart Nebula) - 2020-12-10 0252U - 80mm f6.8 - E 20 Sec sec X 18 - G40 - DS10c - L-enHance filter - RI - Processed
Ken Boquist

Westerhout 5 (Soul Nebula) - 2020-12-10 0310U - 80mm f6.8 - E 20 Sec sec X 18 - G40 - DS10c - L-enHance filter - RI Processed
Ken Boquist

PAUL CASTLE OBSERVATORY OBSERVING SESSIONS

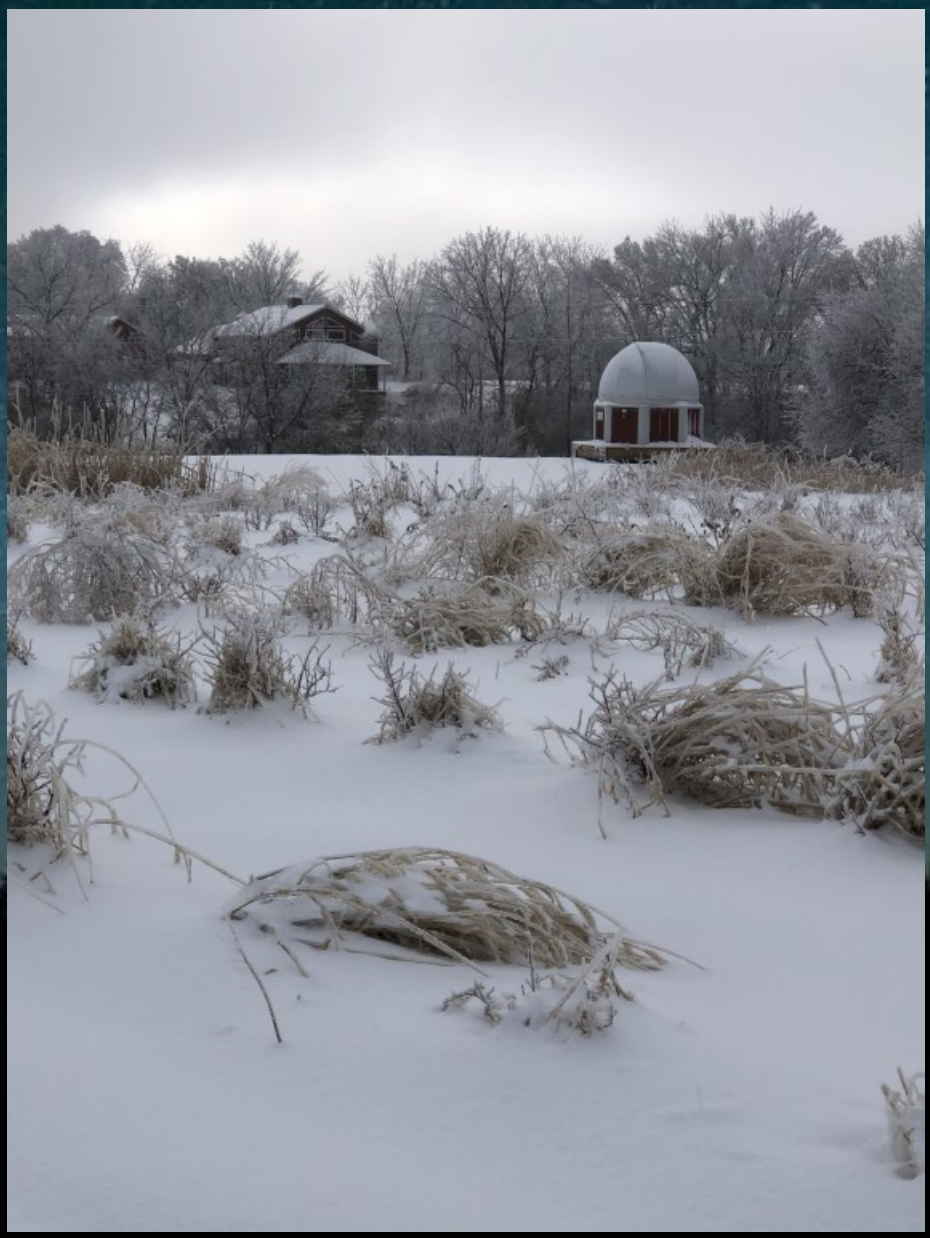


Photo (left) by Gary Nordick Checking out the observatory This is the revised Paul Castle Page In the newsletter

President Alan Sheidler arranged (with the help of Dale Hachtel) for the January 2021 meeting of the Popular Astronomy Club to be conducted via Zoom at 7:00 p.m. local time, on January 11th, 2021. We had 19 members , 4 guests .

President Al Sheidler introduced our speaker for the evening. Chuck Allen from The Astronomical League who gave attendees a talk on :

The **Cosmic Horizons**

Cosmic Horizons explore the limits of human visibility imposed by planetary curvature, photon sensitivity of the human eye, and the speed of light in an expanding universe. We briefly explore the definition of planetary horizons and the role of planetary size in defining them. Next, we examine the faintest astronomical objects we can see with and without optical aid, and the smallest number of photons theoretically detectable by humans. Finally, we discuss the four horizons imposed by time and the speed of light (the Hubble distance, cosmic particle horizon, cosmic event horizon, and future visibility horizon) and consider how these horizons change in an accelerating universe and what effect they have on what we can, or ever will, see.

Al then shared some dome photos that he had received from members. Byron had a nice a photo of M42 and The Horsehead Nebula and the Pleiades.

Paul Levesque also had managed to view the Jupiter Saturn conjunction.

Also shown were Rusty's photos of the conjunction.

.Also saw some of Al's photos.

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HEAVENS ABOVE

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