



# the Skyscraper

vol. 48 no. 08  
August 2021

AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND \* 47 PEEPTOAD ROAD \* NORTH SCITUATE, RHODE ISLAND 02857 \* WWW.THESKYSCRAPERS.ORG

## In This Issue:

- 2 President's Thoughts
- 3 Skylights: August 2021
- 6 The Sun, Moon & Planets in August
- 7 Corner the Great Square of Pegasus
- 8 The Kármán Line: Defining the Edge of Space
- 9 Planetary Nebula in Lyra:
- 9 Messier 57: The Ring Nebula
- 10 Remembering Tina Huestis
- 10 Astronomical League Update
- 14 Starry Scoop
- 16 AstroAssembly 2021

## Seeing the Unseeable: The First Image of a Black Hole"

A presentation by Joseph R. Farah  
Saturday, August 14, 7:00pm EDT at Seagrave Observatory

The Event Horizon Telescope (EHT) is a global array of radio stations linked together to create a virtual radio telescope the size of the Earth. This massive instrument can achieve micro-arcsecond resolution on the sky, making it one of the most sensitive devices ever created, and enabling it to image the most extreme environment in the Universe: the event horizon of a black hole. The EHT represents the next generation of observation in the centuries long development of multi-messenger astronomy, and offers a new way to test general relativity in the ultra-strong gravity regime. Hidden behind the shadow of M87 is a singularity where our understanding of physics breaks down—and this is the story of how a team of astronomers from around the world pushed technology and physics to its limits to take the first picture of a black hole.

Joseph Farah is a Ph.D. student in astrophysics and National Science Foundation Fellow at UC Santa Barbara, studying supernova and experimental cosmology as part of the Las Cumbres Observatory (LCO) and the Global Supernova Project (GSP). His graduate research is funded by

an NSF GRFP. He received his bachelor's degree in physics from the University of Massachusetts Boston.

As an undergraduate, Joseph worked on the Event Horizon Telescope (EHT) project as a Smithsonian Fellow at the Harvard-Smithsonian Center for Astrophysics (CfA) under the supervision of the brilliant Michael Johnson. He helped produce the first image of M87 and led the development of novel techniques for analyzing and measuring the shadows of black holes observed with the EHT. He remains a member of the EHT Collaboration and is leading a paper describing a method for dynamically imaging sources such as the Galactic Center on short timescales as part of the effort to image Sgr A\*. For his work with the Collaboration, Joseph was named a Barry M. Goldwater Scholar, a two-time finalist for the LeRoy Apker award, and a co-recipient of the Breakthrough Prize in Fundamental Physics.

Outside of his research, Joseph is a digital artist and a competitive quarter-mile drag racer. He is also the CTO and co-President of Astraveo.

## Seagrave Memorial Observatory Member Night

**Saturday, August 14 at 8:30 pm**

Learn the constellations; observing with binoculars, viewing through observatory telescopes. Bring your binoculars or telescope.



## Register for ALCon '21 Virtual August 19-21, 2021

Registration for Astronomical League's virtual convention is now open at the following link. IT'S FREE!! The convention features virtual tours, professional and youth speakers, a Slooh presentation, all 2020 and 2021 youth and general award presentations, over \$3,000 in door prizes donated by our member clubs, our League business meeting, an international star party, and a keynote address by Dr. Jocelyn Bell Burnell, discoverer of pulsars. To be eligible, you must register your name and email address. It only takes a minute to do, and League membership is not required. [www.alconvirtual.org](http://www.alconvirtual.org)

# President's Thoughts

by Steve Siok

Hello again everyone,

Great time to observe except for the bugs! It's August. And real summer! Time to go to Stellafane for all of you that make the trek to Springfield, Vermont. Wishing you clear skies on Breezy Hill. I hope you enjoy Stella Kafka's talk about the changing magnitude of Betelgeuse.

It is exciting to talk also about our August meeting, which will be held on August 14. This will be our first in-person meeting after the pandemic, so please make an effort

to come to Seagrave. Our speaker will be Joe Farah, who is a Smithsonian Fellow at the Center for Astrophysics. He will speak about the Event Horizon telescope array and how it was used to image the central black hole in M87. Joe was an undergrad at the time he worked on the team. For everyone who lives far away or would prefer a remote ZOOM, we will be sending out the link. Thanks to Linda and Kathy who have devised the way remote watchers will experience the meeting hall view of the talk.

Also that night we will once again hope for clear skies so we can conduct our first night-time observing session. I welcome everyone with a new instrument to bring it to Seagrave. The moon, Jupiter and Saturn will be well placed for observing. Both Jupiter and Saturn will be within a week of opposition so they will be quite large. The moon will be at first quarter so good views of the terminator and shadows of crater walls. Take care everyone. See you soon.



Our July Skyscrapers picnic was our first in-person event since winter of 2020. Photo by Tracy Prell



*The Skyscraper* is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

## Directions

Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

## Submissions

Submissions to *The Skyscraper* are always welcome. Please submit items for the newsletter no later than **August 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

## E-mail subscriptions

To receive *The Skyscraper* by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

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# Skylights: August 2021

by Jim Hendrickson

Welcome to August. Even though the nights have been getting longer since the solstice in June, this month the shifting onset of night really becomes apparent, with the last 8pm sunset occurring on August 4, and nights will be 74 minutes longer at the end of the month than at the beginning. The last sunset in the 8pm hour occurs on August 4, and we won't return to sunsets this late again until May 17, 2022. With darkness coming earlier, and nights getting a bit cooler, and hopefully a bit less humid, our skywatching conditions should be improving.

August is perhaps best known for the annual Perseid meteor shower, which peaks on the night of the 11th-12th. With the radiant being circumpolar, and minimal interference from the light of a crescent Moon, conditions are optimal for an all-night meteor display. The Perseids are also known to have a wide stream, so even a week or two before and after peak, you're likely to see a few Perseids.

Our tour around the solar system this month starts with Mars. It has put on a good show for us over the past year and a half, and August will be the last month to view the red planet in the evening sky as it's on its way to conjunction with the Sun on October 8. At a distance of 2.6 AU, Mars's tiny 3.6 arcsecond disk is no larger than Uranus, and doesn't offer much in the way of surface detail. While Mars lacks the brilliance and splendor that it did a year ago, it

is worth watching its motion as it joins with two other objects in our solar system.

First, watch for the 2.3% illuminated waxing crescent Moon near Mars on August 9. The Moon will be just 3.3° north of Mars, appearing at approximately the 2 o'clock position.

Then, on the 18th, Mercury is just 10 arcminutes (1/6°) to the west of Mars, appearing below and to the right. Mercury is nearly four times brighter than Mars, and both planets show only tiny gibbous phases, 5.2 and 3.6 arcseconds respectively.

Although Mercury attains a significant eastern elongation from the Sun (23° by month's end), this apparition is not very favorable, owing to the shallow angle of the ecliptic in the western sky after sunset during this time of year. On the 31st, it sets just 50 minutes after the Sun. This presents us with some challenging, yet rewarding, opportunities to spot it near some other celestial objects this month. The very young (0.4d, 0.3% illuminated) waxing crescent Moon is 3.3° to its right on the 8th. On the 11th, it is just over 1° to the 1 o'clock position from Regulus, and, as mentioned above, is its meeting with Mars on the 18th.

While Mercury and Mars leave the sky before twilight ends, Venus shines a bit longer, though its visibility is also limited by the shallow angle of the ecliptic.

On the 10th, the 2.4 day waxing crescent Moon pairs with Venus in what should be one of the month's more memorable sights.

## Events in August

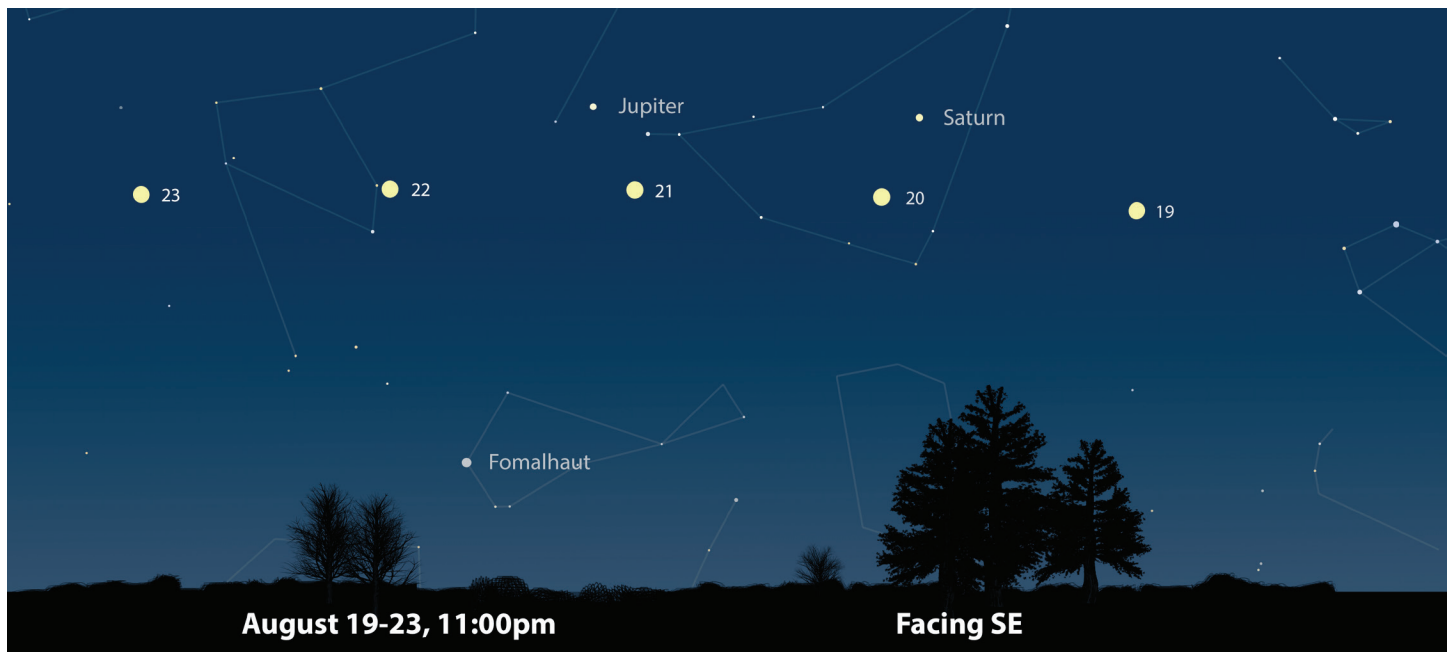
- 1 Moon & Uranus (2.9°)
- 2 Saturn Opposition
- 8 New Moon
- 8 Moon & Mercury (3.6°)
- 9 Moon & Mars (4.0°)
- 10 Moon & Venus (5.9°)
- 11 Mercury & Regulus (1.1°)
- 11 Perseid Meteor Shower Peaks
- 14 Moon & Zubenelgenubi (0.4°)
- 15 First Quarter Moon
- 18 Mercury & Mars (0.2°)
- 18 Moon & Nunki (0.0°)
- 19 Jupiter Opposition
- 20 Moon & Saturn (4.7°)
- 21 Moon & Jupiter (4.2°)
- 22 Full Sturgeon Moon
- 23 Moon & Neptune (4.0°)
- 27 Moon & Uranus (1.6°)
- 30 Last Quarter Moon

Times in Eastern Daylight Time (UTC-4). Ephemeris times are for Seagrave Observatory (41.845N, 71.590W)

After this, Venus continues to progress eastward through Virgo. Its motion becomes apparent during the second half of August as it approaches the first magnitude star Spica, which it passes early next month.

Through a telescope, Venus grows slowly from 12.7 arcseconds to 15.1 arcseconds, and its gibbous phase narrows slightly from 82% to 73%, as its distance closes from 1.31 AU to 1.11 AU during the month of August.

The best planets for viewing this month





The Moon appears near the wide double star Zubenelgenubi on August 14.

are Saturn and Jupiter, which both reach opposition in August, Saturn on the 2nd, and Jupiter on the 19th. This means that you won't need to wait long after sunset to observe them, and they will be visible all night, as they are opposite the Sun in the sky.

Although opposition is typically the best time to observe the outer planets, because it is at this point that they are at their closest - and therefore their largest and brightest - Saturn generally appears best before or after opposition due to its rings and the way the shadows are offset. At opposition, the shadow of the rings on the planet and the planet on the rings are in close alignment, minimizing their visibility. However, when looking at Saturn about a month or so before or after opposition, the shadow angles are offset, and give Saturn a more dramatic, three-dimensional appearance. This does not mean, however, that you should wait to observe Saturn, as it is always a joy to observe whenever it is visible.

Back to the Moon: the 6 day waxing crescent passes near the wide double star Zubenelgenubi (Alpha Librae) on the 14th. The best view will be just before Moonset, when they will be separated by less than  $1/2^\circ$ .

The Full Sturgeon Moon occurs on the 21st, with moonrise at 19:41. On this night, the Moon will be just  $4.5^\circ$  directly below Jupiter, and both objects will transit at about the same time, 40 minutes past midnight.

On the 18th-19th, watch the waxing gibbous Moon graze Nunki (Omicron Sagittarii). For some observers just south of us, the Moon will occult the star, but for us it will be just 1.5 arcminutes from the northern limb of the Moon at 18 minutes past midnight.

Uranus lies within the constellation of Aries, and rises around 11:30pm at the beginning of the month, and just before 10pm by the end of the month. It is located within a triangle of 5th and 6th magnitude stars Pi,

Omicron, and Sigma Arietis. These stars, similar in brightness to Uranus, should aid in locating it in binoculars.

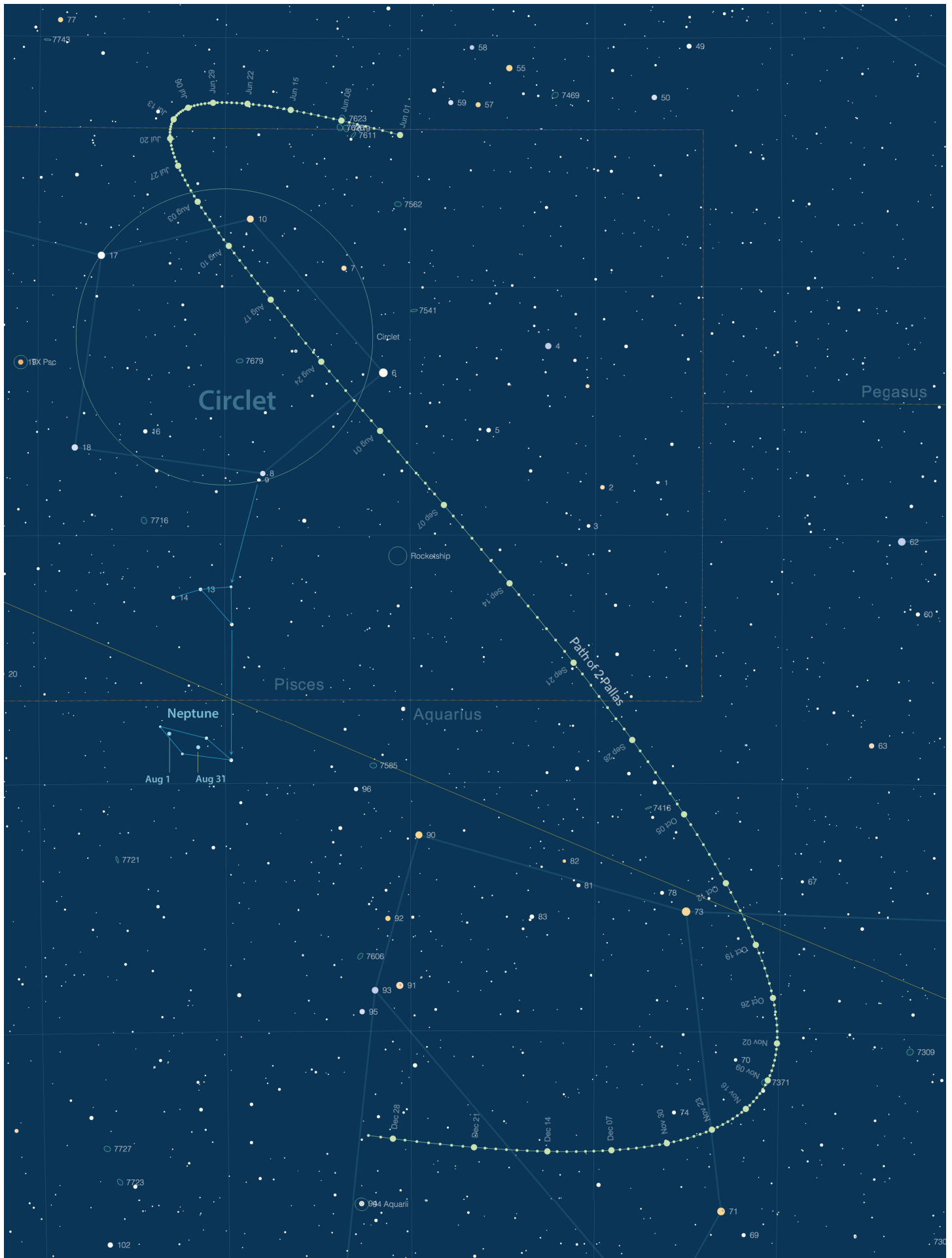
If you have never seen Uranus, or think that it is difficult to find, there is an opportunity on the 27th-28th when the waning gibbous Moon passes as close as 1.6 degrees to its south. Wait until after midnight, and aim your binoculars at the Moon. Place the Moon towards the right of the binocular field of view and you will find two 6th magnitude stars about three Moon diameters apart from each other, and oriented in a roughly 2 and 8 o'clock angle. Bisect this line, and move northward about  $1/2^\circ$  (one Moon diameter) and you should find a similarly bright object.

Our planetary tour now brings us to the Circler asterism in Pisces. It is here that we're at the hopping-off point to find two solar system objects. The first object we find is the third largest object in the asteroid belt, 2 Pallas. Pallas is within its retrograde loop, and due to its highly inclined orbit, it is moving on a distinctly southwesterly trajectory. During August, it is tracking along a line that is closely parallel to the line connecting Theta and Gamma Piscium. Shining at 9th magnitude, you'll need binoculars or a small telescope to locate it, at 2.45 to 2.18 AU from Earth.

Finally, we journey to our solar system's outermost planet, Neptune. Just a bit brighter than Pallas, Neptune's motion amongst the background stars is much slower, given its 29.06 AU distance. For the entire month, it can be found within a quadrilateral of 6th and 7th magnitude stars that is located  $7^\circ$  south of the Circler. Start at 5th magnitude Kappa Piscium, a nice wide double, and move south-southeast just over  $2^\circ$  to find an asterism of 4 6th and 7th magnitude stars. Two of the stars at the western side of this asterism point due south. Follow this line  $2.7^\circ$  until you encounter another star of similar brightness that lies almost exactly in the line. Here is the westernmost point of the  $1.5^\circ$  long diamond-shaped asterism we'll use to find Neptune. The line bisecting the long axis of the diamond is roughly along the path Neptune moves along. Note that the eastern two stars are somewhat dimmer than the western ones, and Neptune will be slightly dimmer still. As the month progresses, Neptune moves from near the easternmost star, to just past the line connecting the short axis of the diamond asterism. After observing Neptune two or three times in August, you'll become familiar with this star pattern, from which Neptune won't venture too far from for the remainder of the year.



The waning gibbous Moon is near Uranus on the morning of August 28.



# The Sun, Moon & Planets in August

This table contains the ephemeris of the objects in the Solar System for each Saturday night in July 2021. Times in Eastern Daylight Time (UTC-4). Ephemeris times are for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
<b>Sun</b>	<b>7</b>	9 08.7	16 24.8	Cnc	-26.8	1892.4	-	-	-	1.01	05:46	12:52	19:57
	<b>14</b>	9 35.3	14 21.2	Leo	-26.8	1894.6	-	-	-	1.01	05:53	12:50	19:47
	<b>21</b>	10 01.3	12 06.4	Leo	-26.8	1897.1	-	-	-	1.01	06:00	12:49	19:37
	<b>28</b>	10 27.0	9 42.3	Leo	-26.8	1899.9	-	-	-	1.01	06:07	12:47	19:26
<b>Moon</b>	<b>7</b>	7 52.7	23 52.2	Gem	-8.7	1819.1	19° W	3	-	-	04:23	12:12	19:54
	<b>14</b>	13 54.0	-9 18.2	Vir	-11.5	1942.9	69° E	32	-	-	12:31	17:56	23:12
	<b>21</b>	20 52.8	-23 03.4	Cap	-12.7	1923.4	160° E	97	-	-	19:41	00:41	05:49
	<b>28</b>	2 34.7	11 56.9	Ari	-12.2	1778.3	115° W	71	-	-	22:09	05:09	12:19
<b>Mercury</b>	<b>7</b>	9 34.1	16 17.8	Leo	-1.6	5.0	6° E	98	0.36	1.35	06:16	13:20	20:22
	<b>14</b>	10 25.0	11 24.4	Leo	-0.8	5.1	12° E	92	0.40	1.32	06:58	13:42	20:25
	<b>21</b>	11 09.1	6 13.2	Leo	-0.4	5.3	18° E	85	0.43	1.27	07:34	13:58	20:21
	<b>28</b>	11 47.9	1 06.5	Vir	-0.1	5.6	22° E	78	0.46	1.19	08:03	14:09	20:14
<b>Venus</b>	<b>7</b>	11 21.7	5 20.1	Leo	-3.9	13.2	34° E	81	0.72	1.28	08:44	15:05	21:25
	<b>14</b>	11 51.8	1 46.7	Vir	-3.9	13.7	36° E	78	0.72	1.23	08:59	15:07	21:15
	<b>21</b>	12 21.6	-1 49.7	Vir	-3.9	14.3	38° E	76	0.73	1.18	09:14	15:10	21:04
	<b>28</b>	12 51.3	-5 25.1	Vir	-3.9	14.9	39° E	74	0.73	1.14	09:29	15:12	20:53
<b>Mars</b>	<b>7</b>	10 29.4	10 37.0	Leo	1.8	3.6	20° E	99	1.66	2.58	07:30	14:11	20:52
	<b>14</b>	10 46.0	8 56.0	Leo	1.8	3.6	18° E	99	1.66	2.59	07:26	14:00	20:34
	<b>21</b>	11 02.5	7 12.2	Leo	1.8	3.6	16° E	99	1.66	2.61	07:21	13:49	20:17
	<b>28</b>	11 18.9	5 25.9	Leo	1.8	3.6	14° E	99	1.66	2.62	07:16	13:38	19:57
<b>1 Ceres</b>	<b>7</b>	4 06.1	14 25.2	Tau	9.0	0.4	73° W	97	2.83	2.96	00:52	07:48	14:43
	<b>14</b>	4 13.9	14 46.7	Tau	8.9	0.4	77° W	97	2.82	2.87	00:31	07:28	14:25
	<b>21</b>	4 21.1	15 05.5	Tau	8.9	0.4	82° W	97	2.82	2.77	00:09	07:07	14:06
	<b>28</b>	4 27.6	15 21.7	Tau	8.8	0.5	87° W	97	2.81	2.67	23:47	06:46	13:46
<b>Jupiter</b>	<b>7</b>	22 05.8	-12 56.3	Aqr	-2.7	48.7	166° W	100	5.03	4.04	20:33	01:48	07:02
	<b>14</b>	22 02.4	-13 15.8	Aqr	-2.7	49.0	173° W	100	5.03	4.02	20:03	01:17	06:30
	<b>21</b>	21 58.9	-13 35.5	Aqr	-2.7	49.0	178° E	100	5.02	4.01	19:29	00:41	05:53
	<b>28</b>	21 55.4	-13 54.7	Cap	-2.7	48.9	171° E	100	5.02	4.02	18:59	00:10	05:21
<b>Saturn</b>	<b>7</b>	20 50.0	-18 32.5	Cap	0.2	18.5	175° E	100	9.95	8.94	19:35	00:28	05:20
	<b>14</b>	20 47.9	-18 41.2	Cap	0.2	18.5	168° E	100	9.95	8.96	19:06	23:58	04:50
	<b>21</b>	20 45.9	-18 49.4	Cap	0.2	18.4	161° E	100	9.95	8.99	18:38	23:29	04:20
	<b>28</b>	20 44.1	-18 56.9	Cap	0.3	18.3	153° E	100	9.95	9.03	18:09	22:59	03:50
<b>Uranus</b>	<b>7</b>	2 49.5	15 51.5	Ari	5.8	3.6	90° W	100	19.74	19.72	23:30	06:31	13:32
	<b>14</b>	2 49.8	15 52.4	Ari	5.8	3.6	97° W	100	19.74	19.60	23:02	06:03	13:05
	<b>21</b>	2 49.8	15 52.5	Ari	5.7	3.6	103° W	100	19.74	19.48	22:35	05:36	12:37
	<b>28</b>	2 49.7	15 52.0	Ari	5.7	3.6	110° W	100	19.74	19.37	22:07	05:08	12:09
<b>Neptune</b>	<b>7</b>	23 35.2	-3 56.4	Aqr	7.8	2.3	142° W	100	29.92	29.12	21:29	03:17	09:05
	<b>14</b>	23 34.6	-4 00.2	Aqr	7.8	2.4	149° W	100	29.92	29.05	21:01	02:49	08:36
	<b>21</b>	23 34.0	-4 04.3	Aqr	7.8	2.4	156° W	100	29.92	29.00	20:33	02:21	08:08
	<b>28</b>	23 33.4	-4 08.6	Aqr	7.8	2.4	163° W	100	29.92	28.96	20:05	01:53	07:40
<b>Pluto</b>	<b>7</b>	19 49.4	-22 41.3	Sgr	14.3	0.2	160° E	100	34.34	33.38	18:53	23:28	04:02
	<b>14</b>	19 48.8	-22 43.4	Sgr	14.3	0.2	153° E	100	34.34	33.43	18:25	23:00	03:34
	<b>21</b>	19 48.2	-22 45.4	Sgr	14.3	0.2	147° E	100	34.35	33.50	17:57	22:31	03:06
	<b>28</b>	19 47.6	-22 47.2	Sgr	14.3	0.2	140° E	100	34.35	33.57	17:29	22:03	02:38

# Corner the Great Square of Pegasus

By David Prosper

The Summer Triangle may be the most famous seasonal star pattern, but during early August evenings another geometrically-themed asterism rises: the Great Square of Pegasus. This asterism's name is a bit misleading: while three of its stars - Scheat, Markab, and Algenib - are indeed found in the constellation of the winged horse Pegasus, its fourth star, Alpheratz, is the brightest star in the constellation Andromeda!

August evenings are an excellent time to look for the Great Square, as it will be rising in the east after sunset. If not obvious at first, wait for this star pattern to rise a bit above the murky air, and remember that depending on your point of view, it may appear more like a diamond than a square. Look for it below the Summer Triangle, or to the southeast of nearby Cassiopeia at this time. As the Great Square rises in prominence during autumn evenings, it becomes a handy guidepost to finding more constellations, including some of the dimmer members of the Zodiac: Aries, Pisces, Aquarius, and Capricornus. Like the Summer Triangle, the Great Square of Pegasus is also huge, but Pegasus itself is even larger; out of the 88 constellations, Pegasus is 7th in size, and feels larger as the stars in its neigh-

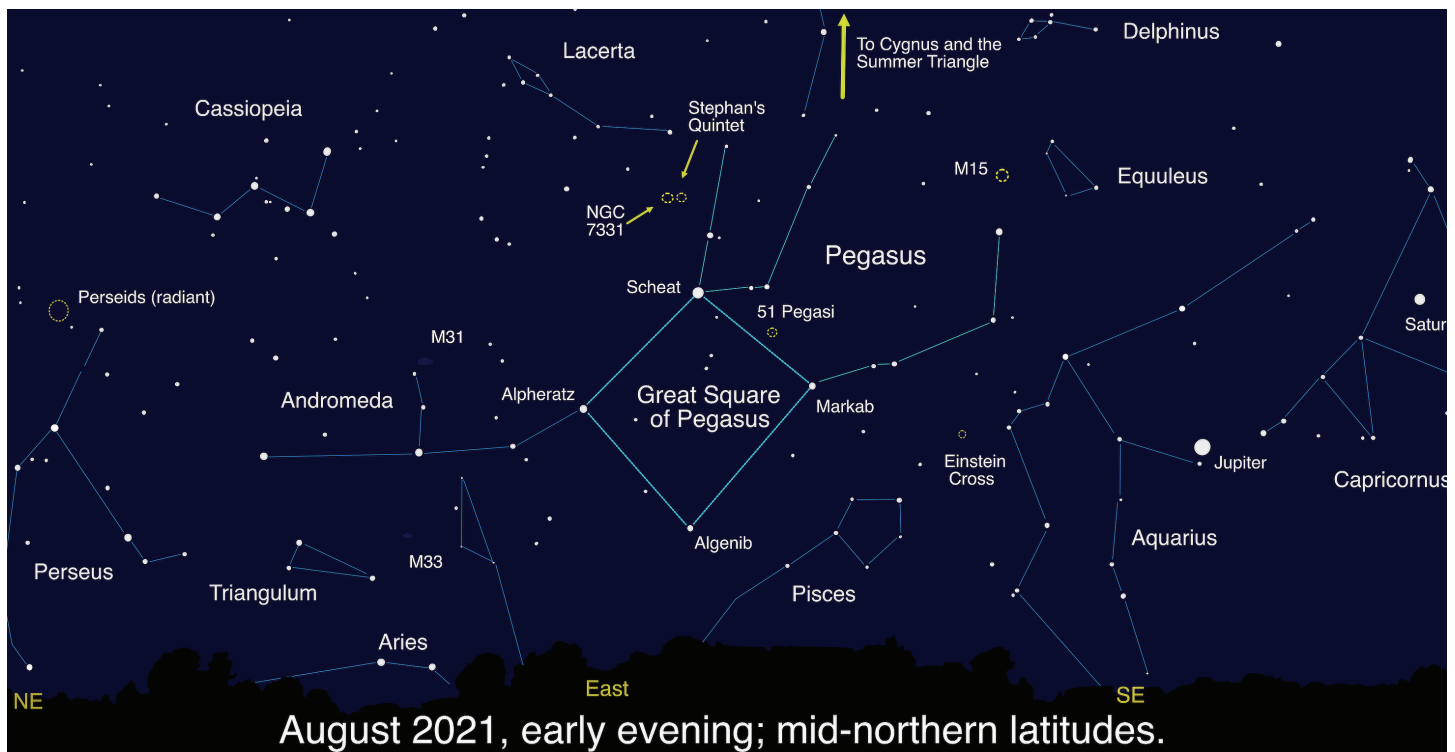


Stephan's Quintet is one of the most famous deep-sky objects in Pegasus. First discovered in 1877, it contains the first galaxy group discovered (which includes 4 of the 5 galaxies making up the Quintet) – and has been studied extensively ever since. One day this group will merge into one supergalaxy! While famous, these galaxies are hard to spot in all but the largest backyard telescopes – but are a favorite target of astrophotographers. Take a virtual flyby of these galaxies with a tour created from Hubble data at: [bit.ly/quintetflyby](https://bit.ly/quintetflyby) Credit: NASA, ESA, and G. Bacon, J. DePasquale, F. Summers, and Z. Levay (STScI)

boring constellations are much dimmer.

There are many notable deep-sky objects found within the stars of Pegasus - ranging from easily spotted to expert level targets - making it a great constellation to revisit as your observing skills improve. Notable

objects include the densely-packed stars of globular cluster M15, a great first target. The potential “Milky Way look-alike” galaxy NGC 7331 is a fun target for more advanced observers, and expert observers can hop nearby to try to tease out the much dim-



August 2021, early evening; mid-northern latitudes.

While the stars of the Great Square of Pegasus are not as bright as those of the Summer Triangle, they still stand out compared to their neighbors, and make a great foundation for exploring this area of the night sky. Note that the brightness of the stars near the horizon is exaggerated in this picture.

mer interacting galaxies of Stephan's Quintet. A fascinating (but extremely difficult to observe) object is a gravitationally-lensed quasar famously known as the Einstein Cross. Pegasus has quite a storied history in the field of exoplanet research: 51 Pegasi was the first Sun-like star discovered to be host to a planet outside our solar system, now officially named Dimidium.

While observing Pegasus and its surroundings, keep your eyes relaxed and ready to catch some Perseids, too! August 2021 promises an excellent showing of this annual meteor shower. The crescent Moon sets early on the evening of the shower's peak on August 11-12, but you can spot stray Perseids most of the month. If you trace the path of these meteors, you'll find they orig-

inate from one point in Perseus - their radiant. Giant planets Jupiter and Saturn will be up all evening as well. Look south - they easily stand out as the brightest objects in the faint constellations Aquarius and Capricornus.

Pegasus truly holds some fantastic astronomical treasures! Continue your exploration of the stars of Pegasus and beyond with NASA at [nasa.gov](https://nasa.gov).



*This article is distributed by NASA Night Sky Network. The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!*

# The Kármán Line: Defining the Edge of Space

by Francine Jackson

Recently, a newspaper quiz asked the upper layer of the atmosphere. Easy answer, the exosphere. No. Kármán Line. Kármán line!?!?

Last month, two "pioneers" of space, Richard Branson and Jeff Bezos, lifted off their respective companies' crafts, Virgin Galactic and Blue Origin, in attempts to reach an altitude capable of allowing several minutes of weightlessness, and observations of the curvature of the Earth, before returning to solid ground. Branson traveled 86 kilometers (53.3 miles) before gliding to a runway landing, while Bezos rocketed upwards, just reaching 107 kilometers (66.4 miles) before parachuting down.

Although it wasn't emphasized as much with Virgin Galactic, Blue Origin actually had as its goal reaching the Kármán Line, before "turning around" and coming back home. But, what is this atmospheric point? Why is it suddenly such a point-on target?

The Kármán Line, by definition, is an attempt to define a boundary between our atmosphere and outer space. Its name derives from Hungarian-American engineer and physicist Theodore von Kármán, who, in 1957, attempted to determine an altitude limit. In the 1960s, the Federation Aéronautique Internationale (FAI), an international record keeping body, established this boundary. But, again, why, especially as it seems different countries actually define this atmosphere/space boundary differently.

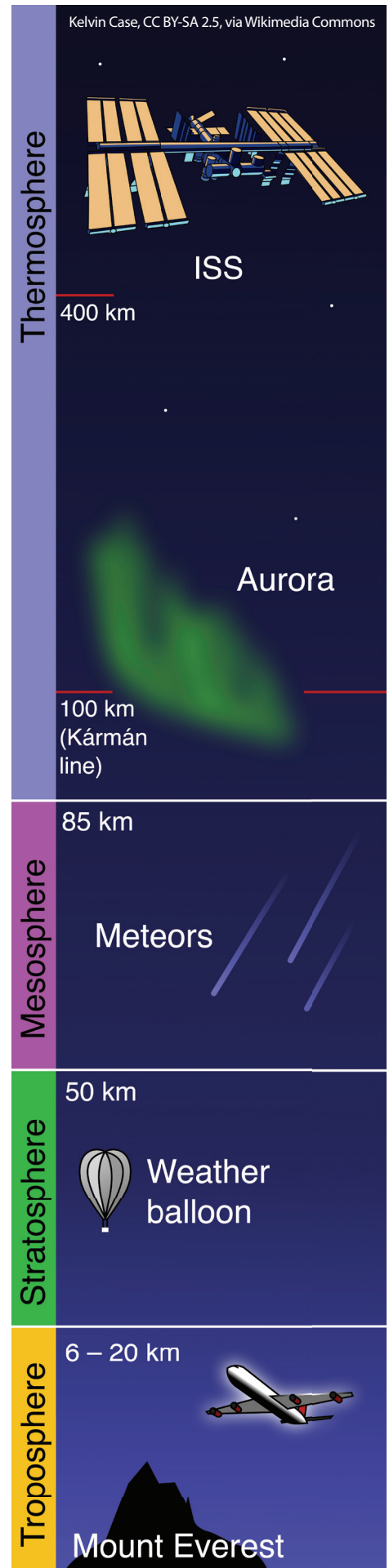
Apparently, like international waters within oceans, international airspace is important for both legal and regulatory purposes, although different countries do define this airspace differently.

The Kármán Line is just a few miles above the mesosphere, jutting just enough to be within the region of the thermosphere where auroras can occur. It also seems to lie right about where the atmosphere's gases are well-mixed, and where heavier molecules tend to occupy lower parts of the atmosphere due to gravitational separation.

But, still, what makes this part of our atmosphere so relevant, especially as it appears now that commercial air travel seems to want to use it as a guide point? Actually, regular airplanes can't travel this high, as their wings need air to move. The thinner the air, the faster it must move to generate enough lift to stay up (remember the SST?). Any craft higher, and a plane wouldn't be able to use lift to support itself.

But, why 100 km (62 miles)? Apparently, although Kármán calculated this limit to be 275,000 feet, or 84 kilometers, he decided on 100 kilometers, because he felt 100 kilometers would be an easier number to remember.

So, does this mean the private companies will utilize this Kármán Line as their constant travel goal, and not the exosphere? Apparently, only Virgin Galactic and Blue Origin know for sure.





# Planetary Nebula in Lyra: Messier 57: The Ring Nebula

by Glenn Chaple for LVAS

(Mag: 8.8, Size: 86" X 62")

Our August Observer's Challenge is M57, the "Ring Nebula," in Lyra. On the surface, this large and bright planetary nebula may not seem like much of a challenge. It's easily found midway between beta ( $\beta$ ) and gamma ( $\gamma$ ) Lyrae and is readily visible even in a common 60mm (2.4-inch) refractor. That said, there are two challenges offered by M57.

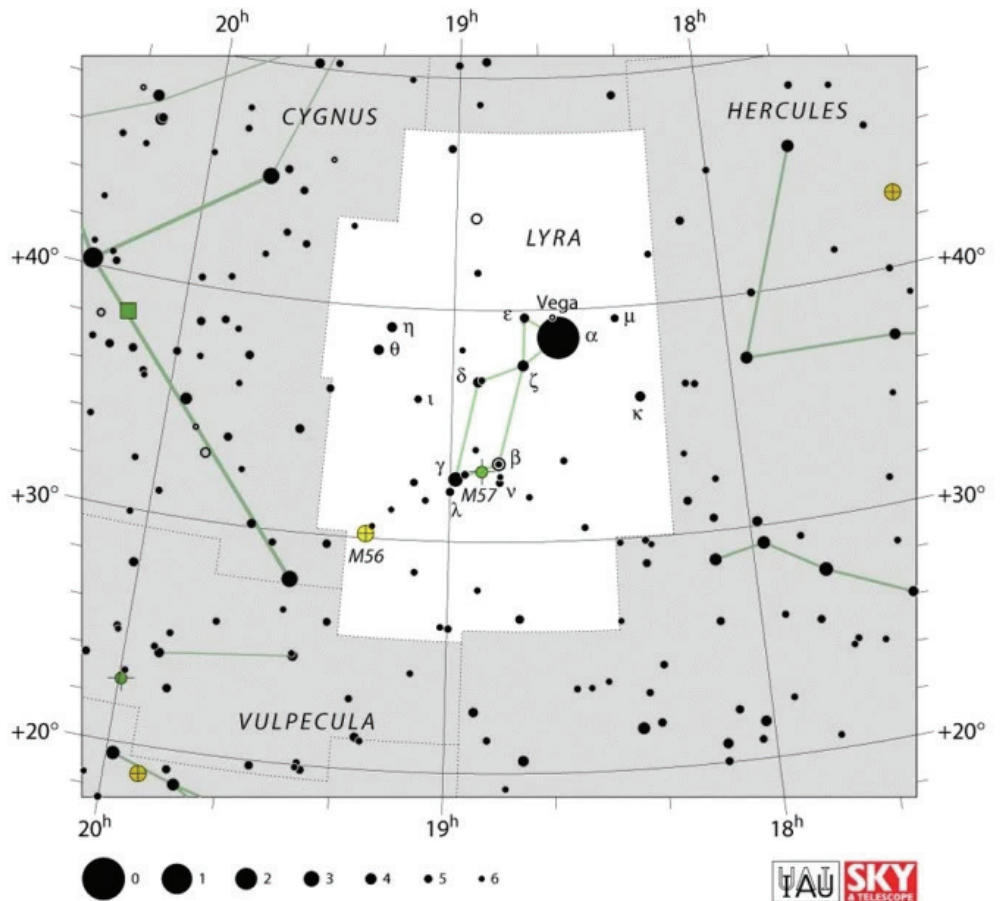
First is its annular aspect. In small-aperture scopes, M57 appears as an oval blob with no dark center. Larger instruments will reveal the dark inner region, hence the Ring itself. What is the smallest aperture that will show the "ring-ness" of M57?

The second challenge involves the visibility of M57's central star, which is said to shine at 15th magnitude but may be slightly variable. This is definitely a big scope target, although Sue French, in her book *Deep-Sky Wonders*, notes that it has been glimpsed in a 9-inch. Her recommendation is to wait for an evening of exceptional seeing and to use high magnification.

Because M57 is so easily located, I view it many times each summer – often at the onset of an observing session. I begin by centering my finderscope on a point midway between beta and gamma and then giving a slight nudge towards beta. A search with low-medium magnification (45-60X) will reveal an out-of-focus star. I then switch to high magnification (100-300X, depending on scope aperture and seeing conditions) for a closeup view.

There has been some confusion as to whether M57 was discovered by Charles Messier or his French contemporary Antoine Darquier de Pellepoix. A historical study in 2013 and published in 2017 indicated that M57 was found by Messier on January 31 1779, and observed by Darquier days later.

Distances to planetary nebulae are iffy at best. A recent measurement of the distance to the nebula's central star yielded a value of 2300 light years, The bright visual part of the Ring Nebula spans nearly a light year, while a faint surrounding halo, visible in an image taken by Mario Motta, more than doubles the nebula's size.



Left: Mario Motta, MD (ATMoB) 32-inch scope, SBIG STL1001E camera Red/green/blue imaging. Right: Mario Motta, MD (ATMoB) 32-inch scope, SBIG STL1001E camera. "M57-c is in NB (Ha/O3/S2) and it shows extended nebulosity you can not get any other way, but blocks the central star."

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone who is interested. If you'd like to contribute notes, drawings, or photographs, we'll be happy to include them in our monthly summary. Submit your observing notes, sketches, and/or images to Roger Ivester ([rogerivester@me.com](mailto:rogerivester@me.com)). To find out more about the Observer's Challenge or access past reports, log on to [rogerivester.com/category/observers-challenge-reports-complete](http://rogerivester.com/category/observers-challenge-reports-complete).

# Remembering Tina Huestis

by Joyce "JT" Towne, Sales Director, Spitz, Inc., former Assistant Producer, Charles Hayden Planetarium

Tina Pala Huestis passed away on June 5, 2021 at the age of 62.

Tina received a BA in anthropology from Franklin Pierce College in NH and worked at the Charles Hayden Planetarium (CHP), Boston, in the 1980s as the planetarium's registrar. She coordinated admissions for the annual Lowell Astronomy Lectures and student enrollment for various astronomy courses. She met her husband Dave Huestis, who was one of the course instructors, while working at the Charles Hayden Planetarium.

Tina presented some live shows under the dome and contributed to the planetarium's marketing efforts. She implemented radio promotions for planetarium shows, wrote articles for the Museum of Science membership's newsletter (i.e. article, "Seen Any Good Eclipses Lately?") and was a writer/editor for the popular planetarium show "Death Stars and Dinosaurs."

Tina commuted daily between Cape Cod and Boston. In 1982 she drove all the

way to Florida with a coworker to witness the launch of space shuttle STS-3. The museum arranged press credentials to allow the two members of the planetarium staff to view and photograph from an ideal vantage point and meet VIPs.

Tina developed a keen appreciation for astronomy, museum exhibitory and in-fotainment over her years at the museum while working closely with Assistant Planetarium Director Walter Webb, Planetarium Director John "Jack" Carr and other department staff.

In 1985, she left her position in the planetarium and went to work for two publishing houses and spent a number of years at METLIFE in Warwick, RI working as a Project Manager in the Product Marketing Dept.

Along with husband and fellow sky watcher Dave Huestis, Tina became an avid birdwatcher. The couple participated as members of Skyscrapers, Inc. at the Seagrave Memorial Observatory in Rhode

Island. Tina and Dave Huestis were married for almost 36 years and they traveled extensively in support of bird watching and observational astronomy.



## Astronomical League Update

by Jeff Padell, Skyscrapers ALCOR (Astronomical League Coordinator)

Dear Skyscrapers, I wanted to give everyone an update on my progress towards the "Open Cluster" award from the

Astronomical League. You need to observe 100 out of 125 specified open clusters. This can be visually or via imaging. I am working on the imaging award for open clusters. I have now made observations/images of 103 open clusters from the list, more than I need in case I was wrong on a few. I then put them into a free website I created to save astronomical images since the person checking over my work has to look at the images individually.

The link to my images follows so you can see that they don't have to be great works

of art, but just show the cluster. I will now begin to complete the paperwork I am required to provide for each cluster. <https://solarhead.shutterfly.com/alopenclusters>.

Do you want to get an Award? The Astronomical League has programs for all levels of astronomers from very basic/beginner to advanced amateur. There are programs that are visual but without scopes or binoculars, and there are more complex ones all the way up to radio astronomy.

A most important award is the Outreach Award. This can be earned by your participation as part of any of Skyscrapers outreach activities. Whether you are operating a telescope as a member of the Ob-

servatory Committee, greeting visitors or helping with any aspect of a Skyscraper Star Party or other outreach activities, you can qualify by logging in your hours to provide documentation to AL.

Among some of the intro programs are: Asterism Observing Program, Constellation Hunter Program, Lunar Observing Program, and Meteor Observing Program.

There are full descriptions of each program on the AL website.

Interested in finding something for you? Check out the AL Website for more information. [www.astroleague.org](http://www.astroleague.org)

Not an AL member? You can join at any time for \$7.50 on the Skyscraper Website.

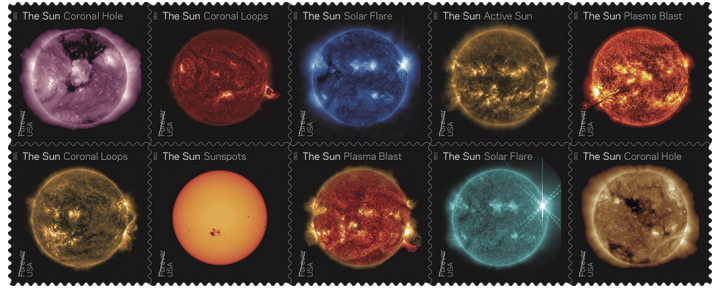
If you need some help or guidance, please feel free to contact me by email: [jeff-padell@gmail.com](mailto:jeff-padell@gmail.com)



### Monthly Presentation Videos on YouTube

With our monthly meetings going virtual this year, we have begun to record and publish, with permission, our monthly Zoom presentations on the Skyscrapers YouTube channel. Go to the URL below to view recent presentations.

<https://www.youtube.com/channel/UCEZ5UnO-Sly0DXsSrUAXONg>



## Astronomical League Update

by Greg Shanos

Dear Skyscrapers Members:

I too have completed two Astronomical League Awards recently, the Meteor Observing Program and the Mars Observing Award. The MARS Astronomy Club offers a free membership renewal for anyone who completes an AL award. Skyscrapers may consider doing the same. I find this is a great motivating factor.

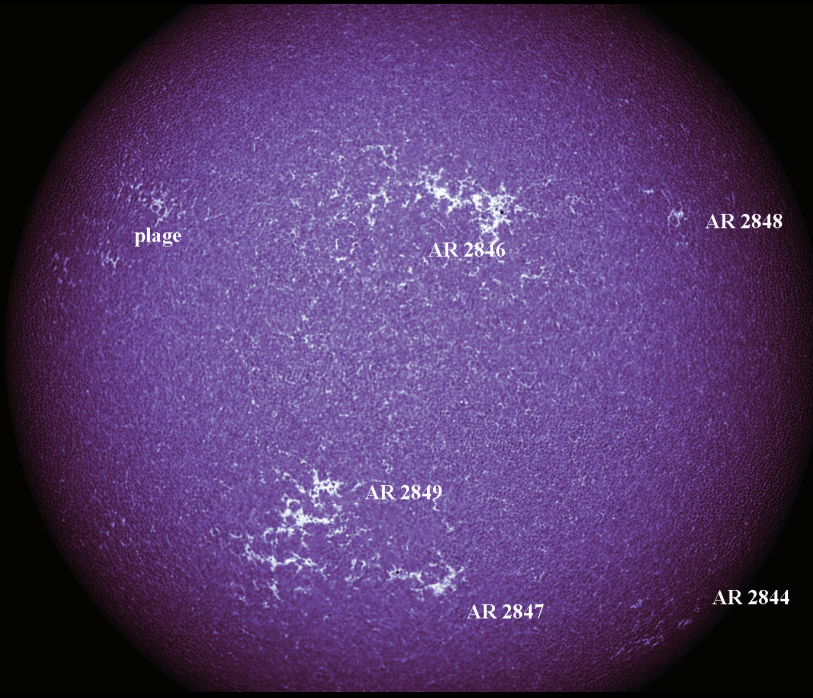
## Sun Science Stamps

by Bob Janus

The US Postal Service has issued a new set of forever stamps commemorating the contribution of Solar Dynamics Observatory with ten images of the Sun in multiple wavelengths. Read more at <https://www.nasa.gov/feature/goddard/2021/the-us-postal-service-to-issue-nasa-sun-science-forever-stamps>



Work In Progress: Tom Thibault (left), Jim Crawford (right) and Jim's son, Brian, have been replacing several of the T-111 panels on the roll-off sheds for the Meade 12 and 16 inch SCTs. During these sessions the trustees have also been present to help and regularly mow the observatory's "astro" turf.

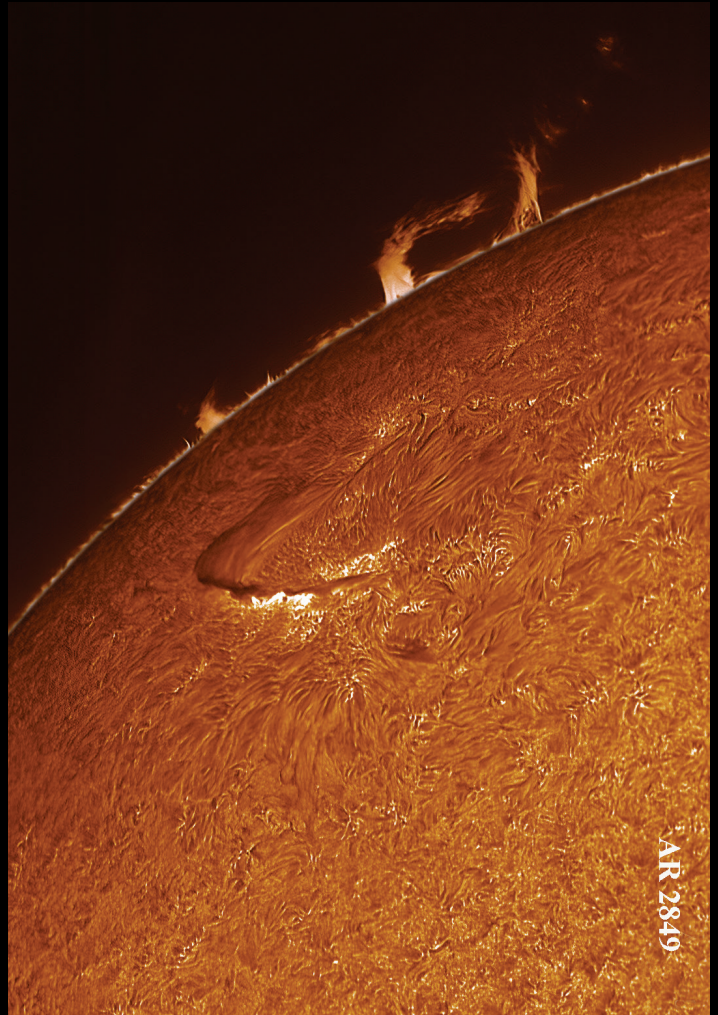


### Sun in CaK light

Sun at 11 am on July 26 in Calcium K. Taken with my Skywatcher 120ED, Lunt CAk module, ZWO ASI174mm by Jeff Padell

### Active Region 2849

Solar active region AR 2849 and proms on July 23. Lunt ED102, Quark Chromosphere, ZWO ASI174mm-cool 100 of 2,000 frames stacked on AR and Proms and combined in Photoshop by Jeff Padell



### Caldwell 17

Slooh 17" from Chile by Jeff Padell

### Caldwell 67



# STARRY SCOOP

Editor: Kaitlynn Goulette



## WHAT'S UP

This month marks the 40-year anniversary of the Voyager 2 flyby of Saturn. This spacecraft used its photopolarimeter, an instrument that had failed on Voyager 1, to give us a very high-resolution look at this planet. Voyager 2 also discovered many more ringlets and took detailed photos of Saturn's rings and moons.

As Earth's journey around the sun continues, the spring constellations are gradually disappearing below the western tree line. About 15 degrees above the southern horizon, you can spot the Teapot, a well-known asterism in the constellation Sagittarius. This star grouping is located in the direction of the center of our galaxy. In this area, there are countless deep-sky objects such as nebulae and star clusters, some of which are even visible to the unaided eye from dark-sky sites. Meanwhile, the autumn constellations are rising above the eastern horizon as they prepare to dominate the sky in the months to come.

Throughout the entire month, you will be able to find both Jupiter and Saturn shining brightly in the evening sky. The nearly full moon joins them on the 20th and 21st. These two planets both reach opposition this month, which is when they make their closest approaches to Earth. This is the best time to observe them and is also when they are at their brightest. An opposition occurs when the earth is directly between the sun and a superior planet. Because of this, Mercury and Venus, both inferior planets, can never be at opposition.

The Perseid meteor shower runs annually from July 17th to August 24th and peaks this month on the 12th and 13th. This shower is

one of the best to observe, producing up to 60 meteors an hour. The meteors radiate from the constellation Perseus but can be seen anywhere in the sky. The Perseids are best seen from a dark place after midnight.

## AUGUST'S SKY

**2: Saturn at Opposition**

**8: New Moon**

**12-13: Perseid Meteor Shower Peak**

**19: Jupiter at Opposition**

**22: Full Moon, Blue Moon**



Credit: Roger B. Culver

Hold star map above your head and align with compass points.

# OBSERVATIONS

Having recently nursed my fractured leg back to health, I made several attempts to observe. But, with the stormy weather pattern in the northeast and the smoke-filled skies, I haven't had much luck. One particular evening, with smoke saturating the atmosphere, the moon was shining with a very noticeable shade of orange. So instead of dragging out my telescope, I took some photos of this eerie sight using a tripod-mounted camera.

Rich Nugent, president of the Amateur Telescope Makers of Boston, has been making use of his "Swift 831" 80mm refracting telescope. This telescope can be set up and taken down very quickly, which allows him to observe whenever a clearing appears overhead. He has recently been focusing his attention on the lunar terminator, which is the line dividing day and night on the moon.

Rich has also been observing Venus, which is our "Evening Star" and shines brightly in the western sky after sunset. Using a different approach, he often enjoys observing Venus in the daytime. He explained that the easiest way to do this is to use the moon as a reference when it's near the planet. However, you must be very cautious to never view the sun directly, especially if you're using binoculars or a telescope.



The purpose of the Starry Scoop is to communicate current astronomy and space events. If you want to share your observations or get digital copies of the Starry Scoop, contact [starryscoop@gmail.com](mailto:starryscoop@gmail.com). The Starry Scoop is now on Facebook. Clear skies!

# OBJECT OF THE MONTH

The featured object for this month is the Eagle Nebula, designated Messier 16. This emission nebula is 7,000 light-years away and features an open star cluster embedded within it. The cluster is made up of more than 8,000 stars and is estimated to have formed about 5.5 million years ago. The Eagle Nebula is famous for its "Pillars of Creation." This feature sits at the heart of the nebula and is part of an active star-forming region.

The Eagle Nebula can be found about 15 degrees above the Teapot asterism, which is part of the constellation Sagittarius. Be mindful that this region is crowded with many objects. You'll need a small telescope to view the star cluster while an 8-inch-aperture telescope or larger is required to observe the nebula. Good luck!



Eagle Nebula  
Photo by: TJ Connolly



"Orange" Moon  
Photo by: Richard Sanderson



# AstroAssembly 2021

Saturday, October 2 at Seagrave Memorial Observatory

47 Peeptoad Road North Scituate, Rhode Island

AstroAssembly returns to Seagrave Observatory in 2021 with an in-person event dedicated to the memories of Ed Turco, Tina Huestis, and other members of the Skyscrapers family who have recently passed.

## All day Saturday at Seagrave Observatory

Poster Session, Swap Table (please bring your own table), Solar Viewing, Astrophotography Contest, Homemade Telescopes (bring yours!), Famous Astro Bake-off Contest.

## 2:30 PM James Head, Brown University

Increasing Science Capabilities in the Apollo Lunar Exploration Program: Perspectives for Artemis

## 3:45 PM Avi Loeb, Harvard-Smithsonian Center for Astrophysics

Extraterrestrial Life: Are We the Sharpest Cookies in the Jar? This presentation will be via Zoom.

## 5:30 PM Dinner Break

Dine on your own at a local restaurant. A list of suggestions will be available.

## 7:30 PM Observing at Seagrave Memorial Observatory

The observatory's telescopes will be available for observing, or set up your own telescope on the grounds.

## 10:30 AM Dedication of Memorial Garden

## 11:00 AM Al Hall, Skyscrapers, Inc.

Remembering Ed Turco, Telescope Maker

## 12:00 PM Boxed Lunch from D'Angelo Grilled Sandwiches

Five options, pre-registration required

## 1:00 PM Rick Lynch, Skyscrapers, Inc.

Remembering the Life of Leslie Peltier

Times of specific activities are subject to change. For up-to-date program information, visit our website: <http://www.theskyscrapers.org/astroassembly2021>. Astrophoto contest submissions must be sent prior to AstroAssembly. See <http://www.theskyscrapers.org/astroassembly-2021-photo-contest> for more information.

\_\_\_ Registrations x \$25 each = \$ \_\_\_\_\_

Name(s) \_\_\_\_\_

\_\_\_ Registrations (Skyscrapers member) x \$20 each = \$ \_\_\_\_\_

\_\_\_ Registrations (youth under 18) \_\_\_\_\_ Free \_\_\_\_\_

\_\_\_ Boxed Lunch \* x \$10 each = \$ \_\_\_\_\_

\_\_\_ Italian Grinder

\_\_\_ Ham & Cheese Grinder

\_\_\_ Turkey & Cheese Grinder

\_\_\_ Garden Salad Dressing \_\_\_\_\_

\_\_\_ Caesar Salad Dressing \_\_\_\_\_

Total = \$ \_\_\_\_\_

Email (required) \_\_\_\_\_

Register online:



- or -

Send completed form and check (Made payable to Skyscrapers, Inc.) to:

Linda Bergemann  
41 Ross Hill Road  
Charlestown, RI 02813-2605

\* Lunch from D'Angelo Grilled Sandwiches. Chips, drink and cookie/brownie included. Grinders come with lettuce, tomato and cheese. Condiments and extras will be available. Salad dressings: Italian, Light Balsamic Vinaigrette, Honey Mustard, Blue Cheese, Greek, Caesar and Ranch.

# Directions to Seagrave Memorial Observatory

## From the Providence area:

Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

## From Coventry/West Warwick area:

Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

## From Southern Rhode Island:

Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

## From Northern Rhode Island:

Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

## From Connecticut:

- Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
- or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

## From Massachusetts:

Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.



47 Peeptoad Road  
North Scituate, Rhode Island 02857