NIGHTFALL

A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

JULY 2023

DEAN FRAZEUR – SPEAKER AT THE JULY HAC MEETING

Dean Frazeur will be speaking on the subject: "Investigating the Impossible: A JWST Mystery"

Ask him “who are you?”, you would get this ½ minute response:

Professional Experience: Dishwasher, production line worker, business supervisor, community college teacher, counselor, consultant, public speaker, and lead pastor (twenty-five + years). Non-retired/Non-monetary rewarded.

Educational Experience: Multiple college and seminary degrees with professional certifications, including doctorate in Family Dynamics.

Familial Experience: Wonderful Wife — Carol, faithful K-9 companion — Zoe the Malinois, 36 fish — mostly unnamed, and a host of friends, too numerous to list.

Astronomical Experience: Sixty-three years minus a short hiatus of fifty-nine years. Current collection of telescopes — Little Red (RedCat 51), Middle Child (WO GT81), and Big Boy (Celestron 11” with HyperStar). Wonderful Wife says, “No more!”

Avocational Experience: Reading, Writing, Arithmetic, Figuring out the Universe and ‘Life’ (Incomplete) and Old Dogs* (yes, like me), (*Board of Directors, Friends of the S.V. Animal Shelter)

Conversation Topic: Down the “Rabbit Hole” Latest Puzzler from JWST — Glass-z12

IDA SOUTHERN ARIZONA CHAPTER

There is an effort underway to re-ignite the Southern Arizona Chapter of the International Dark Sky Association (IDA). There is a need for representation from Cochise County. There will be a meeting in July (details to be announced) of interested parties. Are you willing to expend some energy to help protect our night sky? Contact Ted Forte (tedforte511 at gmail. Dot com) and he will put you in touch with Emilio Falco, formally of the Smithsonian/ Whipple Observatory, who is one of the organizers. This could be your chance to make a difference.

HAC MEMBERSHIP

For the first time in 10 consecutive months, we have no new members to introduce. The club remains healthy with a full roster, but we always have room for more friends. Do you have a friend, neighbor or colleague who has shown an interest in astronomy but is not a member? Why not speak to them about joining the club? We learn from each other so expanding our membership enriches us all. It also strengthens our club, expands our clout in the community, and brings us new allies in the fight to preserve our dark skies.

HACASTRO GROUP ON GROUPS.IO

Are you on the group? The HACAstro group is how we keep in touch with members. On the group, you’ll find schedule reminders, observing opportunity alerts, club and astronomy news, astrophotos and observing reports and a place where you can ask and answer questions about astronomy, telescopes, observing and space science. The calendar on HACAstro is where we maintain our schedule of events.

To join the group, send an email to main+subscribe@HACAstro.groups.io or contact Ted Forte (tedforte511@gmail.com) and he’ll send you an invitation that you can click. Once there you can select to receive individual email, digests, special notices or no email. You can post or read messages from your email server or from the home page at https://hacastro.groups.io/g/main. It is a good way to stay informed and be more involved with your club. Don’t miss out, join today.

SAVE THE DATE – DINE UNDER THE STARS

This year’s Dine Under the Stars scholarship fundraiser for the University South Foundation is Saturday, September 23 from 6 to 9 p.m. The foundation is the owner of the Patterson Observatory and has enjoyed a long symbiotic relationship with HAC. The event includes dinner by Mimosa Pizzeria and music by Desert Fever. There will be a silent auction as well

as a live auction. Live auction items include a “ride-along” with Sheriff Mark Dannels and a half grass-fed steer from Hangar Ranch. The Emcees for the event are Jeff Davenport and Sheriff Mark Dannels.

The Patterson Observatory will be open during the event which is held in a Marquee Tent adjacent to the observatory. Viewers will be treated to views of a first quarter moon, Saturn and Jupiter. Adult tickets are $65 and all proceeds go toward providing scholarships to UArizona students attending classes in Cochise County.

We hope that all HAC members will support the event by purchasing a ticket and attending, donating items for the silent auction, or by operating a telescope at the Patterson. Tickets will go on sale 1 August. See https://www.usfaz.org

HAASP Observatory: Kartchner

As feared, the administrators in Phoenix have inserted themselves into the observatory project process and the previously discussed plans are now moot. Local park personnel are now trying to restart the planning process. The end product will no doubt be less ambitious. At this point we have nothing on the drawing board.

Outreach on Hold

As is our practice every year, we do not schedule Patterson Public Nights or Solar Saturday’s during the monsoon months of July and August. We also try not to schedule other outreach activities either. We will pick up again with a busy schedule in September.

President’s Exploration July 2023

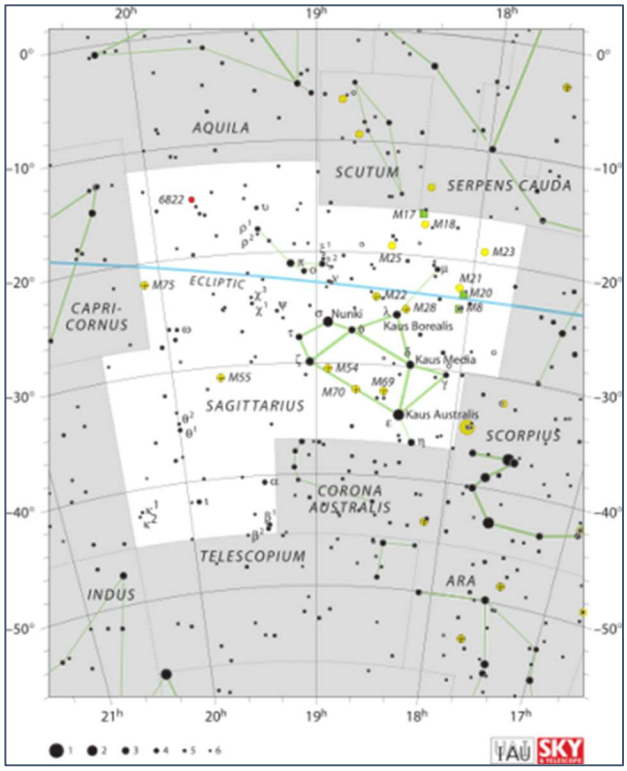
Let’s, this month, look at a constellation near the southern horizon: Sagittarius.

Sagittarius is one of the constellations of the zodiac and is located in the Southern celestial hemisphere. It is one of the 48 constellations listed by the 2nd-century astronomer Ptolemy and remains one of the 88 modern constellations. Its name is Latin for "archer". Sagittarius is commonly represented as a centaur drawing a bow.

The center of the Milky Way lies in the westernmost part of Sagittarius. As seen from the northern hemisphere, the constellation's brighter stars form an easily recognizable asterism known as "the Teapot” These same stars originally formed the bow and arrow of Sagittarius.

To complete the teapot metaphor, under good conditions, a particularly dense area of the Milky Way can be seen rising in a north-westerly arc above the spout, like a puff of steam rising from a boiling kettle.

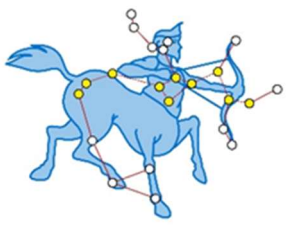
The constellation as a whole is often depicted as having the rough appearance of a stick-figure archer drawing its bow, with the fainter stars providing the outline of the horse's body. Sagittarius famously points its arrow at the heart of Scorpius (the scorpion), represented by the reddish star Antares, as the two constellations race around the sky. Fittingly, Gamma2 Sagittarii is Alnasl, the Arabic word for "arrowhead", and Delta Sagittarii is called Kaus Media, the "center of the bow", from which the arrow protrudes.



Sagittarius is one of the prominent features of the summer skies in the northern hemisphere although in Europe, north of the Pyrenees, it drags very low along the horizon and can be difficult to see clearly. In Scotland and Scandinavia it cannot be seen at all. In southern Brazil, South Africa, and central Australia (30° south), Sagittarius passes directly overhead. It is hidden behind the Sun's glare from mid-November to mid-January and is the location of the Sun at the December solstice. By March, Sagittarius is rising at midnight. In June, it achieves opposition and can be seen all night. The June full moon appears in Sagittarius.

In classical antiquity, Capricorn was the location of the Sun at the December solstice, but due to the precession of the equinoxes, this had shifted to Sagittarius by the time of the Roman Empire. By approximately 2700 AD, the Sun will be in Scorpius at the December solstice.

The Babylonians identified Sagittarius as the god Nergal, a centaur-like creature firing an arrow from a bow. It is generally depicted with wings, with two heads, one panther head and one human head, as well as a scorpion's stinger raised above its more conventional horse's tail. The Sumerian name Pabilsag is composed of two elements: Pabil, meaning 'elder paternal kinsman' and Sag, meaning



'chief, head'. The name may thus be translated as the 'Forefather' or 'Chief Ancestor'.

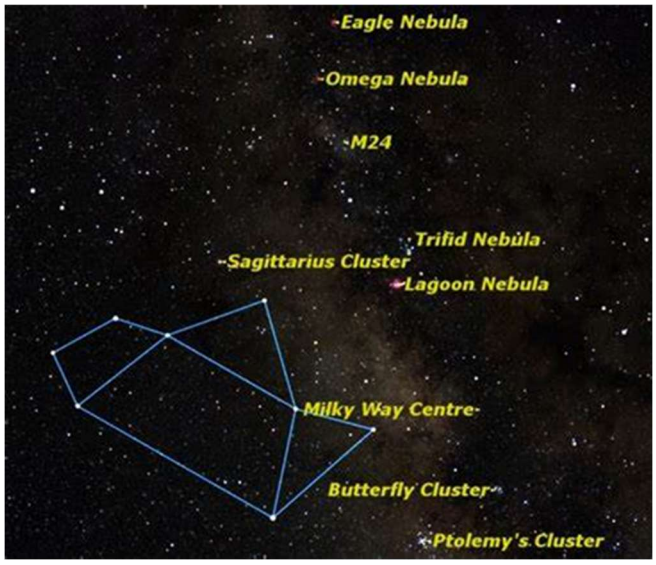
In Greek mythology, Sagittarius is usually identified as a centaur: half human, half horse. However, perhaps due to the Greeks' adoption of the Sumerian constellation, some confusion surrounds the identity of the archer.

A competing mythological tradition, as espoused by Eratosthenes, identified the Archer not as a centaur but as the satyr Crotus, son of Pan, who Greeks credited with the invention of archery. According to myth the Muses, requested that Zeus place him in the sky, where he is seen demonstrating archery.

The arrow of this constellation points towards the star Antares, the "heart of the scorpion", and Sagittarius stands poised to attack should Scorpius ever attack the nearby Hercules, or to avenge Scorpius's slaying of Orion.

The Milky Way is at its densest near Sagittarius, as this is where the Galactic Center of our galaxy lies. As a result, Sagittarius contains many star clusters and nebulae.

Sagittarius contains two well-known “star clouds”, both considered fine binocular objects. The Large Sagittarius Star Cloud is the brightest visible region of the Milky Way. It is a portion of the central bulge of the galaxy seen around the thick dust of the Great Rift, and is the innermost galactic structure that can be observed in visible wavelengths. It has several embedded clusters and superimposed dark nebulae. And the Small Sagittarius Star Cloud, (Messier 24), has an apparent magnitude of 2.5. The cloud fills a space of significant volume to a depth of 10,000 to 16,000 light-years. Embedded in M24 is NGC 6603, a small star cluster that is very dense. NGC 6567, a dim planetary nebula, and Barnard 92, a Bok globule, are also nearby.



The prominent nebulae located in the Sagittarius constellation include the Trifid Nebula, the Horseshoe Nebula, and the Lagoon Nebula. The Lagoon Nebula (M8) is an emission nebula that is located 5,000 light-years from Earth and measures 140 light-years by 60 light-years. The Lagoon Nebula was discovered independently by John Flamsteed in 1680, Guillaume Le Gentil in 1747, and Charles Messier in 1764. The central area of the Lagoon Nebula is also known as the Hourglass Nebula, so named for its distinctive shape. The Hourglass Nebula has its shape because of matter propelled by Herschel 36. The Omega Nebula is a fairly bright nebula, sometimes called the Horseshoe Nebula or Swan Nebula. It has an integrated magnitude of 6.0 and is 4890 light-years from Earth. It was discovered in 1746 by Philippe Loys de Chésaux; observers since him have differed greatly in how they view the nebula, hence its myriad of names: a checkmark, a swan, a loon and a curl of smoke. The Trifid Nebula (M20, NGC 6514) is an emission nebula in Sagittarius that lies less than two degrees from the Lagoon Nebula. Discovered by French comet-hunter Charles Messier, it is located between 2,000 and 9,000 light-years from Earth and has a diameter of approximately 50 light-years.

In 1999 a violent outburst at V4641 Sgr was thought to have revealed the location of the closest known black hole to Earth, but later investigation increased its estimated distance by a factor of 15. Although not visible to the naked eye, Sagittarius A*, the center of the Milky Way, is located off the top of the spout of the Teapot asterism.

The space probe New Horizons is moving on a trajectory out of the Solar System as of 2016 that places the probe in front of Sagittarius as seen from the Earth. New Horizons will exhaust its radioisotope thermoelectric generator long before it reaches any other stars.

Hopefully over the next month as Sagittarius rises higher in the sky you will get a chance to see the “Teapot” and look toward the center of our galaxy.

The Bucket List –July 2023

by Vince Sempronio

This column highlights interesting non-seasonal nighttime, and sometimes daytime sky events that the reader may not be aware of and may wish to observe. I’ll cover one-off events that are special, rare, or uncommon.

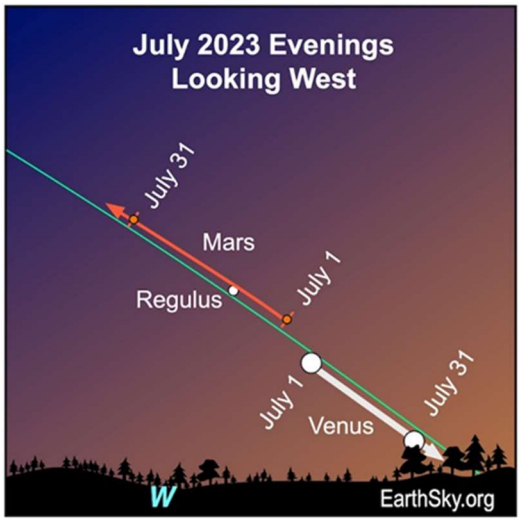
TERM OF THE MONTH

Collimation vs Culmination. These two terms sound nearly the same but have very different definitions. Anyone with a Newtonian or SCT telescope is familiar with collimating their telescopes. This is the process of aligning the optical axes of the mirror and lenes of a telescope. The second term, culmination has nothing directly to do with telescopes. It refers to the instant when an astronomical object crosses an observer’s local meridian. The meridian is better known as imaginary line that runs from north to south, crossing the celestial poles. Knowing this time is helpful when navigating, especially at sea. The term is also used when polar aligning a telescope, when it is helpful to know the time when Polaris crosses the meridian. So, once your telescope is collimated,

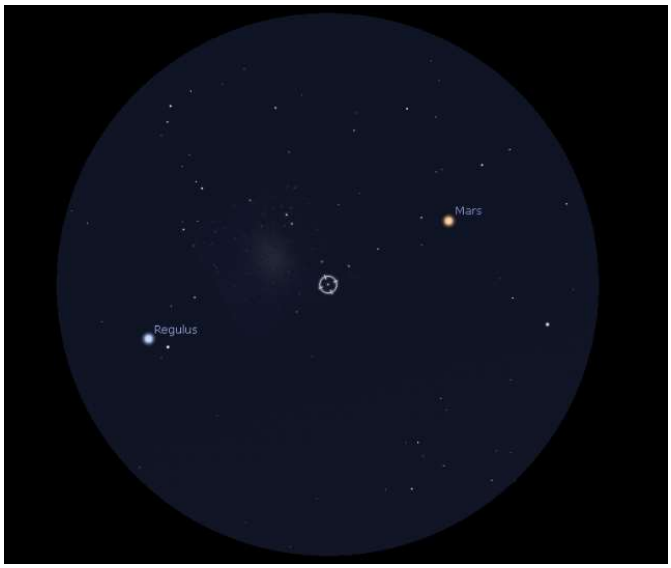
you can wait for your favorite object to culminate so it will be as high in the sky as possible.

IN THE SKY

Looking towards the West this month after sunset, we can witness the end of the celestial courtship between Mars and Venus. In the spring, as Venus entered the evening sky from behind the Sun, the two have been slowly getting closer and closer each day, but alas, on the 1st, they begin to separate. On the 7th, Venus will be at its maximum brightness, shining at magnitude -4.7. The two planets won't be this close together again until February 22nd of 2024.



July 9th, 8:30pm – Mars passes close to the star Regulus. Appearing like a very wide double star, Mars (very red) and Regulus (blue) are very close in magnitude with Mars at +1.7 and Regulus at +1.35. Between them is the Leo I dwarf galaxy located 820,000 lys away. It is part of our local group of galaxies and might be a satellite of the Milky Way. It is very elusive at magnitude +11.2 because of its proximity in the sky to Regulus. It is shown in this rendering for educational purposes only, but if you have a light bucket, feel free to try to observe it. The view is shown for a 5" SCT with a 30mm Plossl eyepiece.



On the evening of the 19th, Mars and the star Regulus will form a striking pair in the west after sunset. They will be separated by about 45', and as it gets darker, the color contrast (red/blue) between them should be noticeable.

July 28th, 7:30pm – Conjunction of Mercury and the star Regulus. This is a very difficult event because Mercury is close to the horizon, 13 degrees in the west at the time given. If you have a very low western horizon, then you'll have a better chance of seeing these two objects. Mercury is magnitude zero and Regulus is +1.3, so a telescope is a must. Venus is lower and slightly to the left which might be used to find Mercury. At the given time, the two will be 11' apart. Good luck with this one.

REMEMBERING THE MONTH OF JULY

Remembering important astronomy and space historical dates that happened in the month of July.

1st, 2004 – The Cassini Huygens spacecraft successfully achieved orbit around Saturn

4th, 1054 – A supernova was observed in what is now called the constellation Taurus. We now refer to this supernova as the Crab Nebula.

5th, 1687 – Isaac Newton publishes his magnum opus, the Philosophiæ Naturalis Principia Mathematica , more simply known as the Principia, a book that describes his laws of motion and universal gravitation.

7th, 1959 (14:28 UT) – A rare occultation of the planet Venus and the star Regulus. This rare event was used to determine the diameter of Venus and the structure of the Venusian atmosphere.

10th, 1962 – The world's first communication satellite, Telstar, was launched into orbit.

14th – The Mariner 4 spacecraft's flyby of Mars takes the first close-up photos of another planet.

15th-22nd – Comet Shoemaker-Levy 9 collides with Jupiter, creating the now iconic string of impacts.

16th, 1746 – Birthdate of Giuseppe Piazzi, an Italian astronomer and the topic of this month's trivia question (see below).

21ST – Neil Armstrong and Edwin "Buzz" Aldrin become the first men to set foot on the Moon.

26th, 1963 – The world's first geosynchronous satellite, Syncom 2, launched from Cape Canaveral on a Delta B booster rocket.

TRIVIA QUESTION OF THE MONTH

Mentioned above, Italian astronomer Giuseppe Piazzi is famous for the discovery of an object on January 1st, 1801. This object was the first of its kind and was named after the Roman goddess of agriculture. What is the name of this object?

Credits: Unless otherwise credited, all graphics were generated by the author using Stellarium.

NASA Night Sky Notes July 2023

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.org to find local clubs, events, and more!

Find A Ball of Stars

Linda Shore, Ed.D

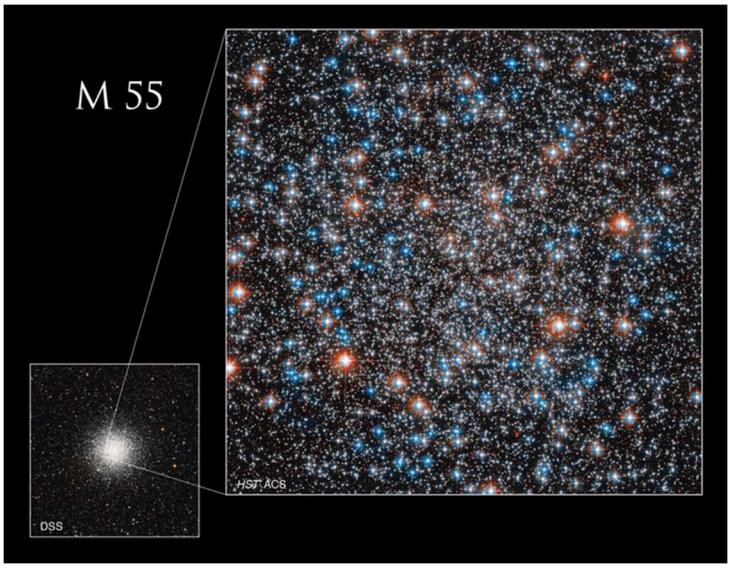
French astronomer Charles Messier cataloged over 100 fuzzy spots in the night sky in the 18th century while searching for comets – smudges that didn't move past the background stars so couldn't be comets. Too faint to be clearly seen using telescopes of the era, these objects were later identified as nebulas, distant galaxies, and star clusters as optics improved. Messier traveled the world to make his observations, assembling the descriptions and locations of all the objects he found in his Catalog of Nebulae and Star Clusters. Messier's work was critical to astronomers who came after him who relied on his catalog to study these little mysteries in the night sky, and not mistake them for comets.

Most easily spotted from the Southern Hemisphere, this "faint fuzzy" was first cataloged by another French astronomer, Nicholas Louis de Lacaille in 1752 from Southern Africa. After searching many years in vain through the atmospheric haze and light pollution of Paris, Charles Messier finally added it to his catalog in July of 1778. Identified as Messier 55 (M55), this large, diffuse object can be hard to distinguish unless it's well above the horizon and viewed far from city lights.

But July is great month for getting your own glimpse of M55 – especially if you live in the southern half of the US (or south of 39°N latitude). Also known as the "Summer Rose Star," M55 will reach its highest point in northern hemisphere skies in mid-July. Looking towards the south with a pair of binoculars well after sunset, search for a dim (mag 6.3) cluster of stars below the handle of the "teapot" of the constellation Sagittarius. This loose collection of stars appears about 2/3 as large as the full Moon. A small telescope may resolve the individual stars, but M55 lacks the dense core of stars found in most globular clusters. With binoculars, let your eyes wander the "steam" coming from the teapot-shaped Sagittarius (actually the plane of the Milky Way Galaxy) to find many more nebulas and clusters.

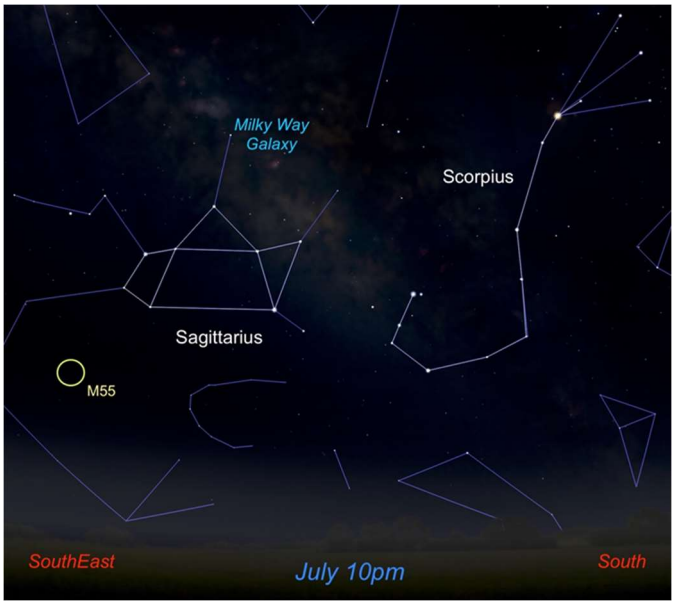
As optics improved, this fuzzy patch was discovered to be a globular cluster of over 100,000 stars that formed more than 12 billion years ago, early in the history of the Universe. Located 20,000 light years from Earth, this ball of ancient stars has a diameter of 100 light years. Recently, NASA released a magnificent image of M55 from the Hubble Space Telescope, revealing just a small portion of the larger cluster. This is an image that Charles Messier could only dream of and would have marveled at! By observing high above the Earth's atmosphere, Hubble reveals stars inside the cluster impossible to resolve from ground-based telescopes. The spectacular colors in this image correspond to the surface temperatures of the stars; red stars being cooler than the white ones; white stars being cooler than the blue ones. These stars help us learn more about the early Universe. Discover even more: https://www.nasa.gov/feature/goddard/2023/hubble-messier-55

The Hubble Space Telescope has captured magnificent images of most of Messier's objects. Explore them all: https://www.nasa.gov/content/goddard/hubble-s-messier-catalog/



The large image shows just the central portion of M55 taken by the Hubble Space Telescope. Above Earth's atmosphere, this magnificent view resolves many individual stars in this cluster. How many can you count through binoculars or a backyard telescope?

Original Image and Credits: NASA, ESA, A. Sarajedini (Florida Atlantic University), and M. Libralato (STScI, ESA, JWST); Smaller image: Digital Sky Survey; Image Processing: Gladys Kober



Look to the south in July and August to see the teapot asterism of Sagittarius. Below the handle you'll see a faint smudge of M55 through binoculars. More "faint fuzzies" can be found in the steam of the Milky Way, appearing to rise up from the kettle.

Image created with assistance from Stellarium: stellarium.org

In The Shadow Of Three Asteroids

By Vince Sempronio

I'm not sure when the next opportunity will present itself for three or more, but I will certainly be waiting anxiously for when it does.

Last year, on the 3rd of June, I attempted to observe three asteroid occultation events during the same evening (dusk to dawn). This was an ambitious attempt since each of the events occurred in different locations. The first was near Sonoita, the second near Kartchner Caverns, and the third from my home in Sierra Vista. Luckily, each of the events were separated in time by at least 2 hours, so logistically it could work out. For each event I needed to drive to the location, set up my equipment, record the event, pack up everything, and drive to the next location. A lot could go wrong.

Well, to make a long story short, I only scored two positive (successful) events with the third being a miss (the asteroid did not pass in front of the star from my observing location). My attempt made me wonder, how many occultations can be observed in the same night? Have others successfully observed three or more? More on that later.

Fast forward to the afternoon of Saturday, June 24th,2023. I was planning for the upcoming observation of an occultation the next night of a 14th magnitude star in Sagittarius by the 13.3 magnitude asteroid (86) Semele. While checking additional information about the event, I noticed a couple of other potential events the same night, but neither of them were visible from my home site. The two events though, crossed paths over Kartchner Caverns State Park. This is one of my frequent observing sites for occultations as it is right across highway 92 from Kartchner. Looking back to the first event, I found that it too passed over Kartchner. This was a great opportunity. I once again had the chance to observe three events on the same evening, but this time, all three would be from the same location.

The second event was of asteroid (104) Klymene at magnitude 13.9 occulting a 12.3 magnitude star in Ophiuchus. The third event was asteroid (1330) Spiridonia at magnitude 15.1 occulting a 12.5 magnitude star in Aquila. All three asteroids are fair sized, and their paths on the ground ranged between 88-185km. This was the major factor in the coincidence of all of their path's crossing.

All three events were within range of my Celestron 8" SCT, so I this was going to be an opportunity I couldn't pass up. Drive once, set up the scope once, observe three times, and I'm done. Well, once again, I overlooked another pertinent detail, one which would require me to change my plans.

It turned out that the time between the second and third events was only 7 minutes. That was a problem. Normally, when I'm observing a single event, I like to schedule at least 10-15 minutes to acquire the target star in the field of view (FOV) of the recording camera. Although the "goto" capability of my scope is pretty good, it isn't perfect, and in the worst-case scenario I may need to completely realign the telescope. To make matters worse, the 7 minutes is shorter when you consider there is an additional 1-minute recording before and after an event. What to do, what to do.

After juggling all the possible solutions, I decided that the best solution was to use two telescopes. In addition to my CPC800 scope, I would bring a C8 OTA on an Evolution mount. This is the setup I usually use for public night events. Even though there was only 7 minutes between the second and third events, there was 2.5 hours between the first event and the second. I could use that extra time to set up the additional scope.

The plan came down to using a separate camera on each scope, so after the second event, I would only have to swap the video cable from extra camera to the recording equipment. The long delay between the first and second events provided ample time to set up the second scope and get it ready for the third event.

I arrived at the observing site near Kartchner around

8:45pm, 45min prior to the (86) event. I set up the CPC800 as I would for any event. I'll leave out the entire alignment specifics, but suffice to say, I'm able to do the entire alignment procedure without the use of an eyepiece; I use the camera and a Telrad for the entire process.

It was hot that Sunday with high temps pushing 100F/40C during the day, and the nighttime temp was around 85F/30C all evening. There was a slight breeze at the observing site, but nothing strong enough to be a concern.

I was set up for the (86) event and on target with 19 minutes to spare. Since there was over 2 hours till the next event, I waited until after the first event was completed before setting up the second scope.

The (86) event came and went, but I was unable to detect the 0.4 magnitude drop on the screen during the recording, so I was already wondering if the chance to get three events was going to happen after all.

After (86), I moved the CPC scope to the FOV of the third (1330) event and then began to set up the second scope. The Evolution mount drive incorporates worm gears on both axes, as does the CPC. I find it to be as accurate as the CPC, but the single fork arm isn't as steady. I acquired the FOV for the third (104) event and tweaked the settings on the backup camera.

After both scopes were on target, I still had 2 hours to wait. Most of my time was spent wondering if there was a Mountain Lion hiding in the bushes waiting to ambush me LOL.

The photo shows the set-up of the two scopes and my laptop. The black bags have 12V batteries. The battery under the laptop had a small inverter attached to top-off the laptop battery as well as keeping the internal battery of the Evolution mount fully charged.

While I waited, every 30 minutes I swapped the video cables to check that both scopes were still on their respective target fields.

All was going well (cue dramatic music), until 10 minutes before the second event when I once again checked each camera's FOV. The camera on the Evolution (second event) was fine, but the FOV on the CPC800 (third event) was not right. Whatever it was displaying was NOT the FOV of where it was supposed to be. I checked for power cable issues, but everything seemed to be working correctly. The only thing I could think of was that the tripod had shifted slightly on the hardpack gravel surface. It would not have to move much to move the FOV away from the target area. I panicked since I knew I wouldn't have time to do a complete realignment, and I definitely didn't want to lose both upcoming events, so I decided to take the chance that if I tried another GoTo to the target star, I might get lucky. If it didn't work, I would just swap the video cable and record the second event and the third would be tossed out.

Using the Celestron "Precision GoTo" option on the hand controller, I entered the RA and Dec of the target star. The scope recommended the same Sync star as it had before, and I hit the "Enter" button. As the scope slewed to the sync star, I knew that if I could center the star there was a good chance that the scope would be aligned close enough to keep the target star centered for the few remaining minutes. Luckily, I saw the Sync star cross the FOV and it stopped near the edge. Whew. I centered it, hit "Enter" again and a few seconds later, the target star was back on the screen!

I still had a few minutes to spare before the beginning of the second event, so I watched the screen looking for any tracking issues. Satisfied, I swapped the video cable so that the second event could be recorded.

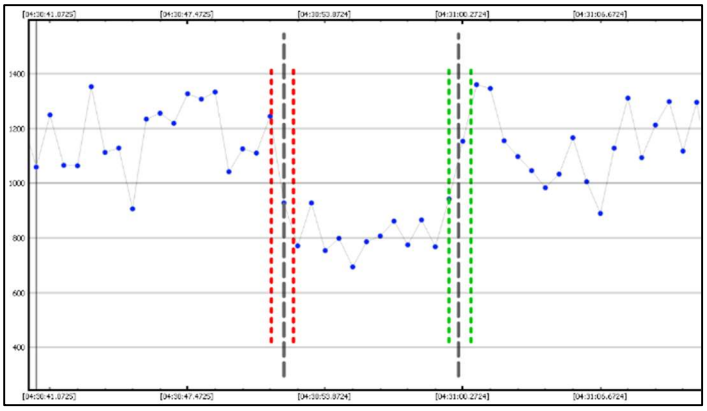
I normally make a 2-minute recording, starting a minute before and ending a minute after the event. I extend this when the duration of the event is long, but for 10 seconds or less events, I stick with my base method.

Watching the second event on the screen, I saw the star disappear and as soon as the recording was done, I quickly swapped the video cable back to the CPC and was relieved that the target star was still there. The third event was also a success; the star disappeared right on time.

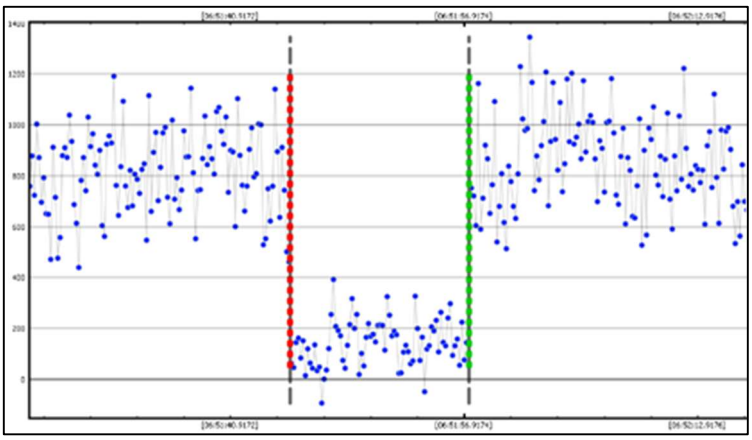
I packed up, which took longer because of the second scope. I made it home by 1:00am and though I was very tired, I just had to know if the first event was a success. I started the video analysis software (PYMOVIE) and configured the target and tracking apertures. I felt hot and dusty so took a shower while it processed, and by the time I got back to the computer, PYMOVIE was finished. I saved the light curve and launched the light curve processing software (PYOTE). There, hiding in the data was a slight dip near the center time of the event. I configured PYOTE and low and behold it found a nice 8.1 second event!

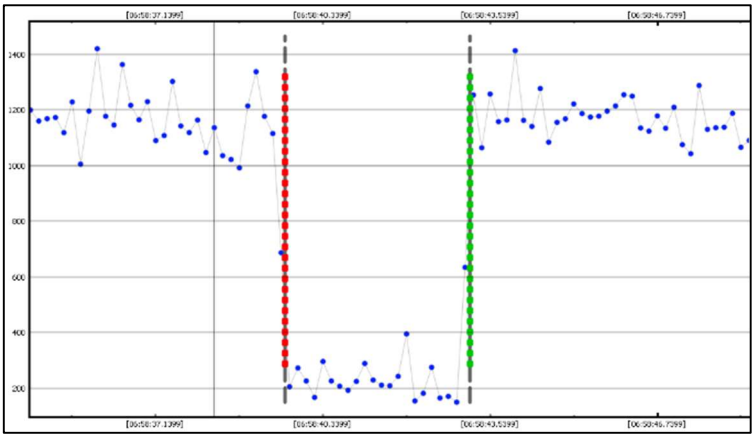
Finally, I could get to bed. When I woke up, I attended the solar event we hosted at the Patterson. Upon returning home, I finished processing the other two events and submitted the results to the occultation results team.

Here are the graphs of three events.



The graph above with the double vertical red and green lines is the first event. The drop is small, but it is there.





I posted an account of my observations to the occultation forum and asked how many other observers had three successes on the same night. I had been told the list was short. Well, it turns out that there have been around half a dozen or so who have observed three, with one person having observed three twice! This past May, an observer in Australia was able to observe four events in one evening, and that was from his home observatory that is not portable. Wow!

I've been observing asteroid occultations in earnest for about two years now. In addition to observing these events, I contribute to the local occultation community by identifying suitable events that will be visible in the state of Arizona. Our state has some very active observers, one of which is one of the most prolific observers in the world. He logged 83 events in 2022, I only had 19.

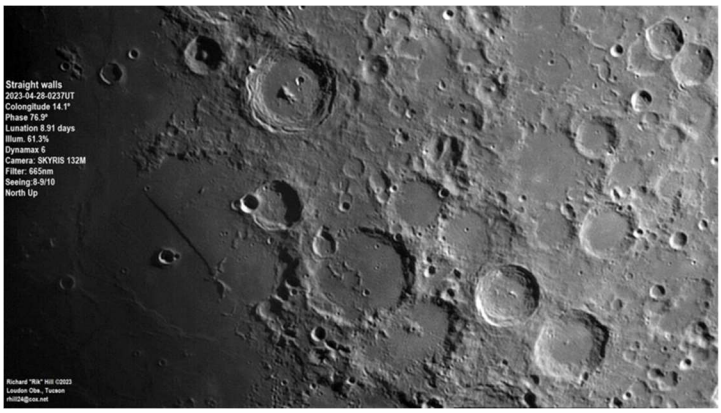
Straight Walls

By Rik Hill

This field is south of the great crater Arzachel (100km dia.) and well known to the versed lunar observer for its many and varied features. The first feature is Arzachel itself, the southernmost of the trio with Ptolemaeus, Alphonsus that dominates the center of the visible disk of the Moon. It is noted for its spectacular terracing and interior rimae one of which that arcs north-south just east of the oddly off center peak on the floor and roughly concentric with Arzachel A (8 km). Below or south of Arzachel is the crater Thebit with the interesting configuration of Thebit A (19 km) on the northwestern portion of the wall and Thebit L (10 km) to the northwest of that. Then west of this is the iconic "Straight Wall" which is neither straight nor a wall per se. It is seen here as a dark diagonal slash on the eastern edge of Mare Nubium, running up from the a curious set of peaks below Thebit northwest to the little crater Thebit D (5 km). The "wall" is made up of a number of small faults 8-50km in length, with the cliffs being some 250-300m high and 2.5-3km in width, angled at less than 10o. The curious peaks are colloquially called "The Stag's Horn Mountains" and are the remnants of previous features destroyed in the massive Nubium impact event.

Just to the right of image center is a particularly well defined good sized crater, Werner (70 km). Between it and Thebit is a larger crater, less well defined, Purbach (118 km) with remnants of now buried craters on it's northwestern floor. Above Werner is a very poorly defined crater, more of an oval plain, Blanchinus and north of it is LaCaille (both 68 km dia.). These are interesting because of their intersection. The raised terrain between the eastern wall of Purbach and the western walls of Blanchinus and LaCaille form what is known as the "Lunar X" at low sun angles. Can you see it here? Those familiar with the feature when it is on the terminator probably can.

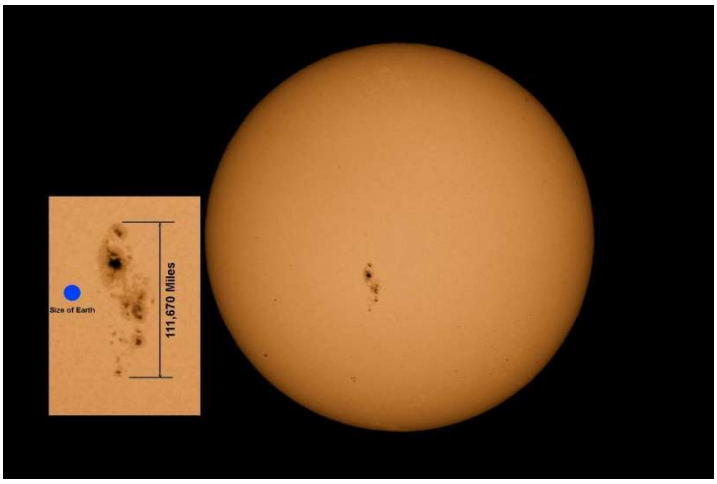
Before leaving this region notice the feature to the upper right of LaCaille. It appears like a deer hoofprint in snow, more hoof-like than the popular Aries Hoofprint! In LROC images it appears to be the juxtaposition of two badly ruined craters that once shared a common straight wall. This is Delaunay (roughly 46km dia) and a much-modified version of the two craters in the uppermost right corner of the image, Azophi (48 km) at bottom and Abenezra (41 km) above. You can see how the shared straight wall is flattened between them as in Delaunay thought these latter craters were not as ruined. This is truly a region of straight and not-so-straight walls!



This montage was created from two images, each a 1500 frame AVI stacked with AVIStack2 (IDL) and assembled with MS ICE then finally processed with GIMP and IrfanView.

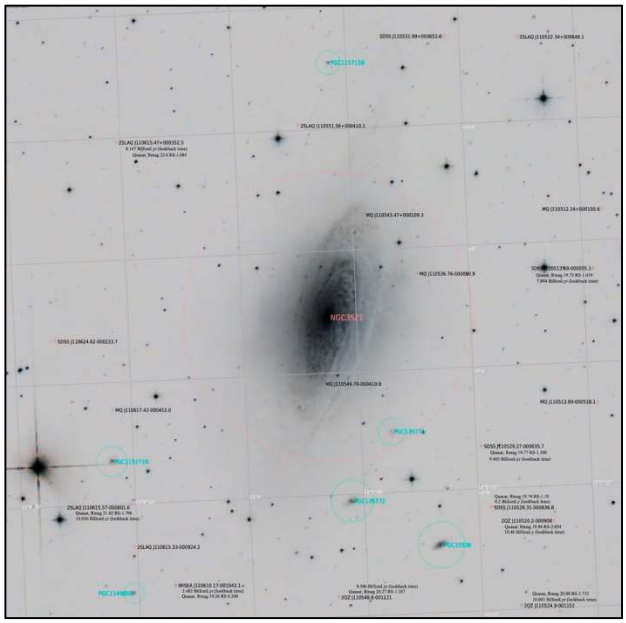
Pictures from Solar Saturday at Patterson on June 10

Pictures from HAC Astro



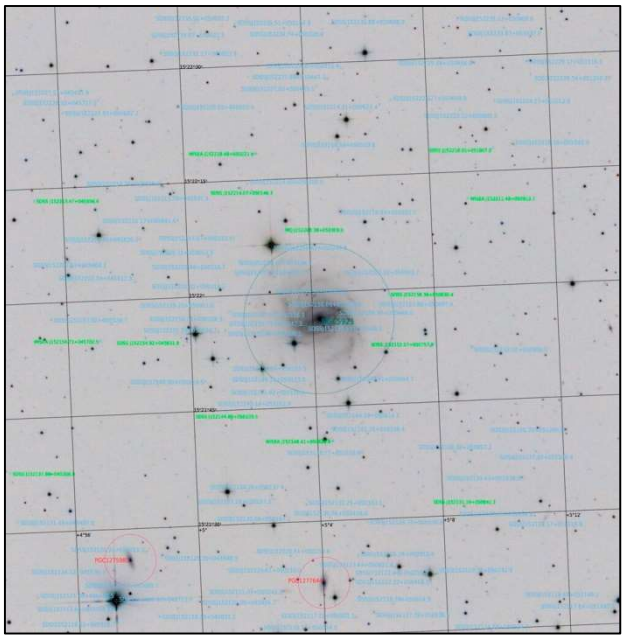
Sun Spots by JD Maddy

NGC 3521 by Glenn Sanner

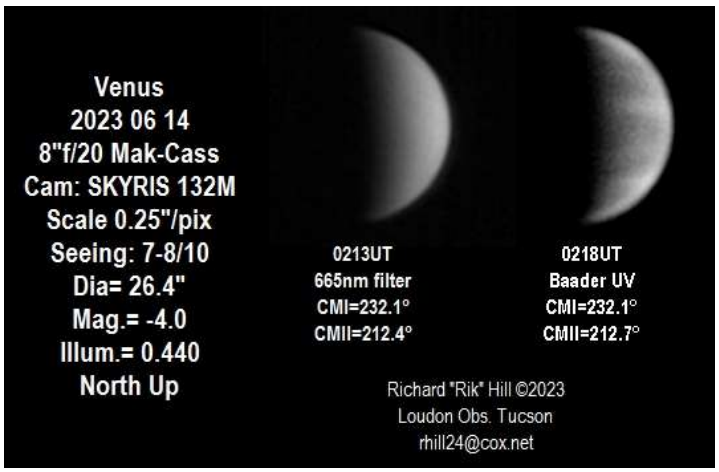


NGC 3521 Annotated and Inverted by Glenn Sanner

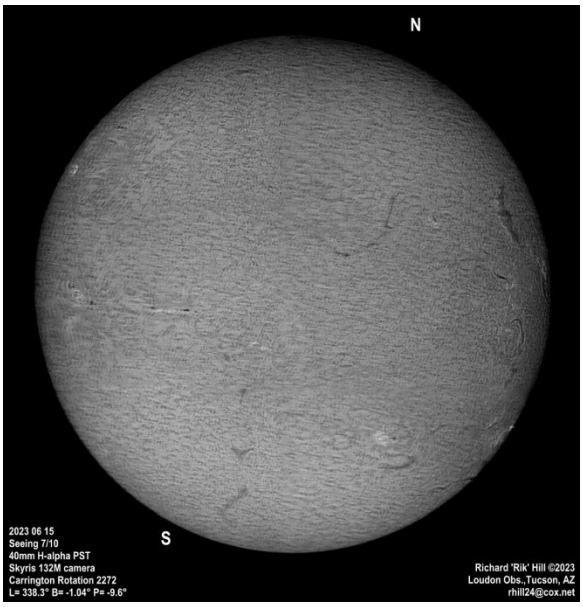
NGC 5921 by Glen Sanner



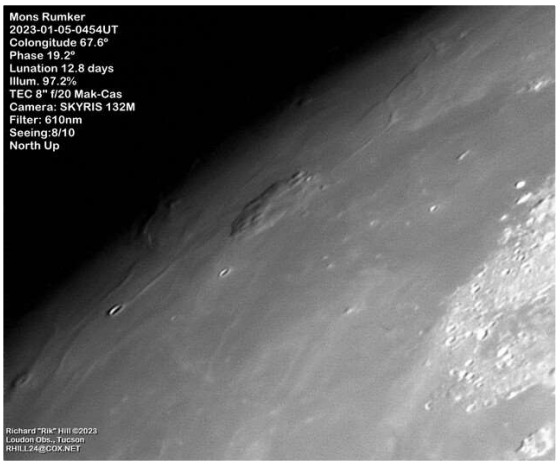
NGC 5921 Annotated and Inverted with Quasars by Glen Sanner



Venus by Rik Hill



Sun in H-Alpha by Rik Hill



Mons Rümker (Moon) by Rik Hill

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HAC Jul Aug 2023 Calendar of Events

SU	MO	TU	WE	TH	FR	SA
2 July	**3** 4:39AM	**4** 	**5**	**6** Saturn/Moon 3°	**7** HAC Meeting Room A102 7PM Venus at greatest brillancy	**8** Neptune/Moon 1.7°
9 6:48PM	**10** Mars/Regulus 0.7 d	**11** Jupiter Moon 2°	**12** Uranus Moon 2°	**13**	**14**	**15**
16	**17** 11:32AM	**18**	**19**	**20** Venus/Moon 8d Mars/Moon 3d	**21** Pluto opposition	**22**
23	**24**	**25** 3:07PM	**26**	**27**	**28**	**29** Delta Aquariid meteors
30 Delta Aquariid meteors	**31** Delta Aquariid meteors	**1 Aug** 11:32AM	**2** Moon at Perigee	**3**	**4** HAC Meeting Room A102 7PM	**5**
6	**7**	**8** 3:28 AM	**9**	**10**	**11**	**12**
13	**14**	**15**	**16** 2:38AM	**17**	**18**	**19**
20	**21**	**22**	**23**	**24** 2:57AM	**25**	**26**
27 Saturn at Opposition	**28**	**29**	**30** 6:36PM Moon at Perigee Saturn/Moon 2d	**31**	**September 23 is Dine Under the Stars. September 24 is the date of the O-REX sample return**	

All times local MST
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