



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

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A Moon Dressed Like Saturn



The Moon shows a slight crescent phase with most of its surface visible by reflected Earthlight known as *ashen glow*. The Sun directly illuminates the brightly lit *lunar crescent* from the bottom, which means that the Sun must be below the horizon and so the image was taken before sunrise. This *double take*-inducing picture was captured on 2019 December 24, two days before the Moon slid in front of the Sun to create a *solar eclipse*. Image Credit & Copyright: [Francisco Sajuel](#)

Membership Renewals Due

| | |
|---------|--|
| 08/2022 | Borowski Force Johnston & Stein Knabb Family Lurcott, L. Manigly Tiedemann Tredinnick Trunk Zullitti |
| 09/2022 | Atmore Brooks Gallagher Holloway Kusovsky Mowrer Nigro Reilly Santos Shaughnessy Simmons Sopin Squire Stein |
| 10/2022 | Abbott Conrad Kraynik Lamm Lane Lester Levin Mills Parker Rosenblatt Toole Vu Wirth Zug |

August 2022 Dates

- 5th** • First Quarter Moon and the Lunar Straight Wall is visible this evening
- 11th** • Full Moon, the Full Sturgeon Moon or the Full Ripening Moon, 9:35 p.m. EDT
- 12th** • The Perseid meteor shower peaks
- 14th** • Saturn is at opposition and is visible all night
- 16th** • Two moon shadows are visible on Jupiter just before midnight
- 19th** • Last Quarter Moon, 12:36 a.m. EDT
- 27th** • New Moon, 4:17 a.m. EDT



CCAS Upcoming Nights Out

In addition to our monthly observing sessions at the Myrick Conservancy Center, BRC (see pg. 7), CCAS has several special "nights out" scheduled over the next few months. Members are encouraged to help out during these events any way they can. See below for more information.

- ☼ Friday, August 19th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.
- ☼ Friday, September 16th - CCAS Special Observing Session at Starr Farm Park, Downingtown, PA. For more information, contact our Observing Chair, [Don Knabb](#).
- ☼ Friday, September 30th - CCAS Special Observing Session with the Atglen Public Library at Wolf's Hollow County Park, Atglen, PA. Non-CCAS members must [register with the library](#) to attend the event. For more information, contact our Observing Chair, [Don Knabb](#).

For more information about future observing opportunities, contact our [Observing Chair](#), Don Knabb.

Summer Society Events

August 2022

18th • The von Kármán Lecture Series: [Voyager – 45 Years in Space](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

19th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

20th • Open call for articles and photographs for the September 2022 edition of [Observations](#).

23rd-26th • CCAS Special Camping Trip & Observing Session at [Cherry Springs State Park](#), Coudersport, PA. For more information, contact our Observing Chair, Don Knabb.

26th • Deadline for newsletter submissions for the September 2022 edition of [Observations](#).

26th-30th • [Almost Heaven Star Party](#), Spruce Knob, WV.

September 2022

9th • Planetarium show at the Mather Planetarium at WCU, "JWST: The First Images." For more information, visit the [WCU Public Planetarium Shows](#) webpage.

13th • CCAS Monthly Meeting, Merion Science Center, Room 112. CCAS Member Speaker: John Conrad, who will present "Do Look Up- DART: the worlds first asteroid deflection test."

16th • CCAS Special Observing Session at Starr Farm Park, Downingtown, PA. For more information, contact our Observing Chair, [Don Knabb](#).

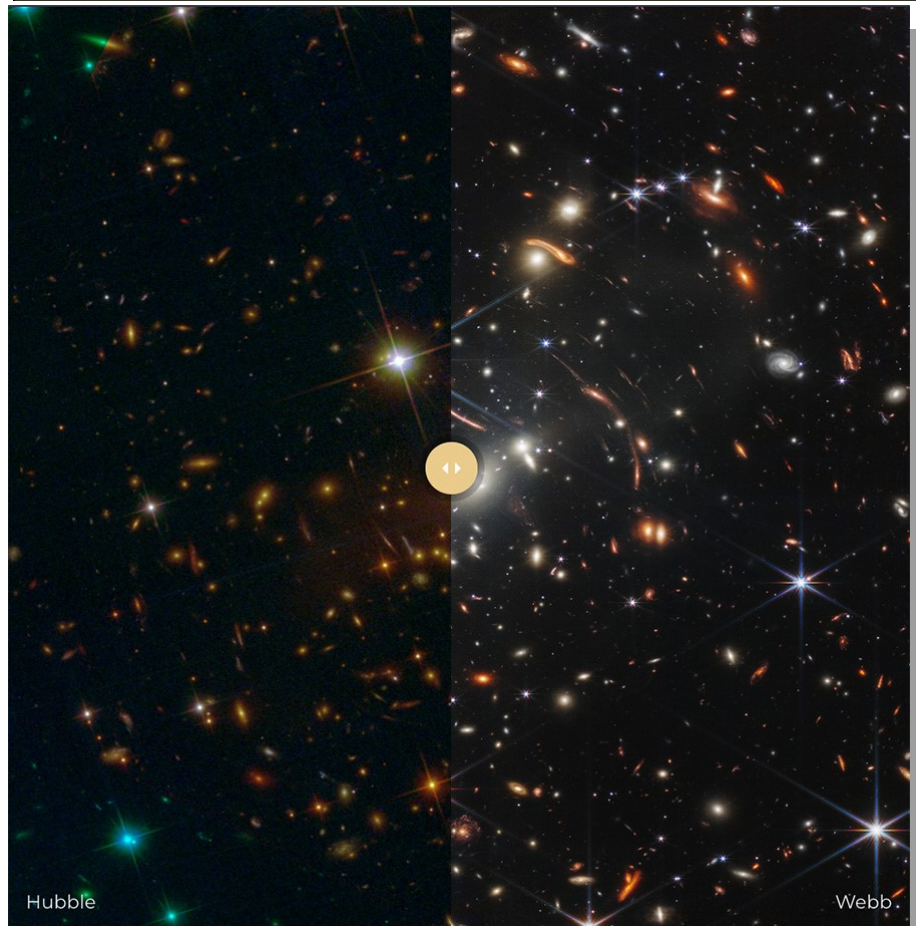
20th • Open call for articles and photographs for the October 2022 edition of [Observations](#).

26th • Deadline for newsletter submissions for the October 2022 edition of [Observations](#).

30th - CCAS Special Observing Session with the Atglen Public Library at Wolf's Hollow County Park, Atglen, PA. Non-CCAS members must [register with the library](#) to attend the event. For more information, contact our Observing Chair, [Don Knabb](#).

Hubble's Future in the Webb Era

by Dave Dickinson, Sky & Telescope Magazine



The Hubble (left) and Webb (right) images of the SMAC 0723 galaxy cluster are shown side by side. [Find interactive comparisons here](#). Credit: John Christensen / [WebbCompare](#)

Perhaps you've heard: The James Webb Space Telescope (JWST) is the latest and greatest observatory in space, [wowing](#)

[the astronomical community](#) with amazing images released last month.

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September 2022 CCAS Meeting Agenda

by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on September 13, 2022, in person (as well as via Zoom) at West Chester University's Merion Science Center, Room 112. The Science Center is located at 720 S. Church St., West Chester, PA. CCAS Member Speaker: John Conrad, who will present "Do Look Up- DART: the worlds first asteroid deflection test."

Please note that inclement weather or changes in speakers' schedules

may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

As for future meetings, we are looking for presenters for our 2022-2023 season and beyond. If you are interested in presenting, or know someone who would like to participate, please contact me at pro-grams@ccas.us.

Why Don't Jupiter's Rings Look Like Saturn's?

by Alison Klesman, *Astronomy Magazine*



Stephen Kane created this simulated image of Jupiter with a more massive ring system along the line of Saturn's. If Jupiter did have such rings, Kane said, they'd appear even brighter than Saturn's because the giant planet is much closer.

Image Credit: UCR/Stephen Kane

Shortly after releasing the spectacular [first images from the James Webb Space Telescope](#) (JWST) in early July, NASA uploaded the telescope's commissioning data to its [online archive](#) as well. These data show off the observatory's ability to track targets — including planets and asteroids in our solar system — and pick apart their reflected light to provide details about their chemical composition.

Among those images were some stunning snaps of Jupiter, taken by JWST's NIRCам through several infrared filters. Visible are features such as [Jupiter's thick, tumultuous cloud belts](#) and its iconic [Great Red Spot](#), a perpetual storm

roughly the size of Earth. But there are a few extra members of the family photobombing the beauty shots: moons [Europa](#), Thebe, and Metis, as well as some of the planet's [thin, faint rings](#).

In fact, the rings' appearance in such short, one-minute exposures “was absolutely a very pleasant surprise,” according to NIRCам instrument scientist John Stansberry, of the Space Telescope Science Institute, in a [NASA blog](#). Stefanie Milam of the Goddard Space Flight Center, who serves as JWST deputy project scientist for planetary science, added that their presence is “absolutely astonishing and amazing.”

Despite the fact that Jupiter

has been known to humankind since ancient times and is [easy to observe in detail with backyard scopes](#), scientists didn't even know the planet had rings until 1979, when [Voyager 1 spotted them](#) as it flew by. That's because, unlike Saturn, whose claim to fame is its large, bright ring system, [Jupiter's rings](#) are thin and hazy structures that cannot be easily seen from Earth.

We now know that *all the outer planets* sport rings. But with Jupiter being larger than Saturn, why doesn't Jove have larger, brighter rings to match? Is it possible that Jupiter once did sport stunning rings — and eventually lost them?

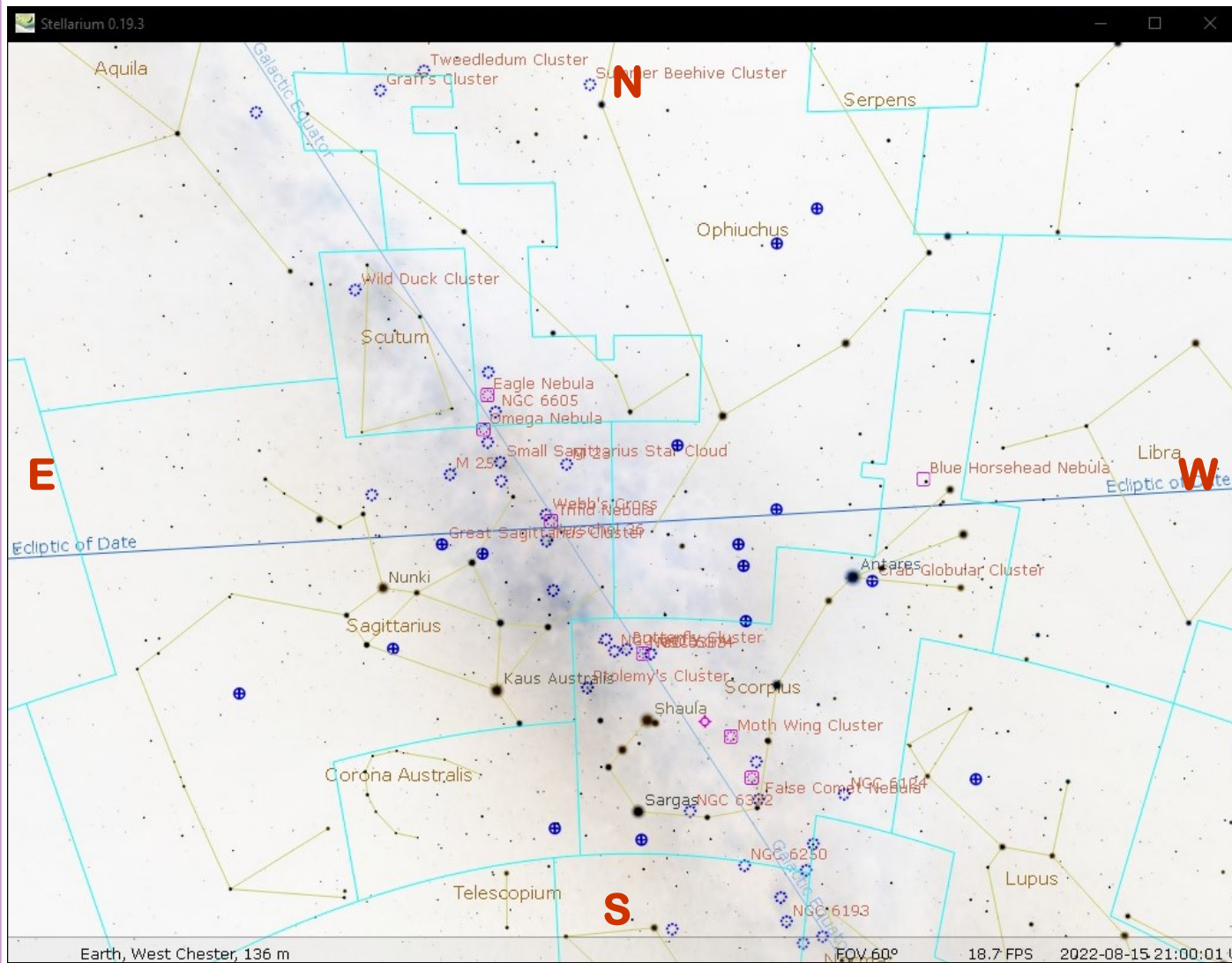
These are exactly the questions

(Continued on page 6)

The Sky Over Chester County

August 15, 2022 at 9:00 p.m. ET

Note: This screen capture is taken from Stellarium, the free planetarium software available for download at www.stellarium.org.



| Date | Civil Twilight Begins | Sunrise | Sunset | Civil Twilight Ends | Length of Day |
|------------|-----------------------|---------------|---------------|---------------------|---------------|
| 08/01/2022 | 5:30 a.m. EDT | 6:01 a.m. EDT | 8:15 p.m. EDT | 8:46 p.m. EDT | 14h 14m 56s |
| 08/15/2022 | 5:45 a.m. EDT | 6:14 a.m. EDT | 7:58 p.m. EDT | 8:27 p.m. EDT | 13h 44m 32s |
| 08/31/2022 | 6:01 a.m. EDT | 6:29 a.m. EDT | 7:35 p.m. EDT | 8:03 p.m. EDT | 13h 05m 57s |

| Moon Phases | | | | | |
|---------------|------------|----------------|-----------|------------|---------------|
| First Quarter | 08/06/2022 | 7:06 a.m. EDT | Full Moon | 08/11/2022 | 9:35 p.m. EDT |
| Last Quarter | 08/19/2022 | 12:36 a.m. EDT | New Moon | 08/27/2022 | 4:17 a.m. EDT |

August 2022 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

| | |
|----|---|
| 4 | The Lunar X is visible around 2 p.m. Yes, you can see it during the day! |
| 5 | First Quarter Moon and the Lunar Straight Wall is visible this evening |
| 11 | Full Moon, the Full Sturgeon Moon or the Full Ripening Moon, 9:35 p.m. EDT |
| 12 | The Perseid meteor shower peaks during the early morning hours |
| 14 | Saturn is at opposition and is visible all night |
| 16 | Two moon shadows are visible on Jupiter just before midnight |
| 19 | Last Quarter Moon, 12:36 a.m. EDT |
| 27 | New Moon, 4:17 a.m. EDT |
| 27 | Mercury is at greatest elongation this evening |

The best sights this month: It seems as if the naked eye planets have been in the pre-dawn sky forever, but during August we finally can see Saturn and Jupiter before midnight. And with Saturn reaching opposition in mid-month, we have a great view of those amazing rings. With a little effort you can also see Mercury near the end of the month low in the west as the glow of the sunset begins to fade. And for a little lunar action, look for the elusive Lunar X at 2 p.m. on August 4th as the Moon rises in the southeast.

Mercury: Look for Mercury near the end of the month, low in the west as the glow of the sunset begins to fade.

Venus: Our sister planet rises about 2 hours before the Sun and shines at a brilliant magnitude -3.9.

Mars: The red planet rises soon after midnight and shines at magnitude 0.2. As the year passes Mars will rise earlier and its size in the eyepiece of your telescope will grow to double what it is during August when it reaches opposition in December.

Jupiter: By the end of August Jupiter will rise around 9 p.m. and shine at a bright magnitude -2.7. The best view is late at night when Jupiter is high in the sky.

Saturn: The ringed planet rises around 9 p.m. at the beginning of August. It reaches opposition on August 14 so the best time to view it is midnight or 1 a.m. when it is highest in the sky. This is the best time of the year to view the beautiful rings since Saturn is at its closest to Earth.

Uranus and Neptune: Uranus rises with Mars and if you center Mars in your binoculars, you can find Uranus less than 2° north of the red planet. Neptune rises about the same time as Jupiter and is best viewed during the wee small hours of the morning when it will be about 35° altitude in the southeastern sky.

The Moon: Full Moon is on August 11th. Native Americans called this the Full Sturgeon Moon. The fishing tribes are given credit for the naming of this Moon, since sturgeon, a large fish of the Great Lakes was most readily caught during this month. A few tribes knew it as the Full Red Moon because as the Moon rises it appears reddish through the sultry haze of summer. Native Canadians called this the Ripening Moon or the Coho Salmon Moon.

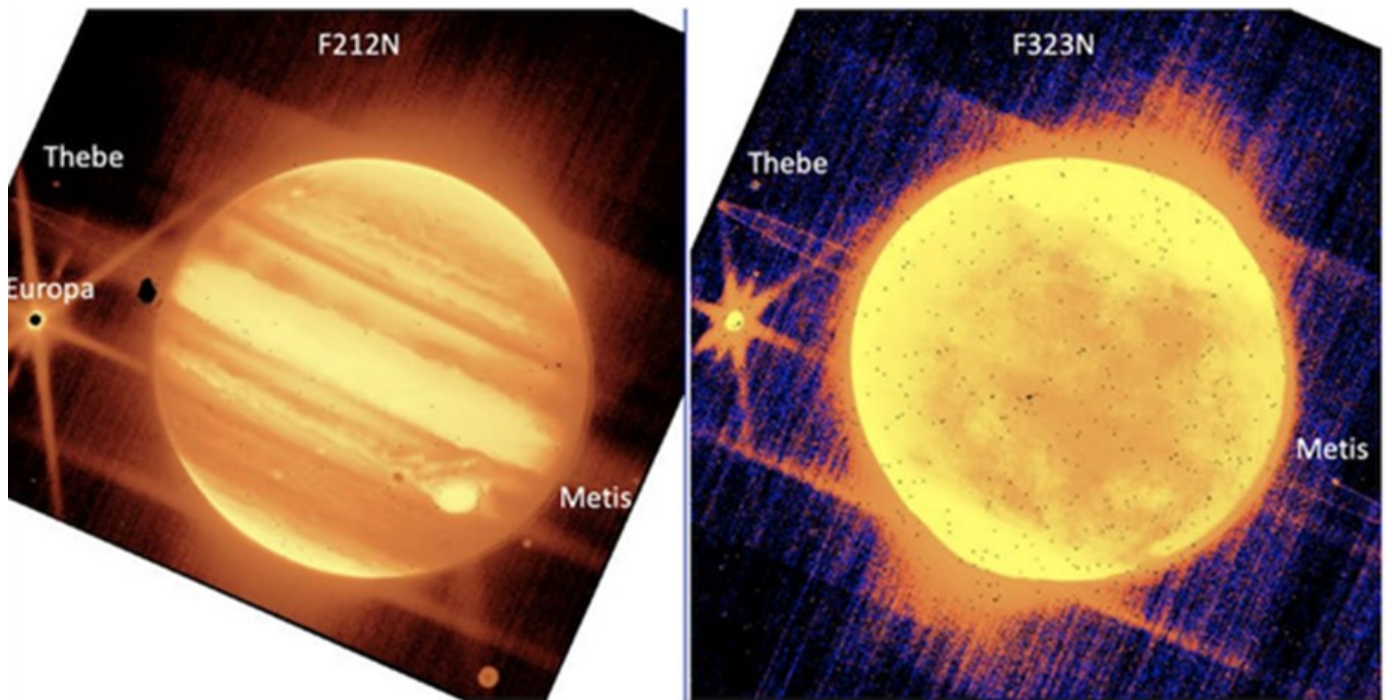
The Lunar X is visible on August 4th around 2 p.m. and the Lunar Straight Wall is visible on August 5th.

Constellations: August has so many great constellations it is difficult to name my favorites, but the southern constellations of Sagittarius and Scorpius are near the top of my list. But the big birds of summer – Cygnus the Swan and Aquila the Eagle, also are incredibly beautiful and Cygnus is just so full of stars it is amazing to gaze upon with binoculars. Then rising in the east is the Great Square of Pegasus with the Andromeda Galaxy not far behind, which is an amazing sight in binoculars.

Messier/deep sky: Aim your binoculars or telescope straight up during August and you will cut through most of the haze that often fills the sky at this time of year. That is easy to do with binoculars or a Dobsonian telescope, but it's hard on one's neck if you are using a refractor. High overhead the

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Jupiter's Rings (Cont'd)



*JWST's NIRCam took these two commissioning images of Jupiter using its 2.12-micron filter (left) and 3.23-micron filter (right). Visible features include the Great Red Spot, moons Europa, Metis, and Thebe, and Jupiter's elusive rings.
NASA, ESA, CSA, and B. Holler and J. Stansberry (STScI)*

(Continued from page 3)

astronomers Stephen Kane and Zhexing Li of the University of California, Riverside ask in a recent [paper](#) now accepted for publication in the *Planetary Science Journal*. After all, as the solar system's most massive planet, they argue in the paper, Jupiter's history must be rife with collisions, captures, and other such events that could provide plentiful material for more substantial rings.

To solve the mystery of Jupiter's underwhelming ring system, the pair turned to computer simulations to examine how the planetary system acts over periods of 1 million to 10 million years. Over this time, they looked at the availability and orbital stability of icy material to form rings, essentially examin-

ing how big, bright rings might form, stick around, or be destroyed. In particular, they looked at how Jupiter's four largest satellites, the [Galilean moons](#) — Io, Europa, Callisto, and Ganymede — affect the formation or longevity of water ice rings.

"We found that the Galilean moons of Jupiter, one of which is the largest moon in our solar system, would very quickly destroy any large rings that might form," Kane said of their simulations' results in a [press release](#). In part, that's because the massive moons can destabilize the orbit of icy particles to eject them from the system, or alternatively sweep particles up into colliding with the moon, rather than orbiting as a ring. Ultimately, Kane said, "Massive planets

form massive moons, which prevents them from having substantial rings."

This lines up with reality, too — after all, Saturn's rings are bright because they are made largely of ice, and likely still around (depending on [their age](#)) because researchers think they are continually replenished by the many small, icy moons embedded within them. Jupiter's dim, thin rings, by contrast, are made mostly of dust likely shed from just a few of its small moons.

So, even if Jupiter managed to build up impressive icy rings in the past, they wouldn't have lasted long. And its present rings, small as they are, are likely quite young — less than 10 million years old. Saturn, by

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Jupiter's Rings (Cont'd)

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in contrast, appears to be in a "sweet spot" in terms of its ability to build up and maintain a large, stunning ring system over longer periods of time.

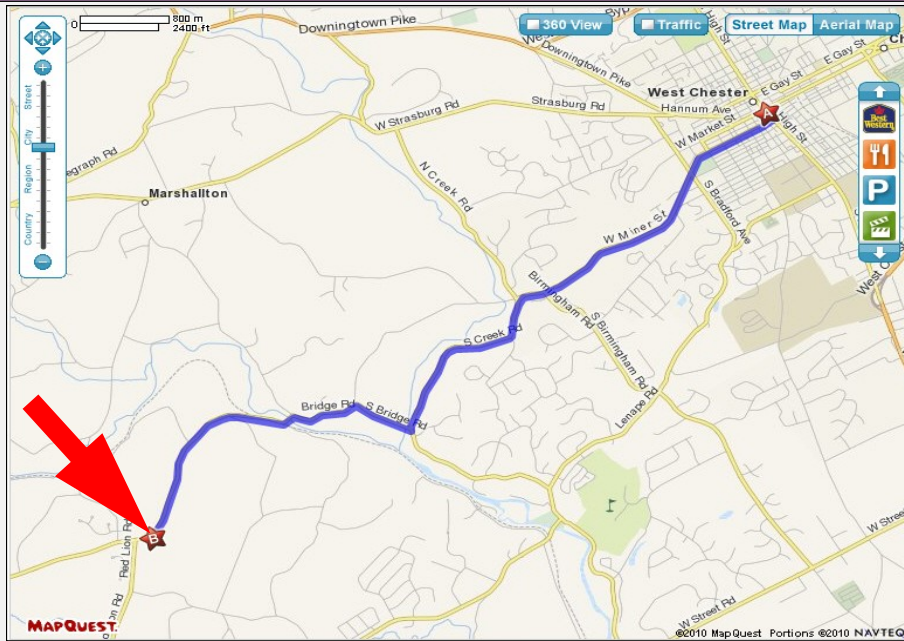
But Kane and Li's research tells us even more, they say. Moving beyond the solar system, the pair also considered what their findings could mean for exoplanets and their rings. After all, rings are more than just superficial decoration — they also tell the story of a planet's dynamical past, as well as that of its environment. If forming or maintaining massive, easy-to-spot rings of ice is difficult, then finding them tells us something valuable about the planets capable of hosting such spectacles.

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Classic La Para by Nicholas La Para



CCAS Directions



Brandywine Red Clay Alliance

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go left through the gate and drive up the farm lane about 800 feet to the top of the hill. The observing area is on the right.

If you arrive after dark, *please turn off your headlights and just use parking lights* as you come up the hill (so you don't ruin other observers' night vision).

Brandywine Red Clay Alliance

1760 Unionville Wawaset Rd
West Chester, PA 19382
(610) 793-1090

<http://brandywinewatershed.org/>

BRC was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

Looking Up: Binocular Objects in Sagittarius

by Don Knabb, CCAS Observing Chair & Treasurer



Photo by the author, Canon 7D mounted on a Meade LXD equatorial mount, Canon EF 50mm f/1.4 lens stopped down to 2.8, 40 seconds at ISO 800, taken near Blakeslee, PA.

I always look forward to August when we have our best opportunity to gaze into the southern constellation Sagittarius. Although I love “going deep” and finding the faint fuzzy objects with a telescope, often I just like to settle back into a lounge chair with my handheld binoculars and gaze upon the brighter Messier objects that inhabit the area of the sky above Sagittarius. If you can find a dark sky observing site several of the objects in the picture below are visible with the naked eye, but even a small set of binoculars provide an incredible view into the heart of our Milky Way galaxy. In this article I’ll give a brief description of my favorite objects in this area of the

sky.

The Milky Way is the “steam” rising out of the “teapot” of Sagittarius. Sagittarius is more correctly known as The Archer, but the teapot shape is so distinctive that I only think of that nickname when I see Sagittarius.

Beginning at the top we see M17, the Omega, Swan or Lobster Nebula. This is one of the brightest diffuse nebulae in the sky and it is at the limit of naked eye visibility in dark skies at magnitude 6.0.

Beneath M17 is M18, an open cluster containing a few dozen bright stars. This cluster does not show up well in the photo, but you won’t mistake it when it

lands in the view of your binoculars. This cluster is quite young at only 32 million years old (doesn’t that make you feel young!).

Continuing down and to the right is M24, the Sagittarius Star Cloud. M24 is not actually a star cluster but is a view toward the center of the Milky Way through a tunnel in the Milky Way’s interstellar dust. With a total magnitude of 4.6 it is the densest concentration of stars visible in binoculars and is easily visible to the naked eye at a dark observing site. I often get lost in M24 for minutes at a time!

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Hubble's Future (Cont'd)



This zoomed-in view highlights the position of a distant star — Earendel — along a ripple in space-time (dotted line) that magnifies it and makes it possible for the star to be detected over a great distance of nearly 13 billion light-years.

Science: NASA / ESA / Brian Welch (JHU) / Dan Coe (STScI)

(Continued from page 2)

But amid all the excitement, the Hubble Space Telescope — NASA's orbital transformational observatory now for more than 32 years — continues its exploration and discovery.

"We believe that we can keep Hubble doing the groundbreaking science it is known for through the latter part of this decade and possibly into the next," says public affairs officer Claire Andreoli (NASA Goddard).

Deployed on April 25, 1990, from the cargo bay of the U.S. space shuttle *Discovery*, Hubble

got off to a rocky start: A defective mirror wasn't discovered until after deployment and calibration. Three years later, astronauts repaired the defect with "corrective lenses," named the Corrective Optics Space Telescope Axial Replacement (COSTAR) package, which they placed in the telescope during the STS-61/Servicing Mission One.

Four servicing missions followed, each one deploying upgrades and new instruments, but the *Atlantis* STS-125 mission in 2009 would be the last: Hubble is now on its own. Despite some scares, including [a brief comput-](#)

[er glitch last year](#), Hubble's doing just fine.

"Hubble is still going strong and continues to have an important and unique role to play in cutting edge astronomy research," says Misty Bentz (Georgia State University) "It also remains popular with astronomy researchers, as the latest call for proposals in March 2022 received five times the number of proposal requests that could be accommodated!"

Hubble's observations over the year have helped scientists [determine the rate of the](#)

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NASA Night Sky Notes: Artemis 1: A Trip Around the Moon – and Back!

by David Prosper

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

We are returning to the Moon - and beyond! Later this summer, NASA's Artemis 1 mission will launch the first uncrewed flight test of both the Space Launch System (SLS) and Orion spacecraft on a multi-week mission. Orion will journey thousands of miles beyond the Moon, briefly entering a retrograde lunar orbit before heading back to a splashdown on Earth.

The massive rocket will launch from Launch Complex 39B at the Kennedy Space Center in Florida. The location's technical capabilities, along with its storied history, mark it as a perfect

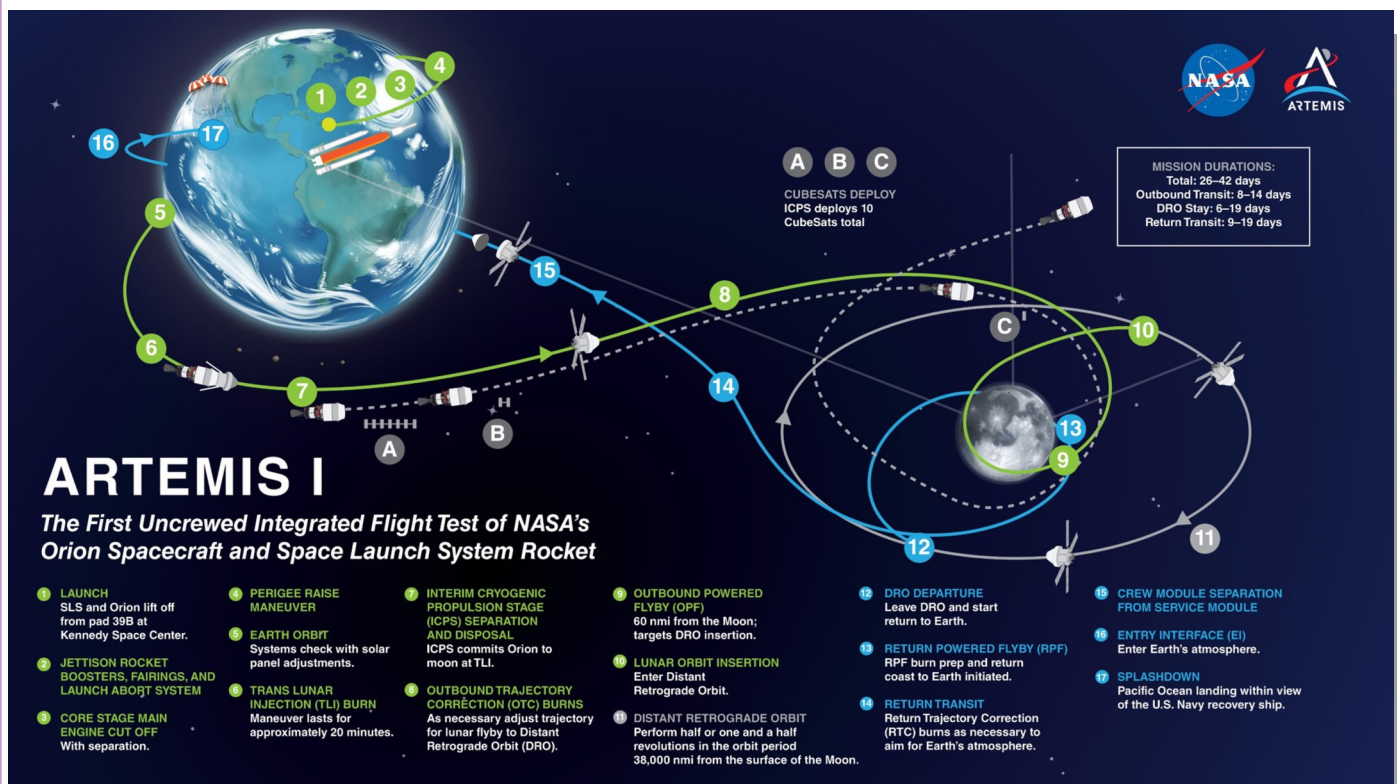


spot to launch our return to the Moon. The complex's first mission was Apollo 10 in 1968, which appropriately also served as a test for a heavy-lift launch vehicle (the Saturn V rocket) and lunar spacecraft: the Apollo Command and Service Modules joined with the Lunar Module. The Apollo 10 mission profile included testing the Lunar Mod-

ule while in orbit around the Moon before returning to the Earth. In its "Block-1" configuration, Artemis 1's SLS rocket will take off with 8.8 million pounds of maximum thrust, even greater than the 7.6 millions pounds of thrust generated by the legendary Saturn V, making it the most powerful rocket in the world!

Artemis 1 will serve not only as a test of the SLS and the Orion hardware, but also as a test of the integration of ground systems and support personnel that will ensure the success of this and future Artemis missions. While uncrewed, Artemis-1 will still have passengers of a sort: two human torso models designed to test radiation levels

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Follow along as Artemis 1 journeys to the Moon and back! A larger version of this infographic is available from NASA at: nasa.gov/image-feature/artemis-i-map

Night Sky Notes (Cont'd)

(Continued from page 10)

during the mission, and “Commander Moonikin Campos,” a mannequin named by the public. The specialized mannequin will also monitor radiation levels, along with vibration and acceleration data from inside its mission uniform: the Orion Crew Survival Suit, the spacesuit that future Artemis astronauts will wear. The “Moonikin” is named after Arturo Campos, a NASA electrical engineer who played an essential role in bringing Apollo 13’s crew back to Earth after a near-fatal disaster in space.

The mission also contains other valuable cargo for its journey around the Moon and back, in-

cluding CubeSats, several space science badges from the Girl Scouts, and microchips etched with 30,000 names of workers who made the Artemis-1 mission possible. A total of 10 CubeSats will be deployed from the Orion Stage Adapter, the ring that connects the Orion spacecraft to the SLS, at several segments along the mission’s path to the Moon. The power of SLS allows engineers to attach many secondary “ride-along” mission hardware like these CubeSats, whose various missions will study plasma propulsion, radiation effects on microorganisms, solar sails, Earth’s radiation environment, space weather, and of course, missions to study the Moon and

even the Orion spacecraft and its Interim Cryogenic Propulsion Stage (ICPS)!

If you want to explore more of the science and stories behind both our Moon and our history of lunar exploration, the Night Sky Network’s **Apollo 11 at 50 Toolkit** covers a ton of regolith: bit.ly/nsnmoon! NASA also works with people and organizations around the world coordinating **International Observe the Moon Night**, with 2022’s edition scheduled for Saturday, October 1: moon.nasa.gov/observe. Of course, you can follow the latest news and updates on Artemis 1 and our return to the Moon at nasa.gov/artemis-1

Observing (Cont'd)

(Continued from page 5)

sky has some beautiful deep sky objects such as M13 and M92, the two bright globular clusters in Hercules. Not far away is M57, the Ring Nebula in Lyra. This is a faint object that is best viewed with averted vision in binoculars or a small telescope. If you are using a refractor or an SCT, target the incredible collection of Messier objects in the southern constellations. Or, set your hardware aside, lay down a blanket and lie on your back and just enjoy the incredible glow of the Milky Way!

Comets: There are no bright comets visible during August but if you want to chase 7th magnitude Comet C/2017 K2 (PanSTARRS) you can find a sky map in the August issue of

Astronomy magazine. The comet will start the month in the constellation Ophiuchus and move into Scorpius later in August.

Meteor showers: It is again time for the most popular meteor shower of the year, the Perseid meteor shower! Unfortunately, the Full Moon will put a damper on our shooting star party this year. But my favorite part of this shower is just as the sky darkens in the evening when you will see fewer shooting stars, but you have a good chance of seeing an “Earth grazer” that travels nearly all the way across the sky. Do not miss this shower! When you see a fireball fly cross the sky you will never forget it.

Jupiter (Cont'd)

(Continued from page 7)

Ring systems could reveal information such as planetary age or details about what kinds of moons must be (or must not be) present, as well as the type or availability of material like icy comets or asteroids in the planet’s solar system.

As astronomers continue to build up our [catalog of known exoplanets](#) and point JWST at them to learn more, the details these worlds reveal — including their rings — will offer a wealth of valuable insight into how stars and their planets form and evolve over time.

[Editor’s Note: Read the original article at [Why don't Jupiter's rings look like Saturn's? | Astronomy.com](#)]

Hubble's Future (Cont'd)



Hubble's recent capture of Terzan 2 in Scorpius . HST / NASA / GFSC / STScI

(Continued from page 9)

universe's expansion, identify moons of Pluto, and shed light on exotic worlds. (See "Celebrating 30 Years" for some of Hubble's most mesmerizing images.)

Even in this year alone, Hubble has broken records while capturing stunning imagery:

Hubble recently discovered the most distant star known, dubbed Earendel. The images show Earendel as it was 12.9 billion years ago, only 900 million years after the Big Bang.

The telescope continues to capture stunning views, such as this deep stare at the globular cluster Terzan 2 in Scorpius on pg. 13.

Hubble is contributing to a currently underway project called the Ultraviolet Legacy Library of Young Stars as Essential Standards (ULLYSES). This program is using 1,000 orbits of Hubble time, in particular its unique capabilities in the ultraviolet part of the spectrum, to study star formation.

The mission also recently im-

aged Comet Bernardinelli-Bernstein (C/2014 UN271), confirming that it's the most massive Oort Cloud comet known. The new observations show that its nucleus is an estimated 137 kilometers (85 miles) across. Comet Bernardinelli-Bernstein will reach perihelion outside the orbit of Saturn in 2031.

Hubble has an important role play in the new JWST era, because even though Webb was often billed as Hubble's successor, the two telescopes are actu-

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Hubble's Future (Cont'd)

(Continued from page 12)

ally quite different.

"Hubble provides high-resolution ultraviolet and visible imaging and spectroscopy, whereas JWST is optimized for the infrared," Bentz says. "Hubble continues to dominate in studies of nearby stars and galaxies, as well as accreting supermassive black holes."

In fact, Bentz is leading a new program that uses Hubble to detect Cepheid variables in three galaxies, in order to determine their distances. "Cepheids are most variable at blue wavelengths, where JWST cannot observe," Bentz explains. "Furthermore, JWST is very slow to move from one target to another, so it is not optimized for returning to the same target again and again, as is needed in study of variable objects like Cepheids."

There are also plans afoot to utilize Hubble for complementary, simultaneous observations with other observatories, including JWST. Such multiwavelength observations can help gain an understanding that studies in ultraviolet, visible, or infrared alone cannot.

As an example, Bentz points to the neutron star merger that the LIGO and Virgo Collaborations detected in 2017. "Astronomers around the world collected observations at every wavelength possible to learn as much as we could about the physical processes happening during the collision and its messy aftermath," Bentz says.

In its most recent review of

Hubble operations, NASA announced that it would support the observatory through June 2026. In fact, current estimates suggest the observatory can stay in a high-enough orbit for operations to continue until the mid-2030s and beyond; its solar arrays and batteries are also in great shape.

The limiting factor comes down to the gyros that the space telescope uses to turn and lock onto targets. While almost all the observatory's systems are redundant, meaning there's still a back-up available if one piece fails, the gyros are one of the few exceptions. Hubble launched with six, but three have failed.

"The telescope is currently operating with three gyros and no spares," Andreoli says. However, while it takes three gyros to enable efficient operations, observations are still possible, albeit less efficient, with only one gyro.

Engineers have found clever ways to keep missions going well past their warranty: Witness the ["warm" mission on Spitzer](#) when its coolant ran out, or Kepler's [extended K2 mission](#) after the second of its four reaction wheels failed. Likewise, after the payload computer gave Hubble problems last summer, team engineers got things back up and running, and they're still working to improve operational processes.

Once the Hubble mission ends, hopefully a long time from now, NASA plans to bring it down in a controlled manner. On the last servicing mission, astronauts installed a Soft Capture Mecha-

(Continued on page 14)

Looking Up (Cont'd)

(Continued from page 8)

Far off to the right is M23, a beautiful open cluster that shines at magnitude 5.5. This cluster fills an area the size of the full Moon.

On the opposite side of M24 is M25, another remarkable open cluster. This 4.6 magnitude cluster contains about three dozen bright stars and may contain up to 600 stars.

Next, we will look directly below M24 where we find M22, one of the brightest globular clusters in the sky and among the first to be discovered in 1665. M22 is one of the finest globular clusters in the sky and one can only imagine what it would look like if it were at the zenith!

Above the teapot's spout we see the duo of M8 and M20. M8 is the Trifid Nebula, one of the most famous objects in the sky. It is an unusual combination of an open cluster, an emission nebula, a reflection nebula and a dark nebula that divides the emission nebula into three parts.

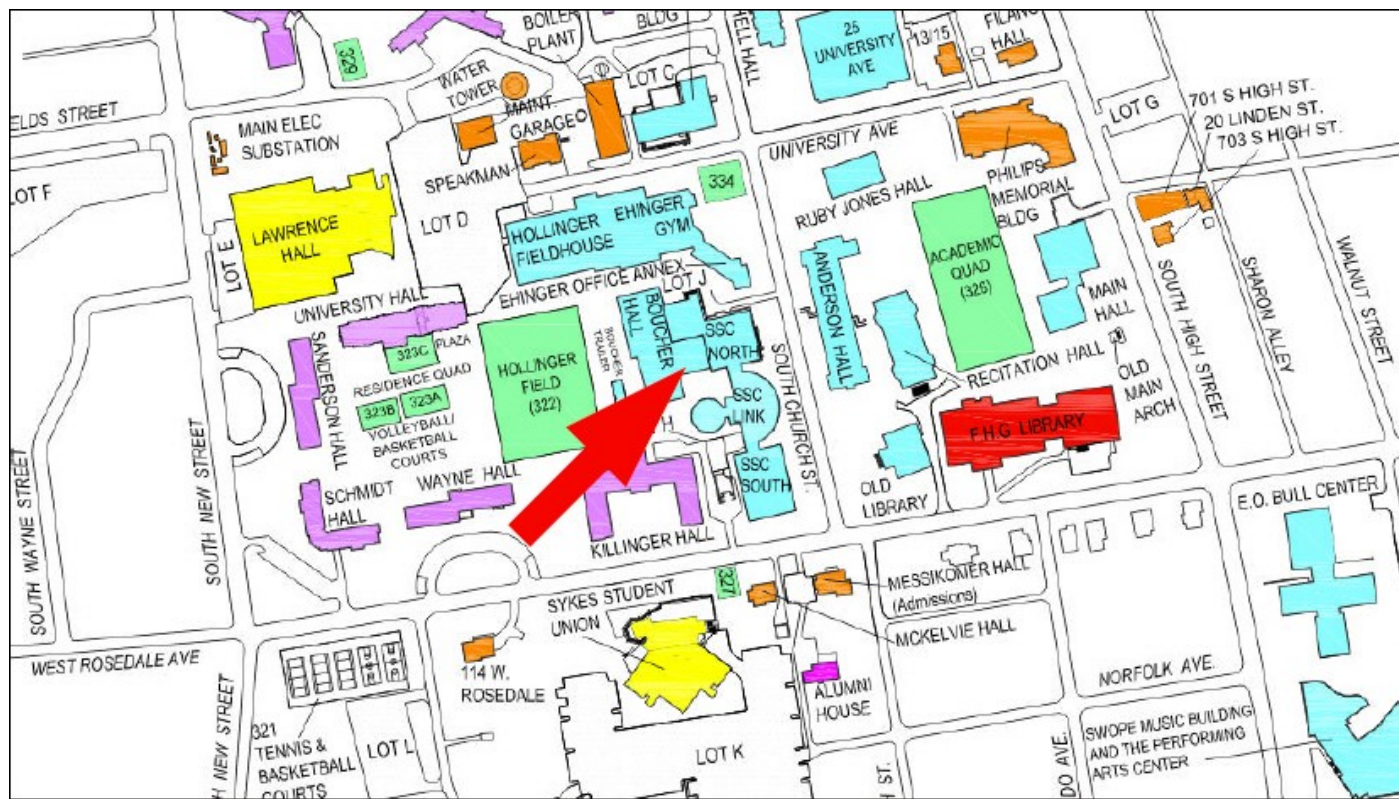
M20 is the equally famous Lagoon Nebula, first observed in 1654. While the Trifid Nebula is usually not visible to the naked eye, the Lagoon nebula can easily be perceived apart from the Milky Way background. M20 is a giant glowing cloud of interstellar gas divided by a dark lane of dust, "the lagoon", and includes a cluster of young stars, NGC 6530, that have formed from it.

So, I hope you have an opportunity to sit back in a chair and enjoy these beautiful and easy to find Messier objects in the southern sky while you have the chance. They are visible for only a few months before they head south for the winter.

CCAS Directions

West Chester University Campus

The monthly meetings (September through May) are held in Room 112 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



Hubble's Future (Cont'd)

(Continued from page 13)

nism on the base of Hubble. It could be used by a robotic mission to boost the telescope's orbit, but more likely it will prepare it for a controlled reentry when the time comes.

An entire generation of astronomers have come of age with Hubble in space, and it remains a vital component in the toolbox of modern astronomers. Expect more great science to come from this venerable space telescope.

[Editor's Note: Read the original article at [Hubble's Future in the Webb Era - Sky & Telescope - Sky & Telescope \(skyandtelescope.org\)](http://www.skyandtelescope.org)

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

| July 2022 Financial Summary | |
|------------------------------------|-------|
| Beginning Balance | \$874 |
| Deposits | \$90 |
| Disbursements | -\$0 |
| Ending Balance | \$964 |

New Member Welcome!

Welcome to our new CCAS members William Kellar from Phoenixville, PA, and Sharon Shultz from Downingtown, PA.

We're glad you decided to join us under the stars! Clear skies to you!

Membership Renewals

You can renew your CCAS membership by writing a check payable to "Chester County Astronomical Society" and sending it to our Treasurer:

Don Knabb
988 Meadowview Lane
West Chester PA 19382

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

Join the Fight for Dark Skies!



You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at \$30.00 for one year. Send to:

International Dark-Sky Association
 3225 North First Avenue
 Tucson, AZ 85719
 Phone: 520-293-3198
 Fax: 520-293-3192
 E-mail: ida@darksky.org

For more information, including links to helpful information sheets, visit the IDA web site at:

<http://www.darksky.org>

Dark-Sky Website for PA



The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

<http://www.POLCouncil.org>

Find out about Lyme Disease!

Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

<http://www.LymePA.org>

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

Good Outdoor Lighting Websites

One of the biggest problems we face in trying to reduce light pollution from poorly designed light fixtures is easy access to good ones. When you convince someone, a neighbor or even yourself, to replace bad fixtures, where do you go for good lighting fixtures? Check out these sites and pass this information on to others. Help reclaim the stars! And save energy at the same time!



Light pollution from poor quality outdoor lighting wastes billions of dollars and vast quantities of valuable natural resources annually. It also robs us of our heritage of star-filled skies. Starry Night Lights is committed to fighting light pollution. The company offers the widest selection of ordinance compliant, night sky friendly and neighbor friendly outdoor lighting for your home or business. Starry Night Lights is located in Park City, Utah.

Phone: 877-604-7377
 Fax: 877-313-2889

<http://www.starrynightlights.com>



Lighthouse Outdoor Lighting is a dedicated lifetime corporate member of the [International Dark-Sky Association](#). Lighthouse's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Phone: 484-291-1084

<https://www.lighthouse-lights.com/landscape-lighting-design/pa-west-chester/>

Local Astronomy-Related Stores

Listing retail sites in this newsletter does not imply endorsement of any kind by our organization. This information is provided only as a service to our members and the general public.



Skies Unlimited is a retailer of telescopes, binoculars, eyepieces and telescope accessories from Meade, Celestron, Televue, Orion, Stellarvue, Takahashi, Vixen, Losmandy and more.

Skies Unlimited
Suburbia Shopping Center
 52 Glocker Way
 Pottstown, PA 19465

Phone: 610-327-3500 or 888-947-2673
 Fax: 610-327-3553

<http://www.skiesunlimited.net>



Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

4403 Main Street
Philadelphia, PA 19127

Phone: 215-667-8309
 Fax: 215-965-1524

Hours:
 Tuesday thru Saturday: 10AM to 6PM
 Sunday and Monday: 11AM to 5PM

<http://www.spectrum-scientifics.com>

CCAS Information Directory

CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: newsletter@ccas.us

Or mail the contribution, typed or handwritten, to:

Dr. John C. Hepler
21 Medinah Drive
Reading, PA 19607

CCAS Newsletters via E-mail

You can receive the monthly newsletter (in full color!) via e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to Dr. John Hepler, the newsletter editor, at: newsletter@ccas.us.

CCAS Website

Dr. John Hepler is the Society's Webmaster. You can check out our Website at:

<http://www.ccas.us>

Dr. Hepler welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work—no copyrighted material! Give your contributions to Dr. Hepler at (484) 883-5033 or e-mail to webmaster@ccas.us

CCAS Purpose

The Chester County Astronomical Society was formed in September 1993, with the cooperation of West Chester University, as a non-profit organization dedicated to the education and enjoyment of astronomy for the general public. The Society holds meetings (with speakers) and observing sessions once a month. Anyone who is interested in astronomy or would like to learn about astronomy is welcome to attend meetings and become a member of the Society. The Society also provides telescopes and expertise for "nights out" for school, scout, and other civic groups.

CCAS Executive Committee

For further information on membership or society activities you may call:

President: Dave Hockenberry
610-558-4248

Vice President: Pete Kellerman
610-873-0162

ALCor, Observing, & Treasurer: Don Knabb
610-436-5702

Secretary: Beatrice Mazziotta
610-933-2128

Librarian: Barb Knabb
610-436-5702

Program: Bruce Ruggeri
484-883-5092

Education: Don Knabb
610-436-5702

Dennis O'Leary
610-701-8042

Webmaster & Newsletter: John Hepler
484-883-0533

Public Relations: Ann Miller
610-558-4248



CCAS Membership Information

The 2021 membership rates are as follows:

REGULAR MEMBER.....\$30/year
SENIOR MEMBER.....\$15/year
STUDENT MEMBER.....\$ 5/year
JUNIOR MEMBER.....\$ 5/year
FAMILY MEMBER.....\$40/year

Membership Renewals

Check the Membership Renewals on the front of each issue of *Observations* to see if it is time to renew. If you need to renew, you can mail your check, made out to "Chester County Astronomical Society," to:

Don Knabb
988 Meadowview Lane
West Chester PA 19382-2178

Phone: 610-436-5702
e-mail: treasurer@ccas.us

Sky & Telescope Magazine

The club membership subscription cost for *Sky and Telescope* magazine has increased to **\$43.95**. This is still a good saving from the regular rate of **\$56.05**.

There is no need to go through the CCAS treasurer for subscriptions or renewals. Just go to the Sky and Telescope website and select "Magazine", then under the FAQs you can subscribe at the club rate.

<https://skyandtelescope.org/subscribe/>

If you have **any** questions call Don Knabb at 610-436-5702.

Astronomy Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$34.00** which is much less than the individual subscription price of **\$42.95** (or \$60.00 for two years).

There is no need to go through the CCAS treasurer for subscriptions or renewals. Just call customer service at 877-246-4835 and request the club rate for your new subscription or renewal.