



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 30, No. 2 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016 February 2022

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NGC 7822 in Cepheus



Hot, young stars and cosmic pillars of gas and dust seem to crowd into NGC 7822. At the edge of a giant molecular cloud toward the northern constellation Cepheus, the glowing star forming region lies about 3,000 light-years away. Image Credit & Copyright: Mark Carter

Membership Renewals Due

| | |
|---------|---|
| 02/2022 | McCaffrey Ruggeri Sutton Tronel |
| 03/2022 | Angelini DellaPenna Fulton Sterrett Zander Zibinski |
| 04/2022 | Chisholm & Odell Hepler Imburgia Miller Richter Rossomando Sah Smaglik |

February 2022 Dates

- 1st** • New Moon, 12:46 a.m. EST
- 8th** • First Quarter Moon and the Lunar X is visible around 1 p.m. EST
- 9th** • The Lunar Straight Wall is visible and the Moon passes between the Pleiades and Aldebaran
- 16th** • Full Moon, the Full Snow Moon or the Full Snow Blinding Moon, 11:56 a.m. EST
- 16th-28th** • The Zodiacal Light is visible from a dark sky site after evening twilight
- 23rd** • Last Quarter Moon, 5:32 p.m. EST



CCAS Upcoming Nights Out

Because of the recent increase in Covid-19 infections, CCAS has curtailed its outreach to local communities with group and organizational observing sessions.

In addition, our monthly observing sessions at Myrick Conservancy Center, BVA, are limited to vaccinated CCAS members only.

- ☼ Friday, March 25, 2022, Myrick Conservancy Center, BVA (Tentative)

For more information about future observing opportunities, contact our Observing Chair, Don Knabb.

Winter / Spring Society Events

February 2022

8th • Monthly CCAS Meeting online via Zoom. The meeting starts at 7:30 p.m. Dr. Morgan Cable, Astrobiology and Ocean Worlds Group, NASA's Jet Propulsion Laboratory (JPL): "Ocean Worlds of the Outer Solar System - Explorations of Titan and NASA's Dragonfly Mission."

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

21st • The von Kármán Lecture Series: [Roving with Perseverance: Findings from One Year on Mars](#), starting at 10:00 pm EDT. Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

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

March 2022

8th • Monthly CCAS Meeting online via Zoom. The meeting starts at 7:30 p.m. Guest Speaker: Guest Speaker: Dr. Benjamin Hockman, Robotics Division, NASA's Jet Propulsion Laboratory (JPL): "Frontiers of Robotic Exploration of the Solar System: From Asteroid Hoppers to European Deep Drills."

17th • The von Kármán Lecture Series: [Moon Dance: Dynamics of the Moons of the Outer Solar System](#), starting at 10:00 pm EDT. Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Vernal Equinox, 11:33 a.m. EDT. First day of spring.

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

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

January 2022 Monthly Meeting Minutes

by Bea Mazziotta, CCAS Secretary

- Dave Hockenberry welcomed members and guests to the January 11, 2022, meeting which was held via Zoom and YouTube only. At its max we had 110 attendees.
- Dave announced that WCU had not yet reached a decision on 'in person' attendance. CCAS will follow their lead and meet virtually until the university gives further guidance.
- Dave also informed members of that the first meeting of the West Chester University Green Team Dark Sky Initiative will be held on Tuesday February 1st from 6 to 7 PM meeting at the Mather Planetarium on the WCU campus. The initiative has the support of local state senator Carolyn Comitta. All are welcome to attend. Further info will be posted as it's available. <https://wcgreenteam.files.wordpress.com/2022/01/wc-greenteam-newsletter-jan-2022.pdf>
- Don Knabb announced that club member Don Miller's application to become a NASA Solar System has been accepted. Congratulations Don Miller!
- Don Knabb showed a short slide presentation as a lead in to the evening's topic - Countdown To Launch, NASA's Space Launch System and the Artemis Lunar Launch presented by Brian Matisak. Brian is the deputy manager of the Systems Engineering and Integration Office for the Space Launch Systems Program at the Marshall Space Flight Center in Huntsville Alabama. Brian described the various stages of NASA's Artemis Program whose missions will strive to ultimately establish a human manned base on the moon from which to further explore the solar system. Through a series of slides he showed the various stages of lunar landings, establishing base camps and how these will prepare us for missions to Mars. The Space Launch System (SLS) will provide a super heavy-lift launch vehicle allowing for greatly increased capacity to carry both crew and cargo to lunar base camps and beyond. SLS will also go further faster promising reduced times to reach the outer solar system and promote deep space exploration.
- Go to eventbrite.com for your free virtual Artemis Launch Passport
- Introduce and/or encourage the next gen to learn more at <https://stem.nasa.gov/Artemis/>

February 2022 CCAS Meeting Agenda

by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on February 8, 2022, online via Zoom. The meeting starts at 7:30 p.m. Guest Speaker: Dr. Morgan Cable, Astrobiology and Ocean Worlds Group, NASA's Jet Propulsion Laboratory (JPL): "Ocean Worlds of the Outer Solar System - Explorations of Titan and NASA's Dragonfly Mission."

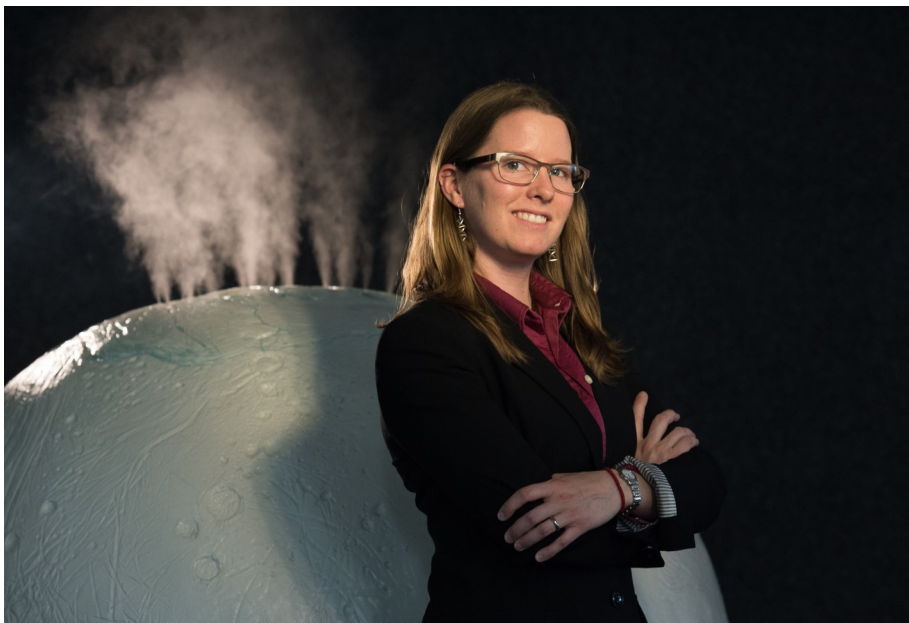
Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS

members will be notified via email 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 programs@ccas.us.

February 2022 Guest Speaker Bio & Presentation Synopsis

by Bruce Ruggeri



Morgan L. Cable, Ph.D.

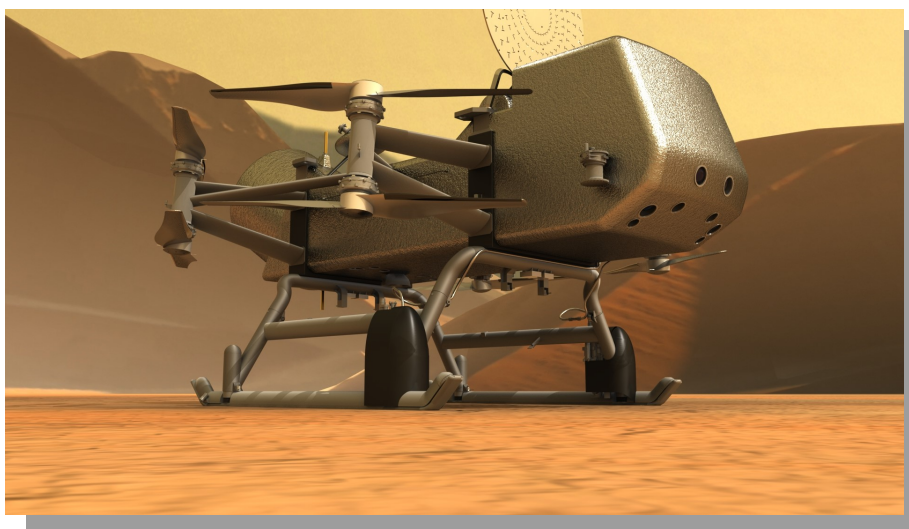
At our next monthly meeting on January 8, 2022, Dr. Morgan Cable, Astrobiology and Ocean Worlds Group, NASA's Jet Propulsion Laboratory (JPL) joins us to present her team's research: "Ocean Worlds of the Outer Solar System - Explorations of Titan and NASA's Dragonfly Mission." Join us online starting at 7:30 p.m.

Presentation Title: Exploring Ocean Worlds of the Outer Solar System.

Synopsis: Our solar system is host to multiple ocean worlds - planets and moons that contain oceans of liquid, usually water, either on their surfaces or underneath icy crusts. These worlds are prime targets of exploration due to NASA's quest to 'follow

the water' and may contain all three ingredients for life as we know it - water, chemistry, and energy. Could life exist in the oceans of Enceladus or Europa? Could even stranger life have emerged in the liquid methane lakes of Titan? We will cover our current state of knowledge of these ocean worlds, including experimental work conducted in labs here on Earth to investigate the unusual cryomineralogy of Titan. We will also discuss some current missions and future mission concepts to explore these worlds' plumes, surfaces, and ocean depths.

Biosketch: Morgan L. Cable earned her Ph.D. in Chemistry from the California Institute of Technology in 2010, where she investigated various lanthanide-based receptor sites for the detection of bacterial spores. As a NASA Postdoctoral Fellow (2010-2013) and currently as a supervisor of the Astrobiology and Ocean Worlds Group at the NASA Jet Propulsion Laboratory, Morgan's work continues to focus on organic and biomarker detection strategies, through both in situ and remote sensing techniques. She also serves as the Ocean Worlds Program Scientist for the Planetary Science Mission Formulation Office, and is a Co-I on Dragonfly and a Collaborator on the Mapping Imaging Spectrometer for Europa (MISE) instrument of Europa Clipper. Morgan has performed field work in extreme environments that serve as analogs for other worlds, such as the Atacama Desert in Chile, the lava fields of Iceland, and the summit of Mt. Kilimanjaro.

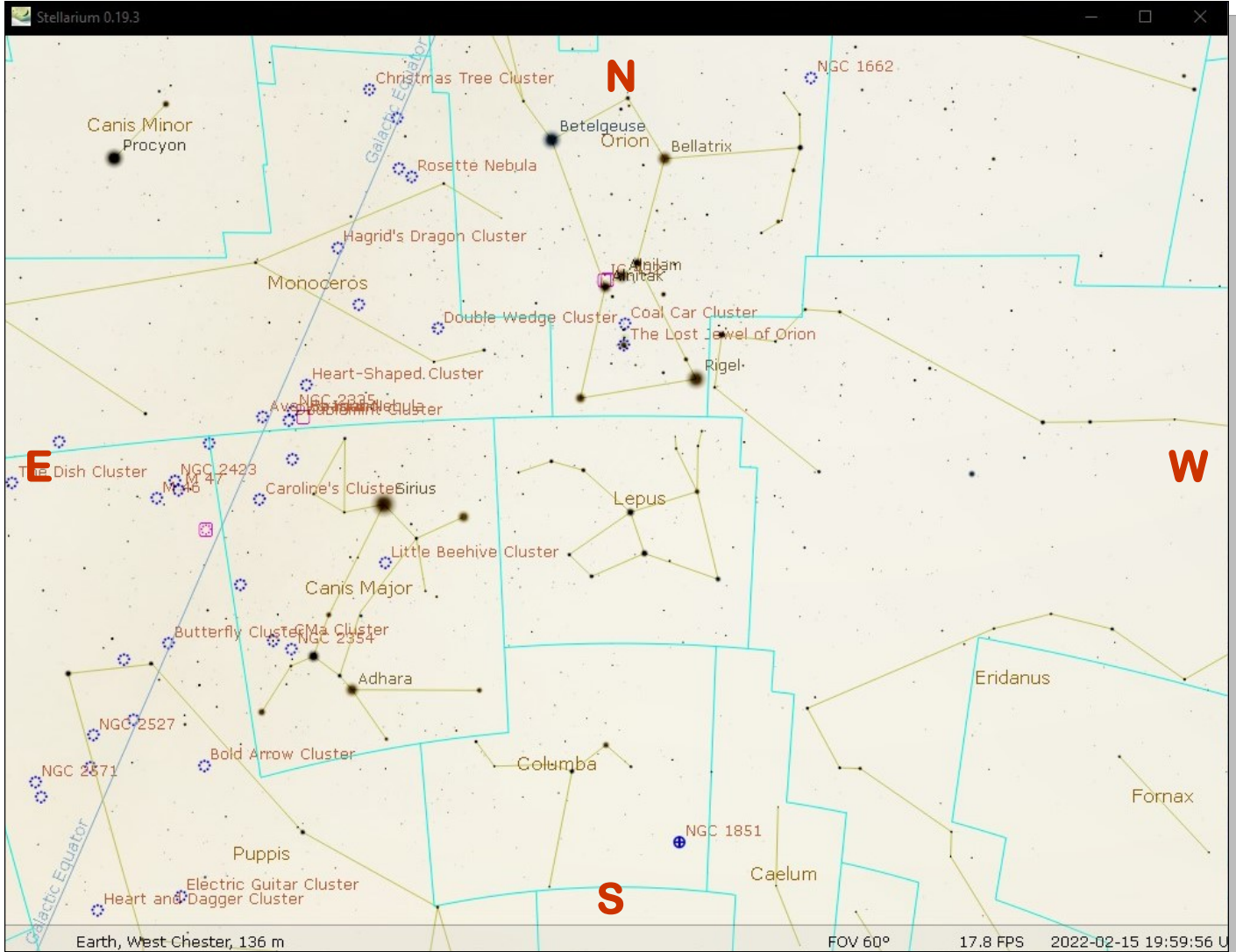


*Artist's Impression of Dragonfly on Titan's surface.
Credits: NASA/Johns Hopkins APL*

The Sky Over Chester County

February 15, 2022 at 8:00 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 |
|------------|-----------------------|---------------|---------------|---------------------|---------------|
| 02/01/2022 | 6:44 a.m. EST | 7:12 a.m. EST | 5:22 p.m. EST | 5:50 p.m. EST | 10h 09m 25s |
| 02/15/2022 | 6:29 a.m. EST | 6:56 a.m. EST | 5:39 p.m. EST | 6:07 p.m. EST | 10h 42m 11s |
| 02/28/2022 | 6:11 a.m. EST | 6:38 a.m. EST | 5:54 p.m. EST | 6:21 p.m. EST | 11h 15m 27s |

| Moon Phases | | | | | |
|---------------|------------|---------------|-----------|------------|----------------|
| | | | New Moon | 02/01/2022 | 12:46 a.m. EST |
| First Quarter | 02/08/2022 | 8:50 a.m. EST | Full Moon | 02/16/2022 | 11:56 a.m. EST |
| Last Quarter | 02/23/2022 | 5:32 p.m. EST | | | |

February 2022 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

| | |
|-------|--|
| 1 | New Moon, 12:46 a.m. EST |
| 2 | Groundhog Day, a cross-quarter day which is about half way between the Winter Solstice and the Spring Equinox. So, we are half-way to spring! |
| 8 | First Quarter Moon and the Lunar X is visible around 1 p.m. |
| 9 | The Lunar Straight Wall is visible and the Moon passes between the Pleiades and Aldebaran |
| 16 | Full Moon, the Full Snow Moon or the Full Snow Blinding Moon, 11:56 a.m. EST |
| 16-28 | The Zodiacal Light is visible from a dark sky site after evening twilight |
| 23 | Last Quarter Moon, 5:32 p.m. EST |

The best sights this month: Unfortunately, we have lost our evening planets to the pre-dawn sky, except for Jupiter early in the month. The Moon puts on a nice show this month as it passes between the Pleiades star cluster and Aldebaran on February 9th. Then on February 11th you can see the Lunar X during the daytime when it appears at approximately 1:00 p.m. The “X” is caused by light illuminating the rims of craters Blanchinus, La Caille and Purback. Also look for the Lunar V much higher on the terminator. The “V” is caused by light illuminating crater Ukert along with several smaller craters. Then on February 13 the Moon forms a line with Castor and Pollux in the constellation Gemini.

Mercury: Mercury is visible in the pre-dawn sky during February.

Venus: Venus is unusually bright in February at magnitude -4.9! Unfortunately, it is only visible in the pre-dawn hours.

Mars: Mars is also visible in the pre-dawn sky but it is much fainter than Venus at magnitude 1.4.

Jupiter: To see the king of the planets during February you need to look low in the west after sunset during the first two weeks of the month. Beyond

then Jupiter will be difficult to see because it will be too close to the horizon.

Saturn: Saturn passes behind the Sun on February 4th and emerges into the pre-dawn sky late in the month to join its pals Mercury, Venus and Mars.

Uranus and Neptune: Neptune sets 3 hours after sunset during February, so to find this distant cold world set up early and use mounted binoculars and an astronomy app to star hop to this faint inhabitant of the outer solar system. Uranus is easier to find and is visible during the evening hours, setting around midnight. You should be able to find this green/blue ice giant with an astronomy app and binoculars, which are best used mounted on a tripod for easy star hopping.

The Moon: Full Moon is on February 16th. According to Native Americans this is the Full Snow Moon since the heaviest snow usually falls during this month. Some tribes also referred to this Moon as the Full Hunger Moon, since harsh weather conditions in their areas made hunting very difficult. Native Canadian tribes called this the Full Frog Moon or the Full Snow Blinding Moon. On February 9th the Moon passes between the Pleiades and Aldebaran in the constellation Taurus. Then on February 13 the Moon forms a line with Castor and Pollux in the constellation Gemini.

Constellations: During February look to the west early to see the Great Square of Pegasus setting. Behind Pegasus and Andromeda, the winter constellations take control of center stage for all of February. My favorite part of the February sky is the south in which we see several constellations with bright stars. This includes Taurus with Aldebaran, Orion with Betelgeuse and Rigel, Canis Major with Sirius and Canis Minor with Procyon. Sirius, Rigel, Aldebaran, Capella, Pollux and Procyon make up the Winter Hexagon. Stay up late and see bright Arcturus in Bootes rising in the east.

Messier/deep sky: Grab your binoculars to search the February sky for deep sky objects since binoculars have nearly zero set up time compared to a cold telescope. The hardest part of telescopic viewing during the cold months is setting up and putting a telescope away. It's hard to handle a telescope and tripod wearing gloves, but without gloves the cold

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Hubble Finds a Black Hole Igniting Star Formation in a Dwarf Galaxy

by NASA Hubblesite



Dwarf starburst galaxy Henize 2-10 sparkles with young stars in this Hubble visible-light image. The bright region at the center, surrounded by pink clouds and dark dust lanes, indicates the location of the galaxy's massive black hole and active stellar nurseries.

CREDITS: SCIENCE: NASA, ESA, Zachary Schutte (XGI), Amy Reines (XGI) IMAGE PROCESSING: Alyssa Pagan (STScI)

Black holes are often described as the monsters of the universe—tearing apart stars, consuming anything that comes too close, and holding light captive. Detailed evidence from NASA's Hubble Space Telescope, however, shows a black hole in a new light: fostering, rather than suppressing, star formation. Hubble imaging and spectroscopy of the dwarf starburst galaxy Henize 2-10 clearly show a gas outflow stretching from the

black hole to a bright star birth region like an umbilical cord, triggering the already dense cloud into forming clusters of stars. Astronomers have previously debated that a dwarf galaxy could have a black hole analogous to the supermassive black holes in larger galaxies. Further study of dwarf galaxies, which have remained small over cosmic time, may shed light on the question of how the first seeds of supermassive black

holes formed and evolved over the history of the universe.

Often portrayed as destructive monsters that hold light captive, black holes take on a less villainous role in the latest research from NASA's Hubble Space Telescope. A black hole at the heart of the dwarf galaxy Henize 2-10 is creating stars rather than gobbling them up. The black hole is apparently

(Continued on page 8)

Observing (Cont'd)

(Continued from page 5)

metal parts chill your hands to the bone very quickly. Binoculars however, once you get them focused, can be easily handled with gloves on your hands. And even a small pair of binoculars will bring many deep sky objects within view.

Comets: There are no bright comets visible during February.

Meteor showers: There are no meteor showers during February. However, from February 16th until March 2nd is a good time to look for the Zodiacal Light, a cone-shaped glow of light that is created when sunlight reflects off dusty debris in the inner solar system.

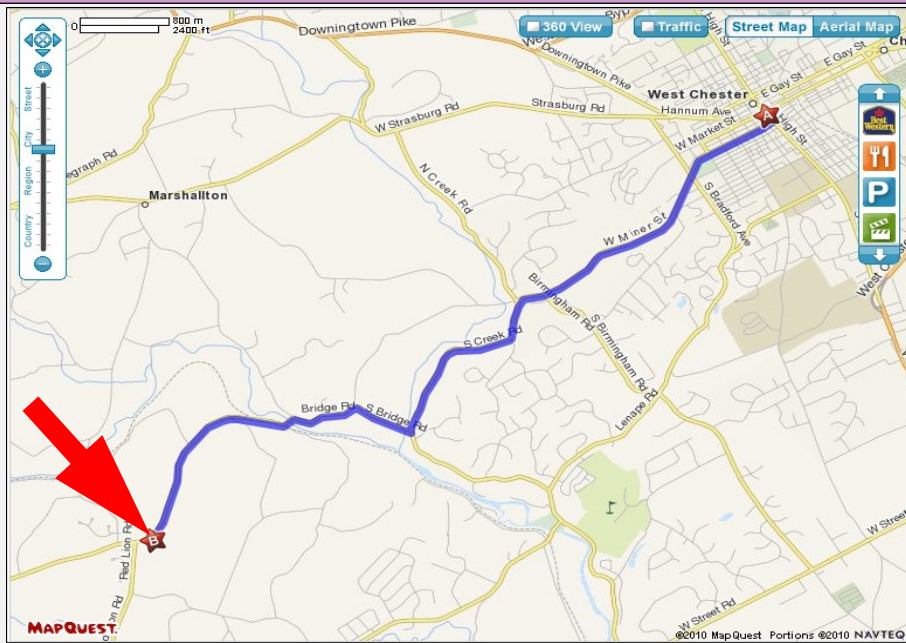
Classic La Para by Nicholas La Para

NASA FINDS A USE FOR NEAR-EARTH ASTEROIDS



LaPara

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.

Black Hole (Cont'd)

(Continued from page 6)

contributing to the firestorm of new star formation taking place in the galaxy. The dwarf galaxy lies 30 million light-years away, in the southern constellation Pyxis.

A decade ago this small galaxy set off debate among astronomers as to whether dwarf galaxies were home to black holes proportional to the supermassive behemoths found in the hearts of larger galaxies. This new discovery has little Henize 2-10, containing only one-tenth the number of stars found in our Milky Way, poised to play a big part in solving the mystery of where supermassive black holes came from in the first place.

"Ten years ago, as a graduate student thinking I would spend my career on star formation, I looked at the data from Henize 2-10 and everything changed," said Amy Reines, who published the first evidence for a black hole in the galaxy in 2011 and is the principal investigator on the new Hubble observations, published in the January 19 issue of *Nature*.

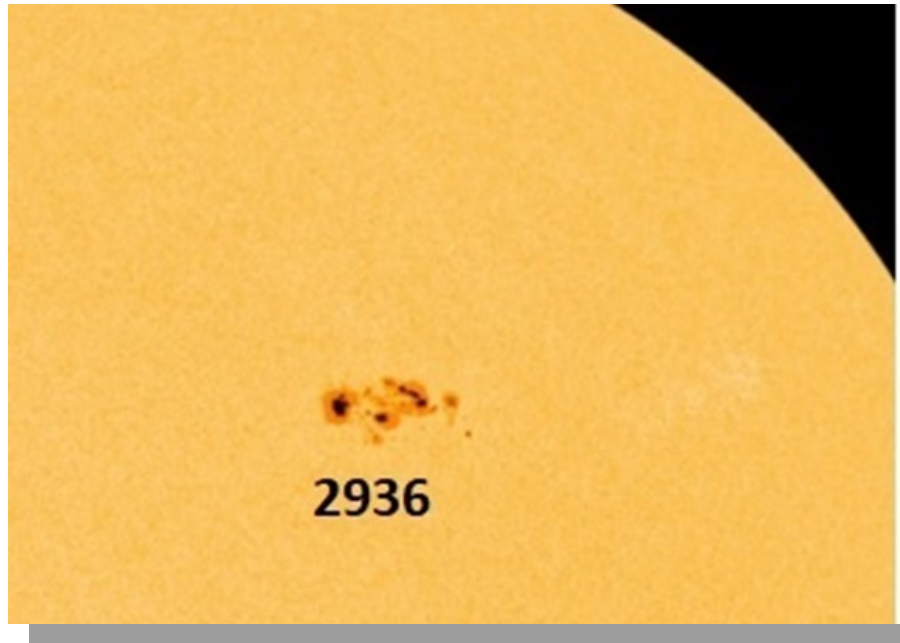
"From the beginning I knew something unusual and special was happening in Henize 2-10, and now Hubble has provided a very clear picture of the connection between the black hole and a neighboring star forming region located 230 light-years from the black hole," Reines said.

That connection is an outflow of gas stretching across space like an umbilical cord to a bright stellar nursery. The re-

(Continued on page 9)

Solar Activity Report

by CCAS Member Frank Angelini

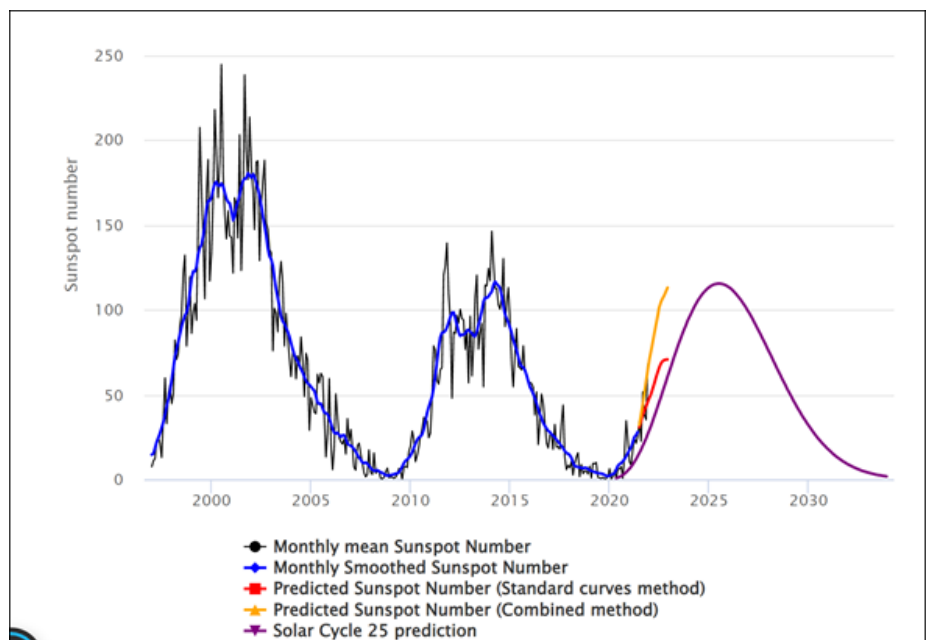


SUNSPOT GROUPING Ars 2936
Celestron C-14 @ PrimeFocus, Nikon D7000, 01-30-2022, 18:18 UTC

I try to stay tuned to solar activity mainly because the sun's activity can have dramatic effects on our terrestrial weather, not to mention the potential danger to astronauts should a particularly energetic coronal mass ejection

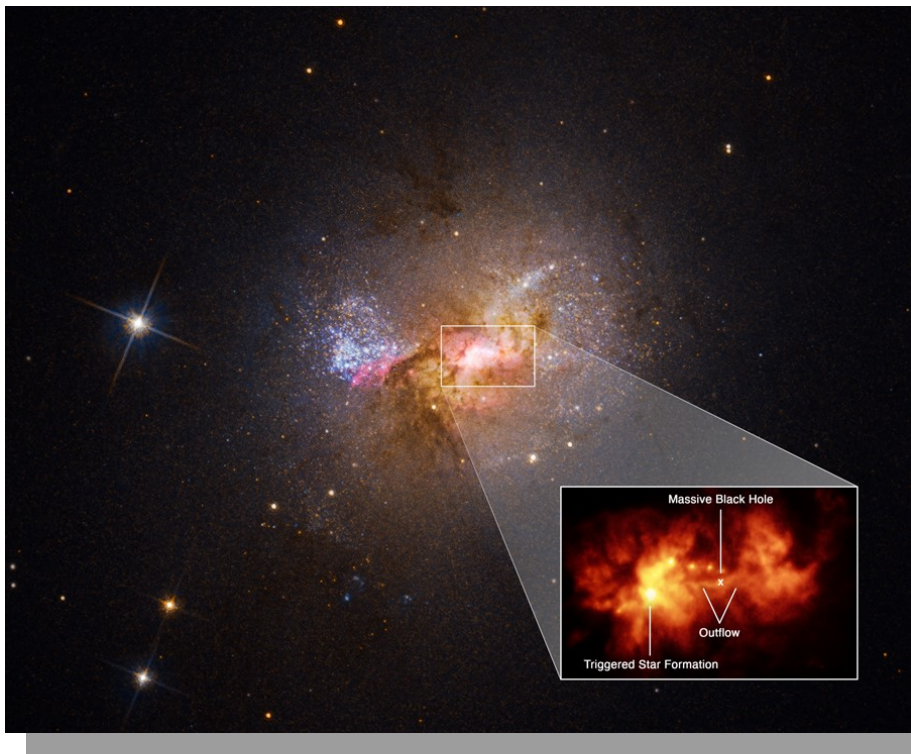
(CME) occur during a critical mission. Now that we are well into solar cycle 25 solar activity will be on the up swing after a few years of very low activity.

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Current Solar Cycle

Black Hole (Cont'd)



A pullout of the central region of dwarf starburst galaxy Henize 2-10 traces an outflow, or bridge of hot gas 230 light-years long, connecting the galaxy's massive black hole and a star-forming region. Hubble data on the velocity of the outflow from the black hole, as well as the age of the young stars, indicates a causal relationship between the two. A few million years ago, the outflow of hot gas slammed into the dense cloud of a stellar nursery and spread out, like water from a hose impacting a mound of dirt. Now clusters of young stars are aligned perpendicular to the outflow, revealing the path of its spread.

CREDITS: SCIENCE: NASA, ESA, Zachary Schutte (XGI), Amy Reines (XGI)
IMAGE PROCESSING: Alyssa Pagan (STScI)

(Continued from page 8)

gion was already home to a dense cocoon of gas when the low-velocity outflow arrived. Hubble spectroscopy shows the outflow was moving about 1 million miles per hour, slamming into the dense gas like a garden hose hitting a pile of dirt and spreading out. Newborn star clusters dot the path of the outflow's spread, their ages also calculated by Hubble.

This is the opposite effect of what's seen in larger galaxies, where material falling toward the black hole is whisked away by surrounding magnetic fields, forming blazing jets of plasma moving at close to the speed of light. Gas clouds caught in the

jets' path would be heated far beyond their ability to cool back down and form stars. But with the less-massive black hole in Henize 2-10, and its gentler outflow, gas was compressed just enough to precipitate new star formation.

"At only 30 million light-years away, Henize 2-10 is close enough that Hubble was able to capture both images and spectroscopic evidence of a black hole outflow very clearly. The additional surprise was that, rather than suppressing star formation, the outflow was triggering the birth of new stars," said Zachary Schutte, Reines' graduate student and lead author of the new study.

Ever since her first discovery of distinctive radio and X-ray emissions in Henize 2-10, Reines has thought they likely came from a massive black hole, but not as supermassive as those seen in larger galaxies. Other astronomers, however, thought that the radiation was more likely being emitted by a supernova remnant, which would be a familiar occurrence in a galaxy that is rapidly pumping out massive stars that quickly explode.

"Hubble's amazing resolution clearly shows a corkscrew-like pattern in the velocities of the gas, which we can fit to the model of a precessing, or wobbling, outflow from a black hole. A supernova remnant would not have that pattern, and so it is effectively our smoking-gun proof that this is a black hole," Reines said.

Reines expects that even more research will be directed at dwarf galaxy black holes in the future, with the aim of using them as clues to the mystery of how supermassive black holes came to be in the early universe. It's a persistent puzzle for astronomers. The relationship between the mass of the galaxy and its black hole can provide clues. The black hole in Henize 2-10 is around 1 million solar masses. In larger galaxies, black holes can be more than 1 billion times our Sun's mass. The more massive the host galaxy, the more massive the central black hole.

Current theories on the origin of supermassive black holes break down into three categories: 1) they formed just like

(Continued on page 13)

Looking Up: The Zodiacal Light

by Don Knabb, CCAS Observing Chair & Treasurer

This month we look for something in the sky that requires no equipment other than a warm hat, coat and gloves! During February it can be difficult to set up a telescope, so I like to look for binocular or naked eye sky objects or phenomena. In this case what we are looking for cannot be seen with binoculars nor is it an object, so we'll go with calling it a phenomenon.

At certain times of year, a faint cone of light appears in the western sky just after darkness falls. This eerie glow is the Zodiacal Light. The reason for the name "Zodiacal" Light is because it is usually seen projected against the zodiacal constellations. The Zodiacal Light is seen as a faint, roughly triangular, whitish glow which appears to extend up from the vicinity of the Sun along the ecliptic or zodiac. The Zodiacal Light decreases in intensity with distance from the Sun, but on very dark nights it has been observed in a band completely around the ecliptic.

The best time to see the Zodiacal Light is when the ecliptic appears nearly vertical to our horizon. For Chester County observers the Zodiacal light is most easily visible from a dark location under clear and transparent skies just after evening twilight in the west in February and March, and in the morning eastern sky, just before the start of twilight in October. Since I am not often out observing before dawn, these next few weeks are, for me, the best opportunity to see the Zodiacal Light. It is so faint that it is completely masked by either moonlight or



Dominic Cantin photographed the Zodiacal Light near Quebec City, Canada, in August 2000 in this 2-minute exposure. The bright spot is the planet Venus. https://en.wikipedia.org/wiki/Zodiacal_light#/media/File:Cantin1.jpg

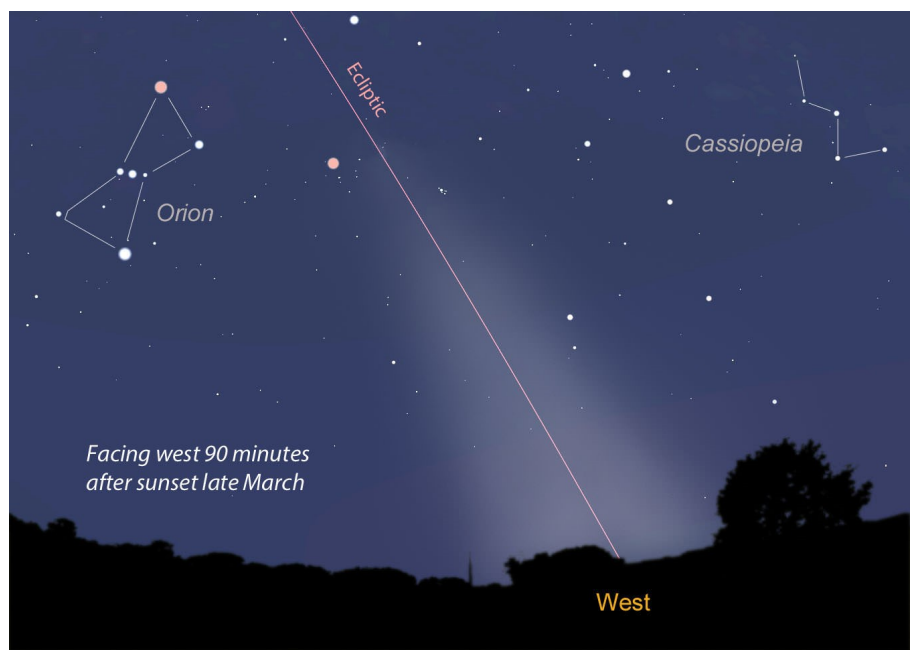
light pollution, so you need to find a dark sky site on a clear night when the Moon is absent from the sky.

The Zodiacal Light is caused

by an enormous cloud of cosmic dust extending outward from the Sun and past the orbit of the Earth. The particles have diame-

(Continued on page 11)

Looking Up (Cont'd)



The zodiacal light is centered on the plane of the solar system called the ecliptic. This is the same band of sky where you'll find the planets and zodiac constellations, hence the name. On late March nights, you can trace it from near the western horizon more than 45 degrees (halfway up the sky). Image created with Stellarium. Retrieved from <https://www.universetoday.com/tag/clementine/>

(Continued from page 10)

ters between a couple of micrometers and a few millimeters. According to earthsky.org, people previously thought the zodiacal light originated somehow from phenomena in Earth's upper atmosphere, but today we understand it as sunlight reflecting off dust grains that circle the Sun in the inner solar system. These grains are thought to be left over from the process that created our Earth and the other planets of our solar system 4.5 billion years ago.

Many people confuse the Zodiacal light with twilight since it occurs in roughly the same area of sky, although careful attention to the time of the true end of astronomical twilight will remove any doubt about whether you are seeing the Zodiacal light or the sky brightening from lingering

twilight. You can find that time for any date and location from this website: <https://www.sunrisesunset.com/predefined.asp>.

Since the band of dust that forms the Zodiacal light completely circles the sun, it actually stretches across the entire night sky. At the anti-solar point, that point in the sky exactly opposite the sun in the sky, lies a very subtle, and very faint brightening of the dust called the Gegenschein, which is German for "counter-glow". The Gegenschein is most easily seen at midnight when it is highest in the sky, and in those times of the year when it is in a part of the sky with few stars from late September to early November in Pisces, and from late January to early February in Cancer.

Interestingly, the Zodiacal Light and Gegenschein can only be seen with the unaided eye, and not through any optical instruments such as binoculars or telescopes because of its large size and low surface brightness.

Information credits:

- http://en.wikipedia.org/wiki/Zodiacal_light
- http://www.space.com/spacewatch/zodiacal_light_021101.html
- http://www.astropix.com/HTML/H_OTHER/ZLITE.HTM
- <http://earthsky.org/astronomy-essentials/everything-you-need-to-know-zodiacal-light-or-false-dusk>

Solar Activity (Cont'd)

(Continued from page 8)

This past weekend, after the snowstorm I thought I better check the observatory roof. After discovering that no damage had occurred, I thought I would take a quick look at old sol. The sky was clear due to the high-pressure front that often follows a snow event. So, I put a solar filter on the 14 and had a look. Wow! I hadn't realized there was so much sunspot activity. I review of the literature later revealed that there has been significant activity, and more is predicted. I decided to take a look every week when weather permits. I'll try to keep you posted especially when I see something noteworthy.

NASA Night Sky Notes: Hang Out with the Twins of Gemini 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.

The night skies of February are filled with beautiful star patterns, and so this month we take a closer look at another famous constellation, now rising high in the east after sunset: Gemini, the Twins!

If you're observing Orion, as discussed in last month's article, then Gemini is easy to find: just look above Orion's "head" to find Gemini's "feet." Or, make a line from brilliant blue-white Rigel in the foot of Orion,



through its distinct "Belt," and then on through orange Betelgeuse. Keep going and you will end up in between the bright stars Castor and Pollux, the "heads" of the Gemini Twins. While not actually related –

these stars aren't bound to each other, and are almost a magnitude apart in brightness – they do pair up nicely when compared to their surrounding stars. Take note: more than one stargazer has confused Gemini with its next-door neighbor constellation, Auriga. The stars of Auriga rise before Gemini's, and its brightest star, Capella, doesn't pair up as strikingly with its second most brilliant star as Castor and Pollux do. Star-hop to Gemini from Orion using the trick above if you aren't sure which constellation you're looking at.

Pollux is the brighter of Gemini-

(Continued on page 13)

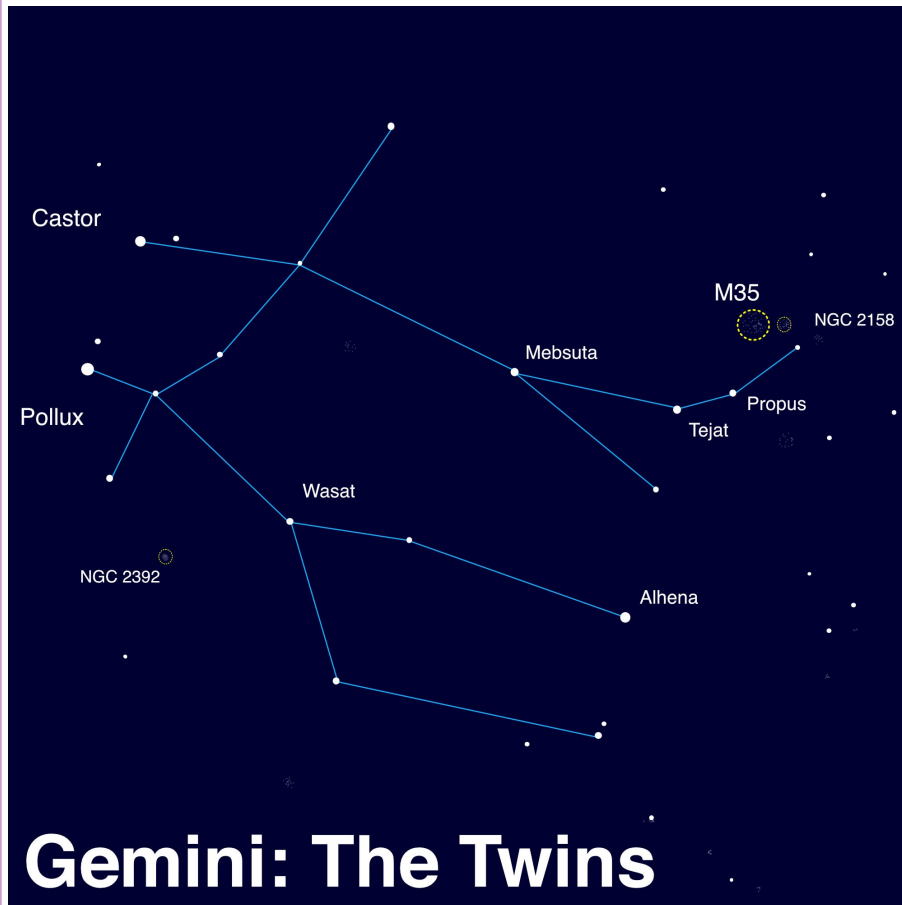


Montage of Gemini North, located on Mauna Kea in Hawaii, and Gemini South, located on Cerro Pachón in Chile.

These "twin" telescopes work together as the Gemini Observatory to observe the entire sky.

Image Credit: NOIRLab Source: <https://www.gemini.edu/gallery/media/gemini-northsouth-montage>

Night Sky Notes (Cont'd)



Castor and Pollux are Gemini's most prominent stars, and often referred to as the "heads" of the eponymous twins from Greek myth. In Chinese astronomy, these stars make up two separate patterns: the Vermillion Bird of the South and the White Tiger of the North. What do you see? The Night Sky Network's "Legends in the Sky" activity includes downloadable "Create Your Own Constellation" handouts so you can draw your own star stories: bit.ly/legendsinthesky Image created with assistance from Stellarium.

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ni's two "head" stars - imagine it has the head of the "left twin" - and located about 34 light-years away from our Solar System. Pollux even possesses a planet, Pollux b, over twice the mass of Jupiter. Castor - the head of the "right twin" - by contrast, lies about 51 light-years distant and is slightly dimmer. While no planets have been detected, there is still plenty of company as Castor is actually a six-star system! There are several great deep-sky objects to observe as well. You may be able to spot one with your unaided eyes, if

you have dark skies and sharp eyes: M35, a large open cluster near the "right foot" of Gemini, about 3,870 light-years away. It's almost the size of a full Moon in our skies! Optical aid like binoculars or a telescope reveals the cluster's brilliant member stars. Once you spot M35, look around to see if you can spot another open cluster, NGC 2158, much smaller and more distant than M35 at 9,000 light-years away. Another notable object is NGC 2392, a planetary nebula created from the remains of a dying star, located

(Continued on page 14)

Black Hole (Cont'd)

(Continued from page 9)

smaller stellar-mass black holes, from the implosion of stars, and somehow gathered enough material to grow supermassive, 2) special conditions in the early universe allowed for the formation of supermassive stars, which collapsed to form massive black hole "seeds" right off the bat, or 3) the seeds of future supermassive black holes were born in dense star clusters, where the cluster's overall mass would have been enough to somehow create them from gravitational collapse.

So far, none of these black hole seeding theories has taken the lead. Dwarf galaxies like Henize 2-10 offer promising potential clues, because they have remained small over cosmic time, rather than undergoing the growth and mergers of large galaxies like the Milky Way. Astronomers think that dwarf galaxy black holes could serve as an analog for black holes in the early universe, when they were just beginning to form and grow.

"The era of the first black holes is not something that we have been able to see, so it really has become the big question: where did they come from? Dwarf galaxies may retain some memory of the black hole seeding scenario that has otherwise been lost to time and space," Reines said.

The Hubble Space Telescope is a project of international cooperation between NASA and ESA (European Space Agency). NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore, Maryland, conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy in Washington, D.C.

<https://hubblesite.org/contents/news-releases/2022/news-2022-002>

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).



Night Sky Notes (Cont'd)

(Continued from page 13)

about 6,500 light-years distant. You'll want to use a telescope to find this intriguing faint fuzzy, located near the "left hip" star Wasat.

Gemini's stars are referenced quite often in cultures around the world, and even in the history of space exploration. NASA's famed Gemini program took its name from these stars, as do the appropriately named twin Gemini North and South Observatories in Hawaii and Chile. You can discover more about Gemini's namesakes along with the latest observations of its stars and related celestial objects at nasa.gov.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

Jan. 2022 Financial Summary

| | |
|-------------------|---------|
| Beginning Balance | \$961 |
| Deposits | \$350 |
| Disbursements | -\$0 |
| Ending Balance | \$1,311 |

New Member Welcome!

Welcome to our new CCAS member Eric Schier 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 (410) 639-4329 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.