



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 29, No. 5 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016

May 2021

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Horsehead and Orion Nebulas



Image Credit & Copyright: Roberto Colombari & Federico Pelliccia The dark **Horsehead Nebula** and the glowing **Orion Nebula** are contrasting cosmic vistas. Adrift 1,500 light-years away in one of **the night sky's** most recognizable **constellations**, they appear in opposite corners of the above **stunning mosaic**. The familiar **Horsehead** nebula appears as a dark cloud, a **small silhouette** notched against the long red glow at the lower left. **Alnitak** is the easternmost star in **Orion's belt** and is seen as the brightest **star** to the left of the **Horsehead**. Below Alnitak is the **Flame Nebula**, with clouds of bright emission and **dramatic** dark dust lanes. The magnificent emission region, the **Orion Nebula** (aka M42), lies at the upper right. Immediately to its left is a prominent **reflection nebula** sometimes called the Running Man. Pervasive **tendrils** of glowing hydrogen gas are easily **traced** throughout the region.

Membership Renewals Due

05/2021	Aylam & Martin-Aylam Cunningham Klapholz LaFrance Ostaneck Quinn Toth
06/2021	Crabb Hanspal Harris Hebdig Mazziotto & Calobrisi McCausland Thomas
07/2021	Barasatian Goss Hockenberry & Miller Hunsinger McGuigan Morgan Piehl Wendel

May 2021 Dates

- 3rd** • Last Quarter Moon, 3:50 p.m. EDT
- 5th** • The Eta Aquariid meteor shower peaks in the predawn hours
- 11th** • New Moon, 2:59 p.m. EDT
- 17** • The Moon is near the Beehive Cluster in Cancer the Crab
- 19th** • The First Quarter, 3:12 p.m. EDT
- 28th** • Full Moon, the Full Flower Moon or the Full Frog Croaking Moon, 7:13 p.m. EDT



Membership Dues Increase

CCAS membership dues increased in March 2021. They hadn't changed in 18 years, so it was time to increase the dues to cover increases in the Society's operating costs. All membership types went up \$5 except for the Student membership, which remained unchanged.

Here are the old and new rates:

Type	Old Rate	New Rate
Regular	\$25	\$30
Senior	\$10	\$15
Student	\$5	\$5
Family	\$35	\$40

Spring / Summer Society Events

May 2021

2nd • Spring [National Astronomy Day](#).

11th • CCAS Monthly Meeting, ONLINE via Zoom. The meeting starts at 7:30 p.m. Guest Speaker: Laura Kerber, PhD, Research Scientist, Caltech and NASA's Jet Propulsion Laboratory (JPL); "Mars - Understanding our Neighboring "Habitable" World and its Latest Revelations."

20th • The von Kármán Lecture Series: [Space Cameras—A Sharper Image](#), 10:00 pm EDT. Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the June 2021 edition of [Observations](#).

26th • Deadline for newsletter submissions for the June 2021 edition of [Observations](#).

June 2021

17th • The von Kármán Lecture Series: [Oh, Jupiter! We Thought We Knew You](#), 10:00 pm EDT. Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Summer Solstice is at 11:32 pm in West Chester, PA. In terms of daylight, this day is 5 hours, 41 minutes longer than on Winter Solstice in December.

20th • Open call for articles and photographs for the July 2021 edition of [Observations](#).

26th • Deadline for newsletter submissions for the July 2021 edition of [Observations](#).

Minutes from the April 13, 2021, CCAS Monthly Meeting

by *Bea Mazziotta, CCAS Secretary*

- Dave Hockenberry welcomed members and guests to the April 2021 CCAS meeting. Zoom and YouTube were the platforms. Attendance topped out at 40.
- Don led members on a tour of the April night sky, pointing out open clusters M36, 37 & 38 all in Auriga; Meissa, a giant double star in Orion; M35, an open cluster in Gemini; and M44, the Beehive open cluster in Cancer. He further noted that April is also a good time to observe the Coma Cluster, a very dense cluster of galaxies in Coma Berenices; M3, a luminous globular cluster in Canes Venatici; M81 Bode's galaxy; and Kemble's Cascade, an asterism of 20 bright stars that appear to 'cascade' in a straight line into an open cluster. Many of these objects are good for binocular viewing, conditions permitting.
- Bruce Ruggeri, Program Chair, introduced the evening's presenter, John Conrad, a CCAS member and NASA/JPL Solar System ambassador. Trained as an Astronautical Engineering in the Air Force & at Purdue, he is now retired from NASA and spends much of his time speaking to groups and sharing his wealth of knowledge and love of astronomy.
- John's topic was NASA Infrared Platforms Seeing Across Space and Time. Among them is SOFIA - Stratospheric Observatory for Infrared Astronomy. SOFIA is housed in a rare Boeing 747SP (special performance) and carries the world's only flying Infrared Astronomy laboratory and 100" infrared telescope. It flies at over 38,000' avoiding 99% of the earth's water vapor which would block the infrared wavelengths.
- Simply put, it is used to observe light in a spectrum that isn't visible to the naked eye or available with any other telescope on earth or in orbit. Many objects in space emit almost all of their energy in Infrared wavelengths that are unseeable in visible light or are hidden behind space dust and gas. In addition SOFIA carries other instruments including cameras, spectrometers and photometers. These help SOFIA gather a wide range of standalone data or data to integrate. SOFIA shuttles between hemispheres to work year round in the drier longer winter nights providing scientists and the world with an amazing eye in the sky.

May 2021 CCAS Meeting Agenda

by *Bruce Ruggeri, CCAS Program Chair*

Our next meeting will be held on May 11, 2021, starting at 7:30 p.m. The meeting will be held online via [Zoom.us](#). Our guest speaker is Dr. Laura Kerber, from the JPL in Pasadena. Her presentation is entitled, "Moon Diver: Planning a Mission to Dive into the Moon."

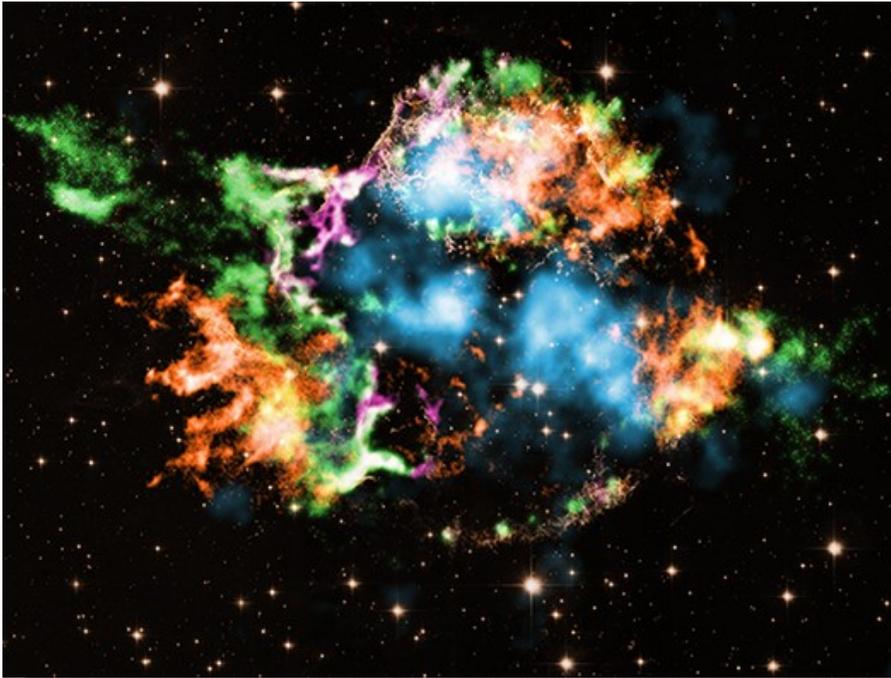
Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS members will be

notified via e-mail with as much advance notice as possible.

As for future meetings, we are looking for presenters for our 2021-2022 season and beyond. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Bubbles With Titanium Trigger Titanic Explosions

by NASA Marshall Space Flight Center / Chandra X-Ray Center



This composite image shows different elements spread throughout the Cassiopeia A supernova remnant: titanium (blue), the ratio of silicon to magnesium (green), iron (orange), and oxygen (purple). The data are overlaid on an optical light image (yellow) captured by Hubble. Chandra: NASA/CXC/RIKEN/T. Sato et al.; NuSTAR: NASA/NuSTAR; Hubble: NASA/STScI

Scientists have found fragments of titanium blasting out of a famous supernova. This discovery, made with NASA's Chandra X-ray Observatory, could be a major step in pinpointing exactly how some giant stars explode.

This work is based on Chandra observations of the remains of a supernova called Cassiopeia A (Cas A), located in our galaxy about 11,000 light-years from Earth. This is one of the youngest known supernova remnants, with an age of about 350 years.

For years, scientists have struggled to understand how massive stars — those with

(Continued on page 6)

May 2021 Presentation: Dr. Laura Kerber, JPL Pasadena CA

by Bruce Ruggeri, CCAS Program Chair

I am pleased to announce our final CCAS Monthly meeting for the Spring set for Tuesday, May 11 commencing at 7:00 pm ET. Our guest speaker is Dr. Laura Kerber, from the JPL in Pasadena. Her presentation is entitled, "Moon Diver: Planning a Mission to Dive into the Moon." The CCAS meeting presentation will commencing at approximately 7:50-8:00PM ET. The presentation title, synopsis and biosketch for Dr. Kerber are provided below.

Abstract:

In 2009, several deep volcanic collapse pits were discovered on the Moon by the Japanese spacecraft SELENE. The Lunar Reconnaissance Orbiter Camera subsequently captured high resolution oblique images of the pits,



revealing that some of them opened into subterranean cav-

erns, and that the walls of the pits exposed up to 40 meters of pristine lava stratigraphy. There are discussions within NASA of the possibility that such lava tubes/pits on the Moon and Mars may be potential sites for establishing human colonies, providing shielding from radiation exposure on the lunar and Martian surface.

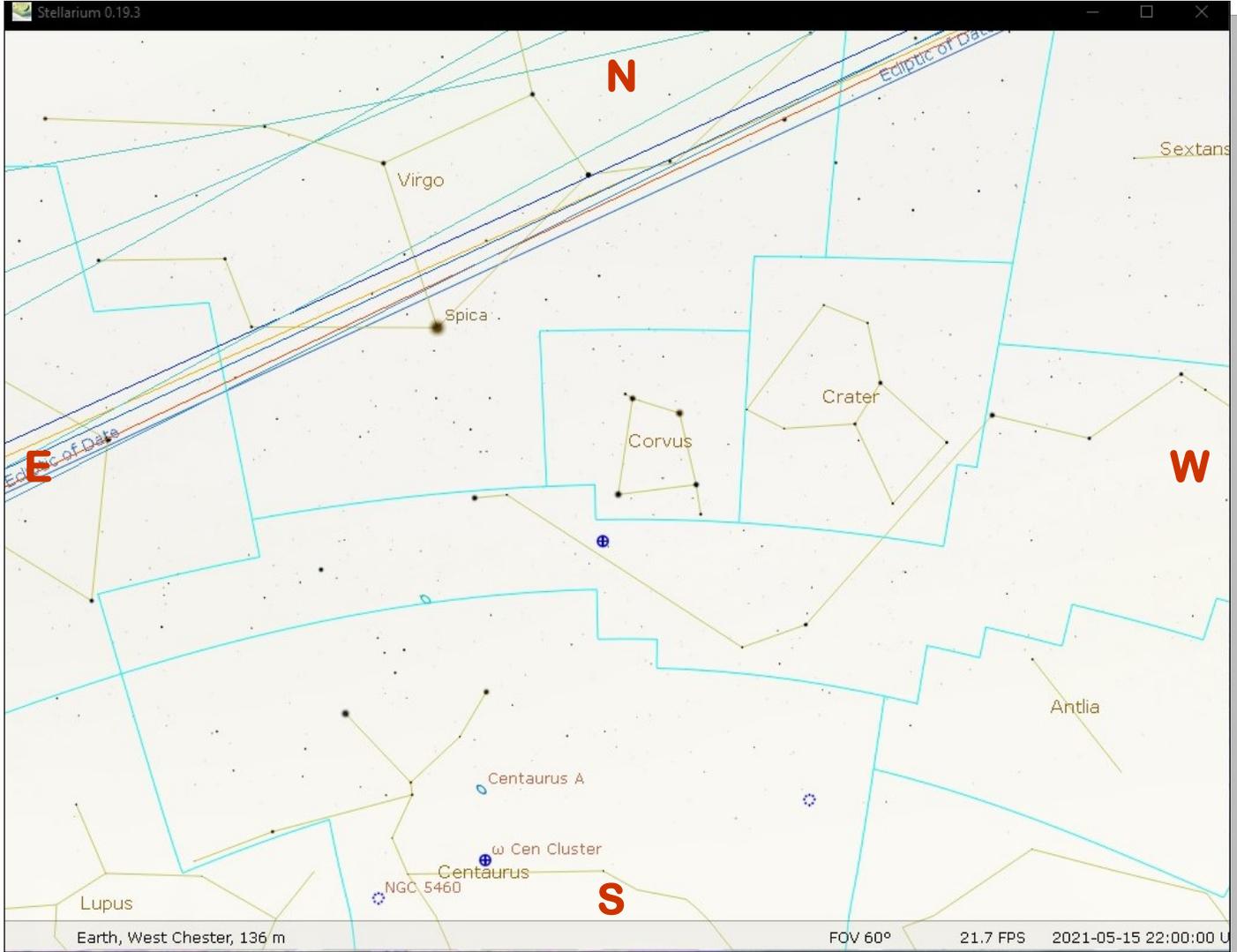
The Moon Diver mission concept proposes to send an extreme terrain rover into one of these pits, rappelling down the wall to expose the history of the lunar mare, and to illuminate the workings of the flood basalt eruptions that created them: eruptions on a scale never before witnessed in the history of humankind.

(Continued on page 6)

The Sky Over Chester County

May 15, 2021 at 10:00 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
05/01/2021	5:32 a.m. EDT	6:02 a.m. EDT	7:57 p.m. EDT	8:26 p.m. EDT	13h 55m 06s
05/15/2021	5:16 a.m. EDT	5:47 a.m. EDT	8:10 p.m. EDT	8:41 p.m. EDT	14h 24m 00s
05/31/2021	5:04 a.m. EDT	5:36 a.m. EDT	8:24 p.m. EDT	8:56 p.m. EDT	14h 48m 26s

Moon Phases					
Last Quarter	05/03/2021	3:50 p.m. EDT	New Moon	05/11/2021	2:59 p.m. EDT
First Quarter	05/19/2021	3:12 p.m. EDT	Full Moon	05/26/2021	7:13 p.m. EDT

May 2021 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

3	Last Quarter Moon, 3:50 p.m. EDT
5	The Eta Aquariid meteor shower peaks in the predawn hours
11	New Moon, 2:59 p.m. EDT
12	The Moon and Venus are very close in the west just after sunset
13	The Moon and Mercury are close in the west just after sunset
16	The Moon is near Mars
16	Mercury is at greatest elongation this evening
17	The Moon is near the Beehive Cluster in Cancer the Crab
18	The Lunar X and Lunar V are visible this evening around 8 p.m.
19	First Quarter Moon, 3:12 p.m. EDT
19	The Lunar Straight Wall is visible this evening
26	Full Moon, the Full Flower Moon or the Full Frog Croaking Moon, 7:13 p.m. EDT
26	A total lunar eclipse is in progress as the Moon sets in the predawn sky
29	Mercury is near Venus in the evening sky

The best sights this month: May is a great chance to see Mercury and two good days to look are May 13th when Mercury is near the Moon and May 28th when Mercury is near Venus. On May 18th we can see the Lunar X and Lunar V. There is also a total lunar eclipse at the end of the month but totality occurs after the Moon has set in Chester County.

Mercury: May is a great month to see Mercury! On May 13th Mercury and the Moon are close, and on May 28th Mercury and Venus are close. If you view this encounter with a telescope you will see Venus's disk nearly full and Mercury as a tiny crescent.

Venus: We are happy to welcome Venus back into the evening sky! Venus will be close to the Moon on May 12th, and this is the closest they will be all year, so don't miss the show. Then on May 28th Ve-

nus is close to Mercury.

Mars: Mars continues to fall behind in our race around the Sun and gets dimmer as the month progresses. On May 15th and 16th Mars and the Moon will be close.

Jupiter: Jupiter will rise around 3:30 a.m. and shines at magnitude -2.2 during May.

Saturn: Saturn rises around 2:30 a.m. during May.

Uranus and Neptune: Both Uranus and Neptune are poorly positioned for observation during May.

The Moon: The Moon is full on May 26th. Native Americans called this the Full Flower Moon. In most areas, flowers are abundant everywhere during this time, thus, the name of this Moon. Other names include the Full Corn Planting Moon, or the Milk Moon. Native Canadians called this The Full Frog Croaking Moon.

The Moon has several encounters during the month, and experiences a total eclipse late in the month. On the 12th it is close to Venus, on the 13th it is close to Mercury and on the 16th it is near Mars. On the 17th it is near the Beehive Cluster in Cancer the Crab.

Then on the morning of May 26th there is a total lunar eclipse, but totality is reached after the Moon has set in Chester County, so we can only see the beginning of the event just before the Moon sets.

A much better Moon event is on May 18th when the elusive Lunar X and Lunar V are visible.

Constellations: Spring is here, and with it the Big Dipper is high overhead. Follow the arc to bright Arcturus and find Boötes. Just to its left is the Northern Crown, Corona Borealis. Leo is easy to find just after sunset looking due south. And bright Vega in Lyra is rising as the night gets a bit later. Stay out later still and watch Cygnus the Swan fly above the eastern horizon.

Messier/deep sky: Would you like to see 500,000 stars at one time? Look nearly overhead during May, to the northwest and not far from Arcturus and find M3, the third object cataloged by Charles Messier. This globular cluster is one of the largest and brightest. Then look about twice as far the other direction from Arcturus and find M5, another fine globular cluster. Under extremely good conditions

(Continued on page 12)

Titanium (Cont'd)

(Continued from page 3)

masses over about 10 times that of the Sun — explode when they run out of fuel. This result provides an invaluable new clue.

"Scientists think most of the titanium that is used in our daily lives — such as in electronics or jewelry — is produced in a massive star's explosion," said Toshiki Sato of Rikkyo University in Japan, who led the study that appears in the journal *Nature*. "However, until now scientists have never been able to capture the moment just after stable titanium is made."

When the nuclear power source of a massive star runs out, the center collapses under gravity and forms either a dense stellar core called a neutron star or, less often, a black hole. When a neutron star is created, the inside of the collapsing massive star bounces off the surface of the stellar core, reversing the implosion.

The heat from this cataclysmic event produces a shock wave — similar to a sonic boom from a supersonic jet — that races outwards through the rest of the doomed star, producing new elements by nuclear reactions as it goes. However, in many computer models of this process, energy is quickly lost and the shock wave's journey outwards stalls, preventing the supernova explosion.

Recent three-dimensional computer simulations suggest that neutrinos — very low-mass subatomic particles — made in the creation of the neutron star play a crucial role in driving bubbles that speed away from the neutron star. These bubbles continue

driving the shock wave forward to trigger the supernova explosion.

With the new study of Cas A, the team discovered powerful evidence for such a neutrino-driven explosion. In the Chandra data they found that finger-shaped structures pointing away from the explosion site contain titanium and chromium, coinciding with iron debris previously detected with Chandra. The conditions required for the creation of these elements in nuclear reactions, such as the temperature and density, match those of bubbles in simulations that drive the explosions.

The titanium that was found by Chandra in Cas A and that is predicted by these simulations is a stable isotope of the element, meaning that the number of neutrons its atoms contain implies that it does not change by radioactivity into a different, lighter element. Previously astronomers had used NASA's NuSTAR telescope to discover an unstable isotope of titanium in different

locations in Cas A. Every 60 years about half of this titanium isotope transforms into scandium and then calcium.

"We have never seen this signature of titanium bubbles in a supernova remnant before, a result that was only possible with Chandra's incredibly sharp images," said co-author Keiichi Maeda of Kyoto University in Japan. "Our result is an important step in solving the problem of how these stars explode as supernovae."

"When the supernova happened, titanium fragments were produced deep inside the massive star. The fragments penetrated the surface of the massive star, forming the rim of the supernova remnant, Cas A," said co-author Shigehiro Nagasaki of the RIKEN Cluster for Pioneering Research in Japan.

These results strongly support the idea of a neutrino-driven explosion to explain at least some supernovae.

(Continued on page 7)

May Speaker (Cont'd)

(Continued from page 3)

This presentation will describe the science behind Moon Diver's goals, explain some of the engineering challenges that must be overcome to make it possible, and provide a window into how NASA mission concepts are developed from idea to reality.

Biosketch:

Dr. Laura Kerber is a research scientist at JPL with interests in physical volcanology and extra-

terrestrial cave environments. Dr. Kerber holds two Masters Degrees, in Geology and Engineering, and a PhD in Geology from Brown University. She enjoys combining remote sensing, field work, and modeling, and working on the interface between the surface geology and planetary atmospheres. She is the Deputy Project Scientist of the 2001 Mars Odyssey mission and Principal Investigator of the Moon Diver Discovery mission concept.

Titanium (Cont'd)

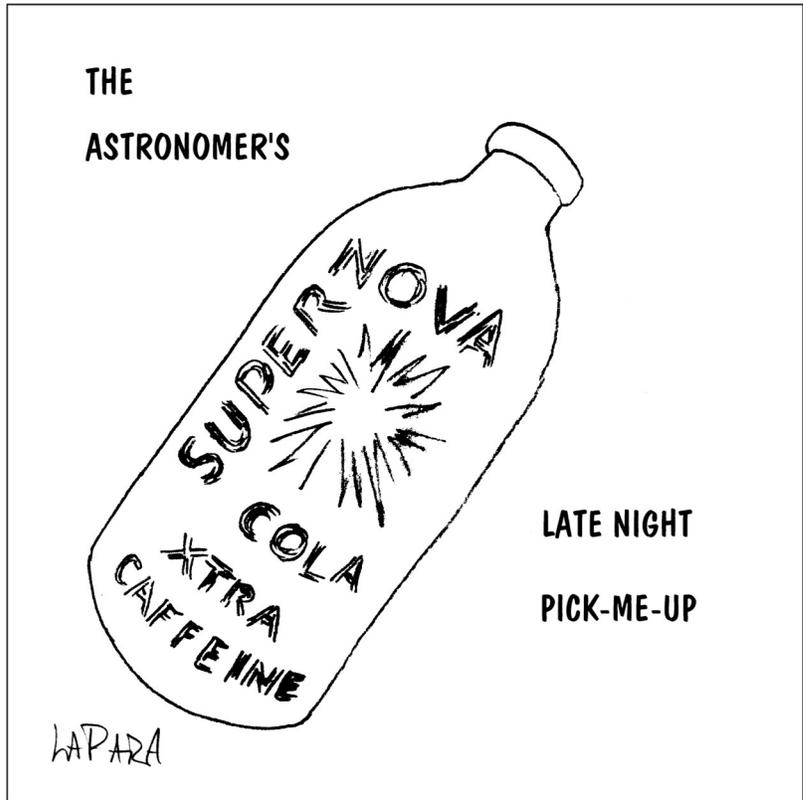
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"Our research could be the most important observational result probing the role of neutrinos in exploding massive stars since the detection of neutrinos from Supernova 1987A," said co-author Takashi Yoshida of Kyoto University in Japan.

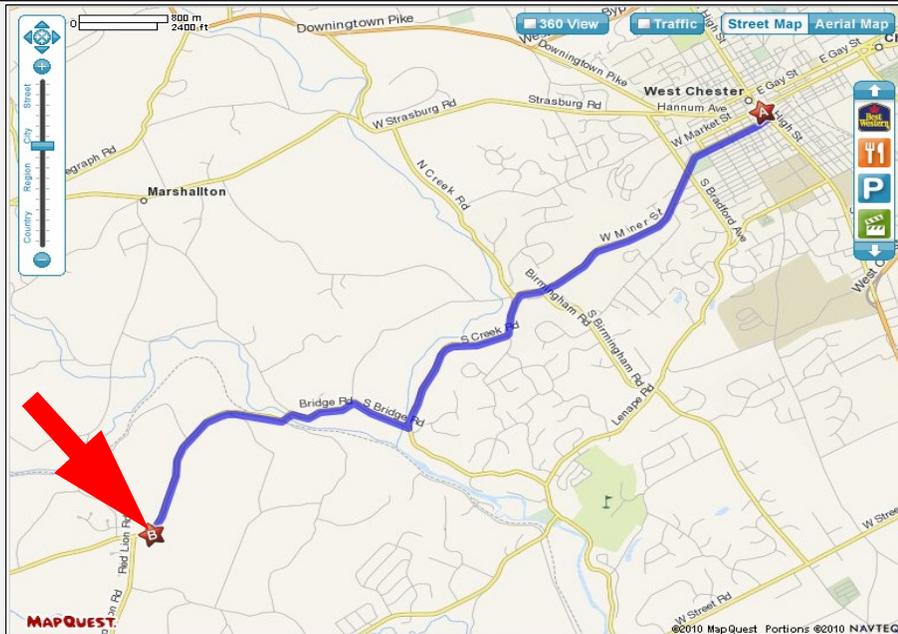
Astronomers used over a million and half seconds, or over 18 days, of Chandra observing time from the supernova Cassiopeia A (Cas A) taken between 2000 and 2018. The amount of stable titanium produced in Cas A exceeds the total mass of the Earth.

These results have been published in the April 22, 2021 issue of Nature. In addition to Sato, Maeda, Nagataki and Yoshida, the authors of the paper are Brian Grefenstette (California Institute of Technology in Pasadena, California), Brian J. Williams (NASA Goddard Space Flight Center in Greenbelt, Maryland), Hideyuki Umeda (University of Tokyo in Japan), Masaomi Ono (RIKEN Cluster for Pioneering Research in Japan), and Jack Hughes (Rutgers University in Piscataway, New Jersey). NASA's Marshall Space Flight Center manages the Chandra program. The Smithsonian Astrophysical Observatory's Chandra X-ray Center controls science from Cambridge Massachusetts and flight operations from Burlington, Massachusetts.

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.

Through the Eyepiece: Melotte 111, the Coma Berenices Cluster of Stars

by Don Knabb, CCAS Treasurer & Observing Chair



Credit: NASA/Donald R. Pettit - <http://spaceflight.nasa.gov/gallery/images/station/crew-6/html/iss006e40537.html>

As we sit under dark skies during May we often search the sky for galaxies around the constellations Leo, Virgo and Coma Berenices. The Leo Cluster is a galaxy cluster in the constellation Leo. Along with the Coma Cluster, it is one of the two major clusters comprising the Coma Supercluster. The Virgo Cluster is a cluster of galaxies whose center is in the constellation Virgo. If you have very dark skies and a large telescope you can see these faint fuzz balls of deep space. This region of the sky holds the north galactic pole. Here we have a window into the depths of the universe, unobscured by the Milky Way.

But this article is about another

Coma Cluster. This is the Coma Berenices Cluster of stars. It is much easier to see and is a naked eye object in a dark sky location and is a nice sight in binoculars in Chester County skies. Around 9 or 10 at night during May one need only lean back in your lounge chair and look due south and about half way from the horizon to the zenith. If you see a fuzzy spot a bit behind and above Leo's tail, you have found the Coma Cluster of stars.

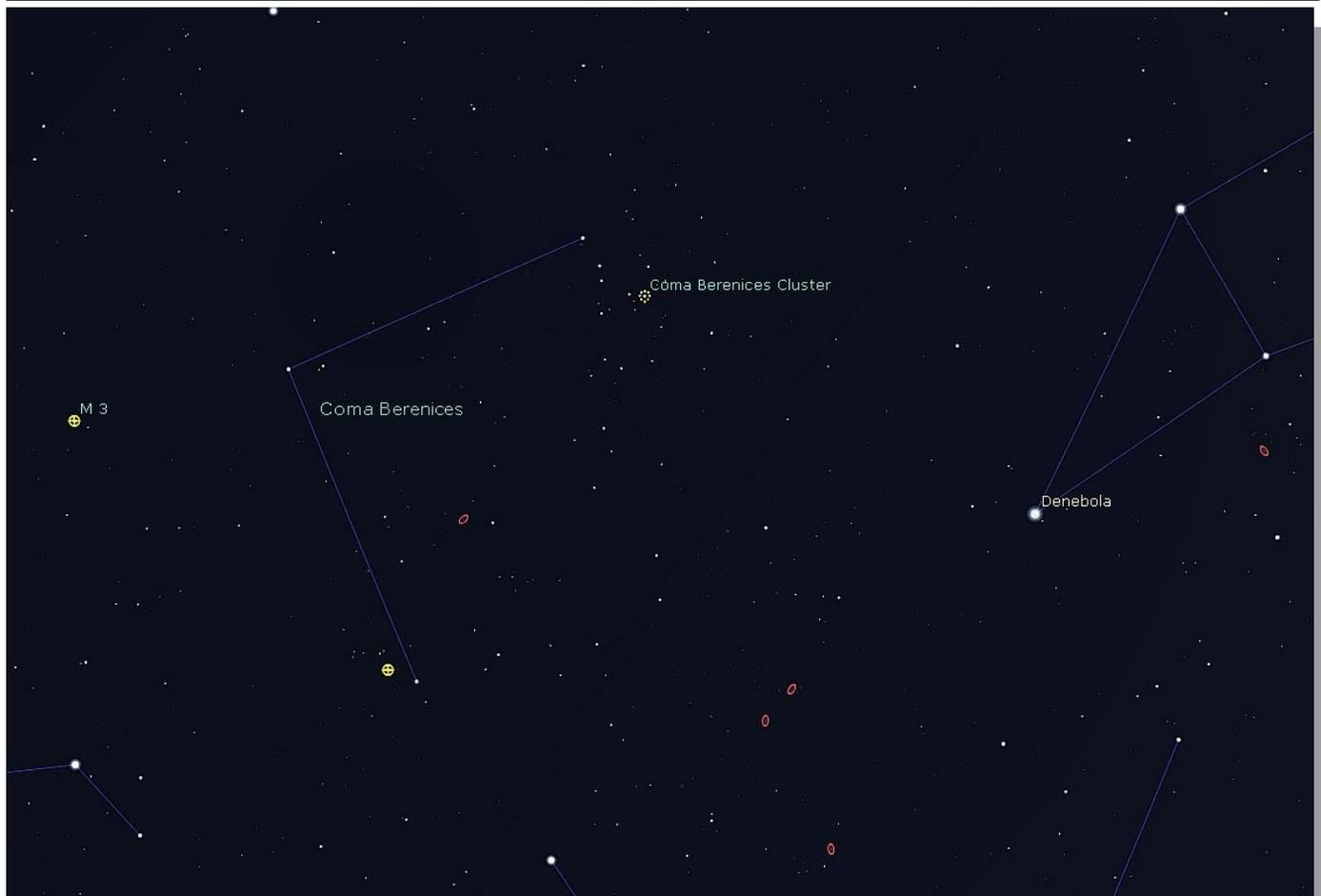
The Coma Cluster of stars is also known as Melotte 111 after its entry in the catalogue of deep sky objects by the astronomer P. J. Melotte. This cluster is in the constellation Coma Berenices.

The Coma Cluster is a small but nearby star cluster in our galaxy with a common proper motion, making it a true physical cluster, not just a visual alignment of widely distant stars. At one time it was considered to represent Leo's tail. The open cluster is 288 light-years away, roughly twice as distant as the Hyades, and covers an area of more than 5 degrees on the sky. That's the size of 10 full Moons! The cluster is approximately 450 million years old.

Photos don't do the Coma Cluster justice, but below is a picture that was taken by astronaut Donald Pettit while on the

(Continued on page 9)

Eyepiece (Cont'd)



Sky map created with Stellarium planetarium software

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International Space Station. Melotte 111 is too large for a telescope. It is a wonderful naked eye object or use low powered binoculars to see this large cluster. Some of its stars are visible to the naked eye but it needs binoculars to reveal its true potential. There is also some background nebulosity and larger telescopes will also show that many of the “stars” visible to binoculars as small fuzzy patches are really galaxies.

This is a star cluster similar in nature to the Pleiades and Hyades but is further away and

slightly fainter. The Coma star cluster is currently neither approaching nor receding from us. This makes it one of the nearest open star clusters, only the Ursa Major Cluster and the Hyades are closer.

The cluster was never cataloged as a Messier or NGC object, even though it's very visible. At least 37 stars have been identified as members of this cluster. Its brightest stars are 50 times brighter than our sun and its faintest are 1/3rd the sun's brightness.

The diagram above will help you find the Coma Cluster. If you can't see it naked eye from

your observing location, use binoculars and scan east from Leo's tail.

Information credits:

http://en.wikipedia.org/wiki/Coma_Berenices
<http://www.seds.org/messier/extra/ngc/mel111.html>
http://en.wikipedia.org/wiki/Mel_111

NASA Night Sky Notes: Virgo's Galactic Harvest

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.

May is a good month for fans of galaxies, since the constellation Virgo is up after sunset and for most of the night, following Leo across the night sky. Featured in some ancient societies as a goddess of agriculture and fertility, Virgo offers a bounty of galaxies as its celestial harvest for curious stargazers and professional astronomers alike.

Virgo is the second-largest constellation and largest in the Zodiac, and easily spotted once you know how to spot Spica, its brightest star. How can you find it? Look to the North and start with the Big Dipper! Follow the general curve of the Dipper's handle away from its "ladle" and towards the bright orange-red star Arcturus, in Boötes – and from there continue straight until you meet the next bright star, Spica! This particular star-hopping trick is summed up by the famous phrase, "arc to Arcturus, and spike to Spica."

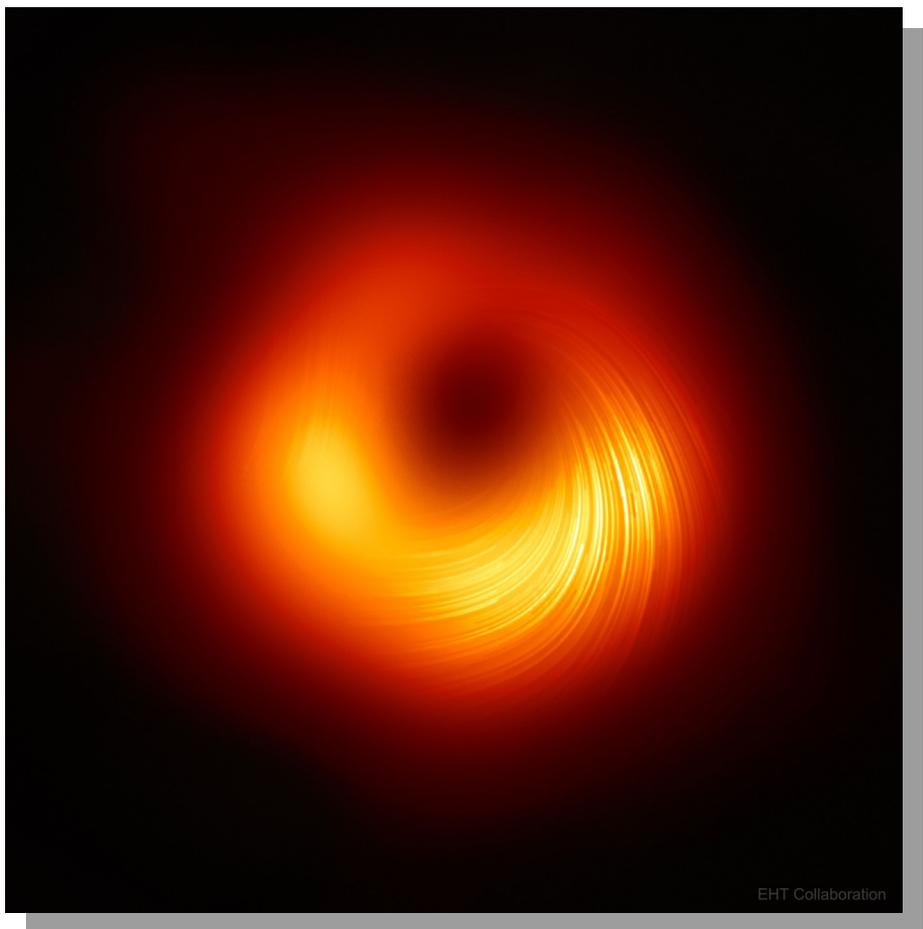
This large constellation is home to the Virgo Cluster, a massive group of galaxies. While the individual stars in Virgo are a part of our own galaxy, known as the Milky Way, the Virgo Cluster's members exist far beyond our own galaxy's borders. Teeming with around 2,000 known members, this massive group of galaxies are all gravitationally bound to each other, and are themselves members of the even larger Virgo Supercluster of galaxies, a sort of "super-



group" made up of groups of galaxies. Our own Milky Way is a member of the "Local Group"

of galaxies, which in turn is *also* a member of the Virgo Supercluster! In a sense, when we gaze upon the galaxies of the Virgo Cluster, we are looking at some of our most distant cosmic neighbors. At an average distance of over 65 million light years away, the light from these galaxies first started towards our planet when the dinosaurs were enjoying their last moments as Earth's dominant land animals! Dark clear skies and a telescope with a mirror of six inches or

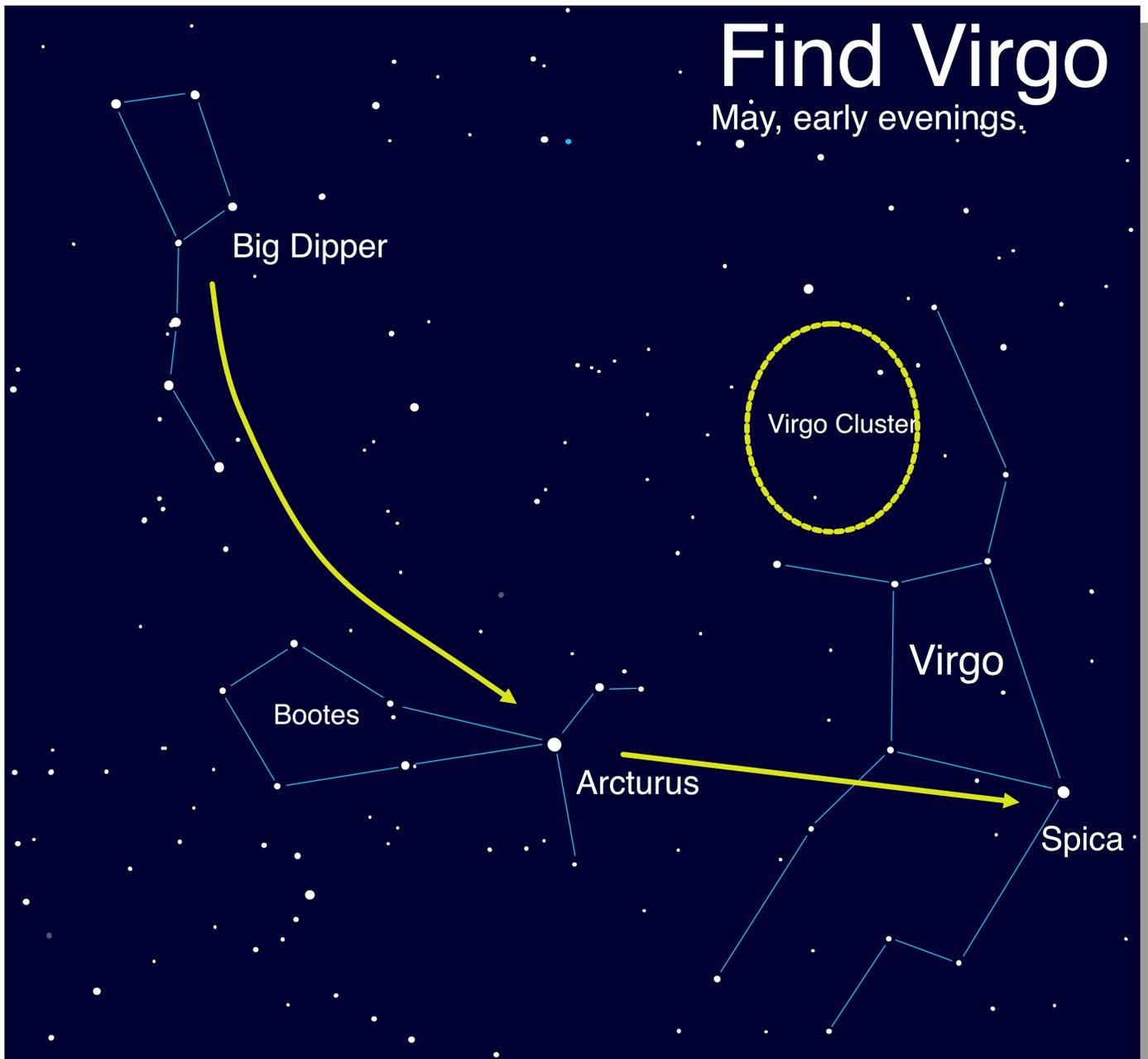
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The first image of a black hole's event horizon was taken in the center of one of the most prominent galaxies in Virgo, M87! This follow up image, created by further study of the EHT data, reveals polarization in the radiation around the black hole. Mapping the polarization unveils new insights into how matter flows around and into the black hole - and even hints at how some matter escapes! More details: apod.nasa.gov/apod/ap210331.html Credit: Event Horizon Telescope Collaboration

Find Virgo

May, early evenings.



Find Virgo by “arcing to Arcturus, then spiking on to Spica.” Please note that in this illustration, the location of the Virgo Cluster is approximate - the borders are not exact.

(Continued from page 10)

more will reveal many of the cluster’s brightest and largest members, and it lends itself well to stunning astrophotos.

Virgo is naturally host to numerous studies of galaxies and cosmological research, which

have revealed much about the structure of our universe and the evolution of stars and galaxies. The “Universe of Galaxies” activity can help you visualize the scale of the universe, starting with our home in the Milky Way Galaxy before heading out to the Local Group, Virgo Cluster and

well beyond! You can find it at bit.ly/universeofgalaxies.

You can further explore the science of galaxies across the Universe, along with the latest discoveries and mission news, at nasa.gov.

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).



Observing (Cont'd)

(Continued from page 5)

it is said that both these clusters can be detected with the naked eye. Unfortunately, that will not be possible in the skies of Chester County.

Comets: There are no bright comets visible during May, but if you have a large scope you can chase Comet C/2020 R4 (ATLAS) as it passes through Canes Venatici.

Meteor showers: The Eta Aquariid meteor shower is active from April 19th through May 28th, and peaks on the night of May 4/5. These meteors are dust left behind by Halley's Comet!

CCAS Membership Information and Society Financials

Treasurer's Report

by Don Knabb

April 2021 Financial Summary

Beginning Balance	\$1020
Deposits	\$270
Disbursements	-\$0
Ending Balance	\$1290

New Member Welcome!

Welcome new CCAS members Deepak & Purvi Malkan, from Exton, 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
501 Main St.
Ashland, PA 17921

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 **\$54.95**.

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.