



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 30, No. 4 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016 April 2022

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James Webb Telescope



While the purpose of this image was to focus on the bright star at the center for alignment evaluation, Webb's optics and NIRCam are so sensitive that the galaxies and stars seen in the background show up. At this stage of Webb's mirror alignment, known as "fine phasing," each of the primary mirror segments have been adjusted to produce one unified image of the same star using only the NIRCam instrument. This image of the star, which is called 2MASS J17554042+6551277, uses a red filter to optimize visual contrast. Image credit: NASA

Membership Renewals Due

04/2022	Chisholm & Odell Hepler Imburgia Miller Richter Rossomando Sah Smaglik
05/2022	Aylam & Martin-Aylam Bentley Bogusch Cunningham Fletcher Malkan O'Hara Ostaneck Rosenstein Toth
06/2022	Crabb Dhargalkar Hanspal Harris Hebding Hodson Lindtner Maynard Mazziotta & Calobrisi Thomas

April 2022 Dates

- 1st** • New Moon, 2:24 a.m. EDT.
- 9th** • First Quarter Moon 2:47 a.m. EDT, and the Lunar Straight Wall is visible.
- 16th** • Full Moon, the Full Pink Moon or the Full Birds Lay Eggs Moon, 2:55 p.m. EDT.
- 22nd** • The Lyrid Meteor shower peaks in the pre-dawn hours.
- 29th** • Mercury is at greatest eastern elongation (21°), 4 a.m. EDT.
- 29th** • The Lunar Straight Wall is visible
- 30th** • New Moon, Black Moon, 4:24 p.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, April 22nd • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.
- ☼ Friday, May 20th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.
- ☼ Saturday, May 28th • CCAS Special Observing Session at Hoopes Park, West Chester, PA. The observing session starts at sunset.

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

Spring Society Events

April 2022

4th • Introduction to Astronomy Class: Spaceship Earth – the Sun and its effects on the Earth, Henderson High School, 7 p.m. EST.

8th • Monthly CCAS Meeting at WCU Merion Science Center, Room 112 & online via Zoom. The meeting starts at 7:30 p.m. CCAS Member Speaker and newly appointed NASA Ambassador, Dr. Don Miller, “Humanity’s Exploration of Venus: What We’ve Learned, Current Questions, and Future Plans.”

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

22nd • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

25th • Introduction to Astronomy Class: Other Kids on the Block, Henderson High School, 7 p.m. EST.

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

May 2022

2nd • Introduction to Astronomy Class: Star Charts and Planetarium Software, Henderson High School, 7 p.m. EST.

9th • Introduction to Astronomy Class: Using a Telescope, Henderson High School, 7 p.m. EST.

10th • Monthly CCAS Meeting at WCU Merion Science Center, Room 112 & online via Zoom. The meeting starts at 7:30 p.m. Guest Speaker: Dr. Michael Brown, Professor of Planetary Astronomy, CalTech, “The Search for Planet Nine – New Developments and Insights.”

16th • Introduction to Astronomy Class: Beyond Naked-Eye Observing, Henderson High School, 7 p.m. EST.

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

20th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

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

28th • CCAS Special Observing Session at Hoopes Park, West Chester, PA. The observing session starts at sunset.

March 2022 Monthly Meeting Minutes

by Bea Mazziotta, CCAS Secretary

- Dave Hockenberry welcomed members and guests to the meeting on March 8th, which was again held via Zoom and YouTube only. While we are grateful for these platforms, we excitedly look forward to the April meeting which will be in person at WCU. Yay!
- Don Knabb announced a new viewing event for club members and guests at BRC on March 25th. More viewing events are in the works as requests come in from local groups. Look for a list of those upcoming events in the newsletter or the CCAS website. <http://www.ccas.us/>
- In lieu of a tour of the current night sky, Don Knabb shared a slide presentation put together by John Goss, the president of the Roanoke Valley Astronomical Society. The presentation described the positive experiences both members and guests enjoy when stargazing with an astronomy club.
- Bruce Ruggeri introduced the evening’s speaker, Dr. Benjamin Hockman.
- Dr. Hockman is a Robotics Technologist at NASA JPL Pasadena. He earned his PhD in Aeronautics and Astronautics at Stanford. As lead engineer on the ‘Hedgehog’ Project his graduate work focused on the design, control, and autonomy for the robotic exploration of small solar system bodies, such as asteroids and comets.
- His presentation was titled Frontiers of Exploration of the Solar System: From Asteroid Hoppers to European Deep Drills.
- To explore these objects NASA will need to calculate their differing gravities in order to develop robotics that can function on their surfaces. Dr. Hockman conceived a novel concept of ‘Gravity Poppers’ or hopping probes. These are small, minimalistic probes that are deployed to the surface of the object from an orbiting spacecraft. Once on the surface the poppers will periodically ‘pop’ so as to per-

(Continued on page 13)

April 2022 CCAS Meeting Agenda

by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on March 8, 2022, in person (as well as via Zoom) at West Chester University’s Merion Science Center, Room 112 (please note the new room right next to our previous room). The Science Center is located at 720 S. Church St., West Chester, PA. CCAS Member Speaker and newly appointed NASA Ambassador, Dr. Don Miller, “Humanity’s Exploration of Venus: What We’ve Learned, Current Questions, and Future Plans.”

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 programs@ccas.us.

April 2022 Guest Speaker Bio & Presentation Synopsis

by Bruce Ruggeri

Our April CCAS Monthly meeting is scheduled for April 12, 2022, commencing at 7:00 pm ET. Our speaker is CCAS member and newly appointed NASA Ambassador, Dr. Don Miller who has prepared an outstanding presentation on Venus, a fascinating subject that has not been presented in the recent past and is extremely timely and gaining renewed attention by NASA and other space agencies for reasons Don will discuss.

The presentation will commence at approximately 7:50-8:00PM ET. The presentation title, synopsis and bio sketch for Dr. Miller are provided below.

Title: Humanity's Exploration of Venus: What We've Learned, Current Questions, and Future Plans

Synopsis: Venus has fascinated mankind for millennia given its



Benjamin Hockman, Ph.D.

prominence in the night sky. Before the 20th century, little was known about this cloud covered planet. It has been called Earth's twin given its comparable size and density. However, we now know that

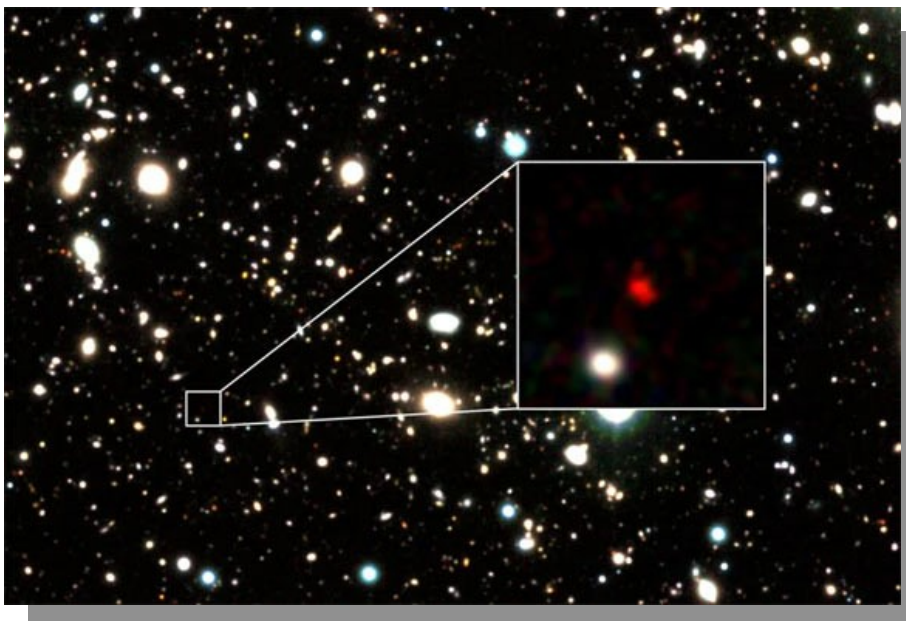
it could more appropriately be called Earth's evil twin thanks to the information from the many space probes that have visited it during the past 55 years.

This presentation will provide an overview of what we currently know about the planet, its puzzling geology and harsh atmospheric conditions, and some of the questions about the evolution of Venus to its current state that scientists are trying to answer. The presentation will also provide a historic overview of humanity's exploration of Venus and discuss current major mission plans by NASA and other space agencies to explore Earth's "evil twin" world. Venus could be an excellent place to investigate how planets change over time and the possibility of "time windows of habitability" for life

(Continued on page 10)

Astronomers Spot Most Distant Galaxy Ever Seen

by News Staff / Source, courtesy Sci-News.com



HD1 (red object). Image credit: Harikane et al., arXiv: 2112.09141.

The newly-discovered galaxy, named HD1, existed when the Universe was just 330 million years old.

"Observing the first galaxy formation is one of the main goals in the modern astronomy," said Dr. Fabio Pacucci, an astronomer at the Harvard & Smithsonian Center for Astrophysics and the Black Hole Initiative at Harvard University, and his colleagues.

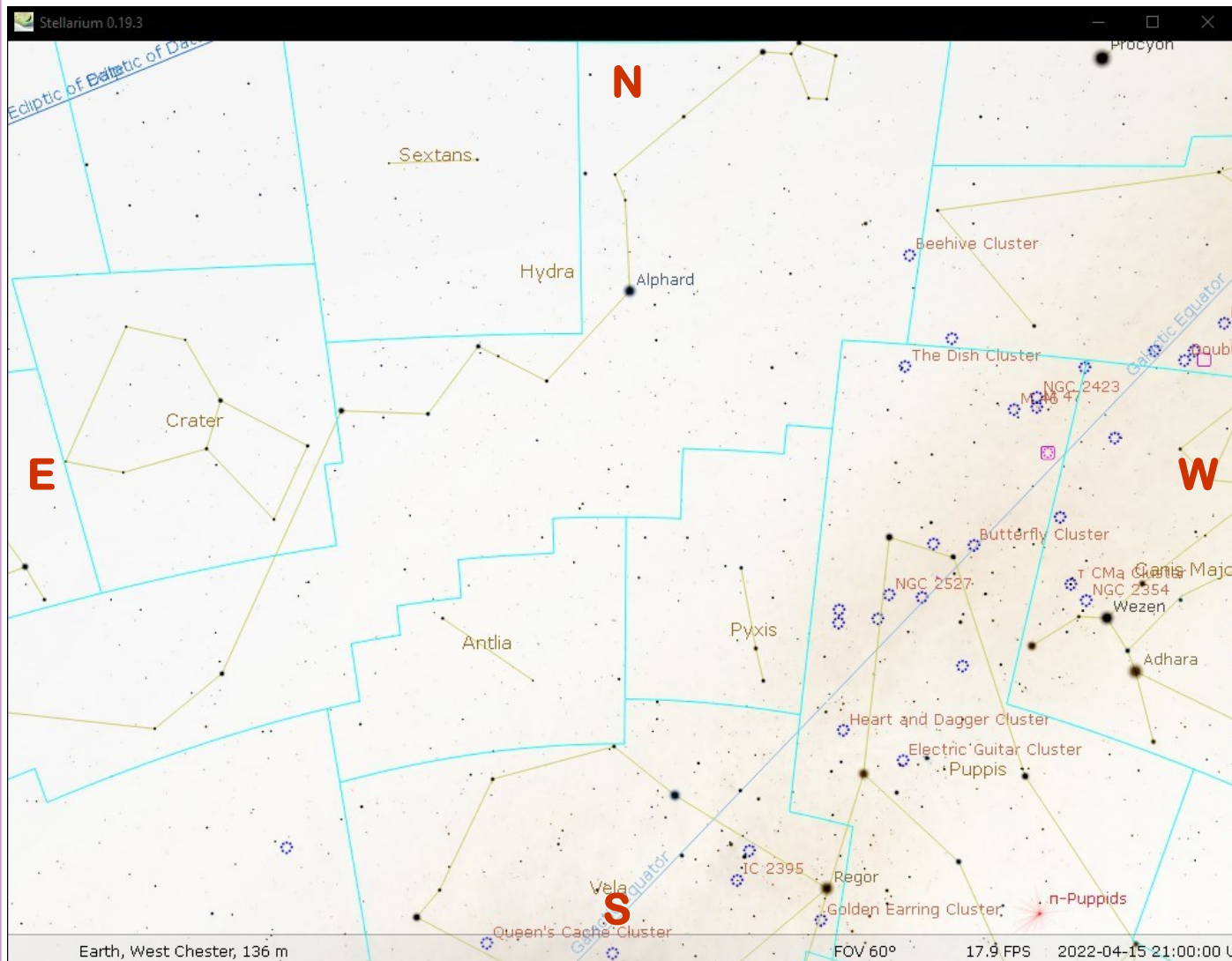
"One of the most straightforward approaches to achieve this goal is to observe forming galax-

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The Sky Over Chester County

April 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
04/01/2022	6:19 a.m. EDT	6:46 a.m. EDT	7:26 p.m. EDT	5:54 p.m. EDT	12h 40m 19s
04/15/2022	5:56 a.m. EDT	6:24 a.m. EDT	7:40 p.m. EDT	8:09 p.m. EDT	13h 16m 17s
04/30/2022	5:34 a.m. EDT	6:03 a.m. EDT	7:56 p.m. EDT	8:25 p.m. EDT	13h 52m 19s

Moon Phases					
			New Moon	04/01/2022	2:24 a.m. EDT
First Quarter	04/09/2022	2:47 a.m. EDT	Full Moon	04/16/2022	2:55 p.m. EDT
Last Quarter	04/23/2022	7:56 a.m. EDT	New Moon	04/30/2022	4:24 p.m. EDT

April 2022 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	New Moon, 2:24 a.m. EDT
8	The Lunar X is visible at 5 p.m.
8/9	The Moon is near Castor and Pollux
9	First Quarter Moon, 2:47 a.m. EDT, and the Lunar Straight Wall is visible
16	Full Moon, the Full Pink Moon or the Full Birds Lay Eggs Moon, 2:55 p.m. EDT
22	The Lyrid Meteor shower peaks in the pre-dawn hours
23	Last Quarter Moon, 7:56 a.m. EDT
29	Mercury is at greatest elongation for the best evening viewing of the year and is near the Pleiades
30	New Moon, Black Moon, 4:24 p.m. EDT

The best sights this month: On April 8th the elusive Lunar X is visible around 5 p.m. The only evening planet is Mercury, and April 29th is a great opportunity to add this planet to your list of observations because that is the date when Mercury is at its greatest altitude of 2022 for our location. Also, on April 29th the Pleiades are near Mercury so this will be a great sight in binoculars. If you are an early riser, the morning of April 18th has a nice view - look to the southeast to see Jupiter, Venus, Mars and Saturn lined up.

Mercury: Mercury is the only planet in the evening sky this month. On April 29th Mercury is 21° away from the Sun and can be seen in the fading glow of the sunset. Binoculars will help you find this elusive planet after the Sun has set. Don't ever point binoculars or a telescope directly at the Sun.

Venus: Our sister planet is visible in the morning planet parade and shines at a dazzling magnitude -4.4!

Mars: Mars is also in the pre-dawn sky.

Jupiter: Jupiter has emerged from behind the Sun and is low in the pre-dawn sky. Jupiter and Venus are very close in the pre-dawn sky on April 30th. They will not be this close again until 2039.

Saturn: Saturn also is in the pre-dawn sky during April.

Uranus and Neptune: On April 17th Uranus is close to Mercury, low in the southwest after sunset. You will need a clear view of the horizon to see these planets. Neptune is in the pre-dawn sky and on April 27th is near Venus.

The Moon: The Moon is full on April 16th. Native Americans called this the Full Pink Moon. This name came from the herb moss pink, or wild ground phlox, which is one of the earliest flowers of the spring. Other names for this full Moon are the Full Sprouting Grass Moon and among coastal tribes the Full Fish Moon because this was the time that the shad swam upstream to spawn. Native Canadians called this The Full Bullhead Moon or the Full Birds Lay Eggs Moon.

The Lunar X is visible at 5 p.m. on April 8th and the Lunar Straight Wall is visible on April 9th.

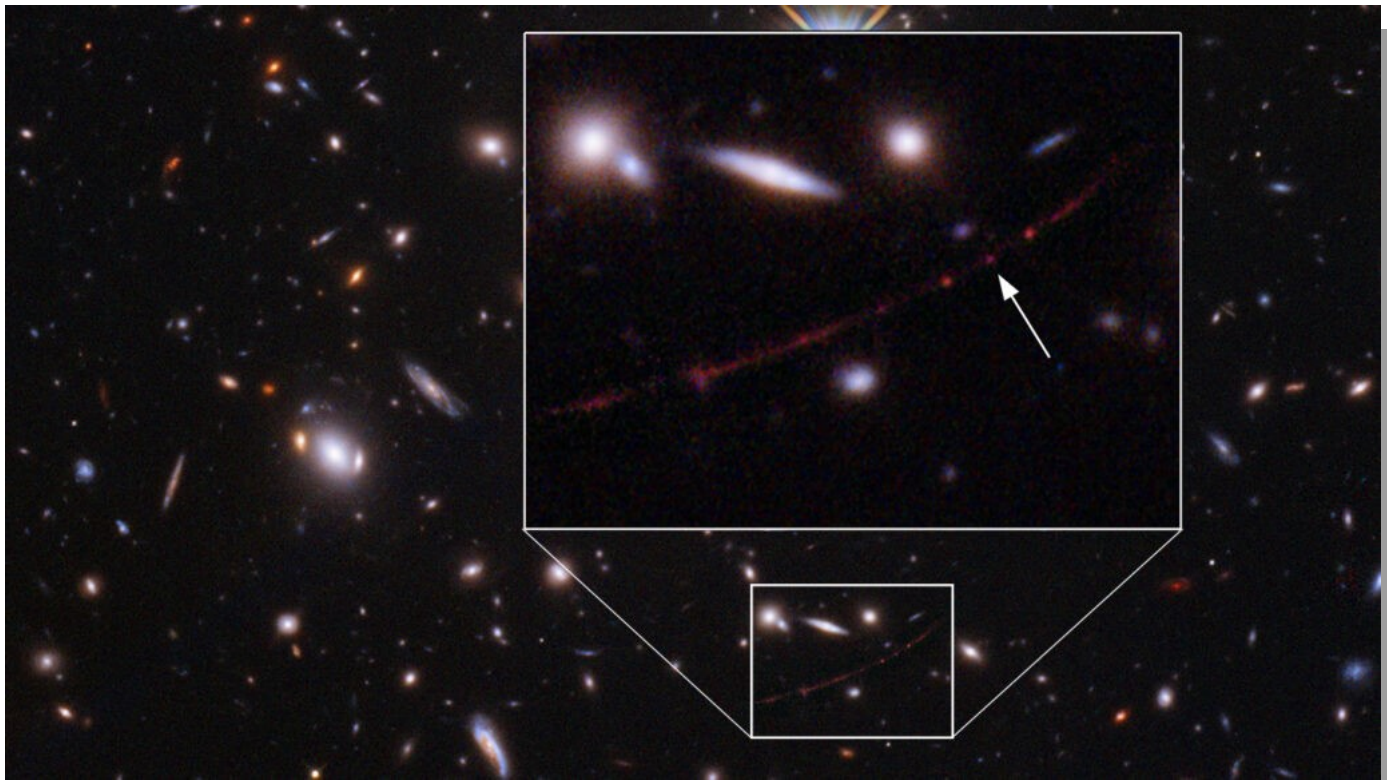
Constellations: Goodbye Orion, hello Hercules! Ah, spring is here, and this is a great time of the year to stare at the bright points of light in the sky and wonder what early humans thought as they gazed into the night. It's not so cold now and the humidity of summer is not affecting our view of the sky. It takes some careful looking with binoculars, but it is worth the effort to find the dim constellation Cancer the Crab with its beautiful Beehive Cluster. Leo the Lion fills our gaze around 9 p.m. and if you stay out a bit you'll see the Northern Crown, the constellation Corona Borealis rising with Hercules the Hunter not far behind.

Messier/deep sky: April's binocular highlights include open clusters M36, M37 and M38 in Auriga, M35 in Gemini and M44, the Beehive, in Cancer. Telescopic highlights are globular clusters M13 and M92 in Hercules, galaxy M94 in Canes Venatici, galaxy M51 between Canes Venatici and the handle of the Big Dipper, and of course the Leo Triplet of galaxies in Leo. Also look for nu Draconis, a beautiful double star in Draco the Dragon. And a new double star I recently became aware of is Iota Can-

(Continued on page 7)

A Star Nicknamed 'Earendel' May Be the Most Distant Yet Seen

by Liz Kruesi, courtesy ScienceNews



A newfound possible star (arrow) is from the universe's first 900 million years, researchers say. It's only visible because of an intervening galaxy cluster, which magnifies the light of this object and a background galaxy, seen as the red arc. SCIENCE: NASA, ESA, BRIAN WELCH/JHU, DAN COE/STSCI; IMAGE PROCESSING: NASA, ESA, ALYSSA PAGAN/STSCI

A chance alignment may have revealed a star from the universe's first billion years. If confirmed, this star would be the most distant one ever seen, obliterating the previous record (SN: 7/11/17). Light from the star traveled for about 12.9 billion years on its journey toward Earth, about 4 billion years longer than the former record holder, researchers report in the March 30 *Nature*. Studying the object could help researchers learn more about the universe's composition during that early, mysterious time.

"These are the sorts of things that you only hope you could discover," says astronomer Katherine Whitaker of the University of Massachusetts Amherst, who was not part of the new study.

The researchers found the object while analyzing Hubble Space Telescope images of dozens of clusters of galaxies nearer to Earth. These clusters are so massive that they bend and focus the light from more distant background objects, what's known as gravitational lensing (SN: 10/6/15).

In images of one cluster, astronomer Brian Welch of Johns Hopkins University and colleagues noticed a long, thin, red arc. The team realized that the arc was a background galaxy whose light the cluster had warped and amplified.

Atop that red arc is a bright spot that is too small to be a small galaxy or a star cluster, the researchers say. "We stumbled into finding that this was a

lensed star," Welch says.

The researchers estimate that the star's light originates from only 900 million years after the Big Bang, which took place about 13.8 billion years ago.

Welch and his colleagues think that the object, which they poetically nicknamed "Earendel" from the old English word meaning "morning star" or "rising light," is a behemoth with at least 50 times the mass of the sun. But the researchers can't pin down that value, or learn more about the star or even confirm that it is a star, without more detailed observations.

The researchers plan to use the recently launched James

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Observing (Cont'd)

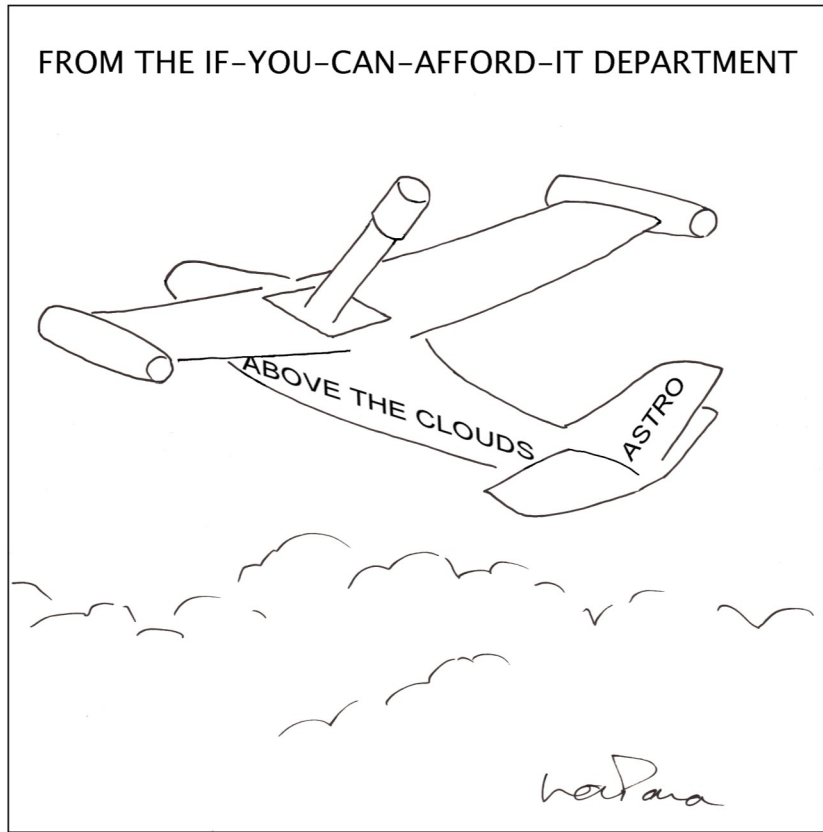
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cri, a yellow and blue double star that to me looks very similar to Albireo in Cygnus. Iota Cancri, also called Decapoda, is due north of the Beehive Cluster.

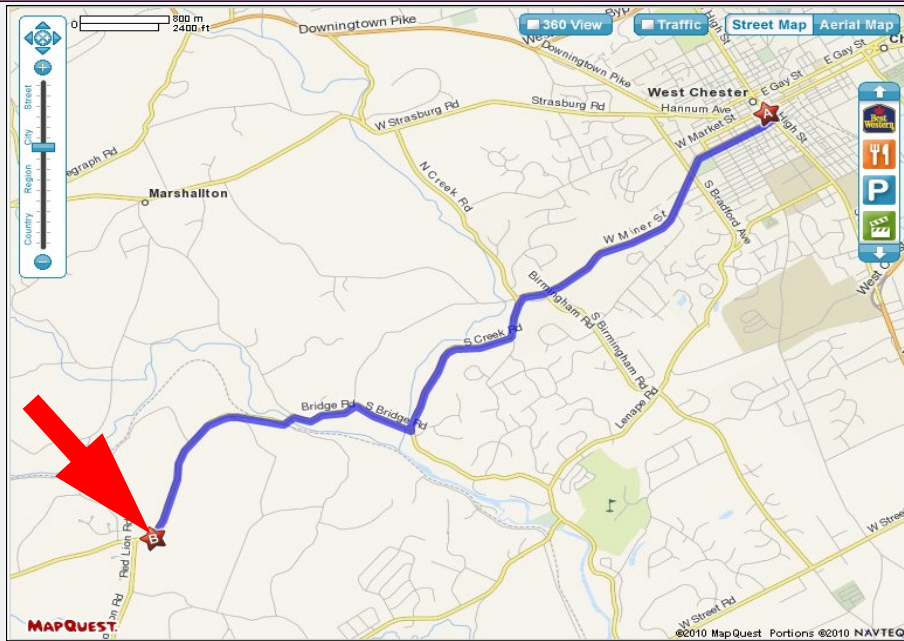
Comets: There is a chance that comet C/2021 O3 (PanSTARRS) will be visible late in April. Information on this comet is in the April issue of Astronomy magazine.

Meteor showers: The Lyrid meteor shower peaks on the morning of April 22nd. The radiant will be 30° high around midnight so we might see some shooting stars before the waning gibbous Moon rises late at night.

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

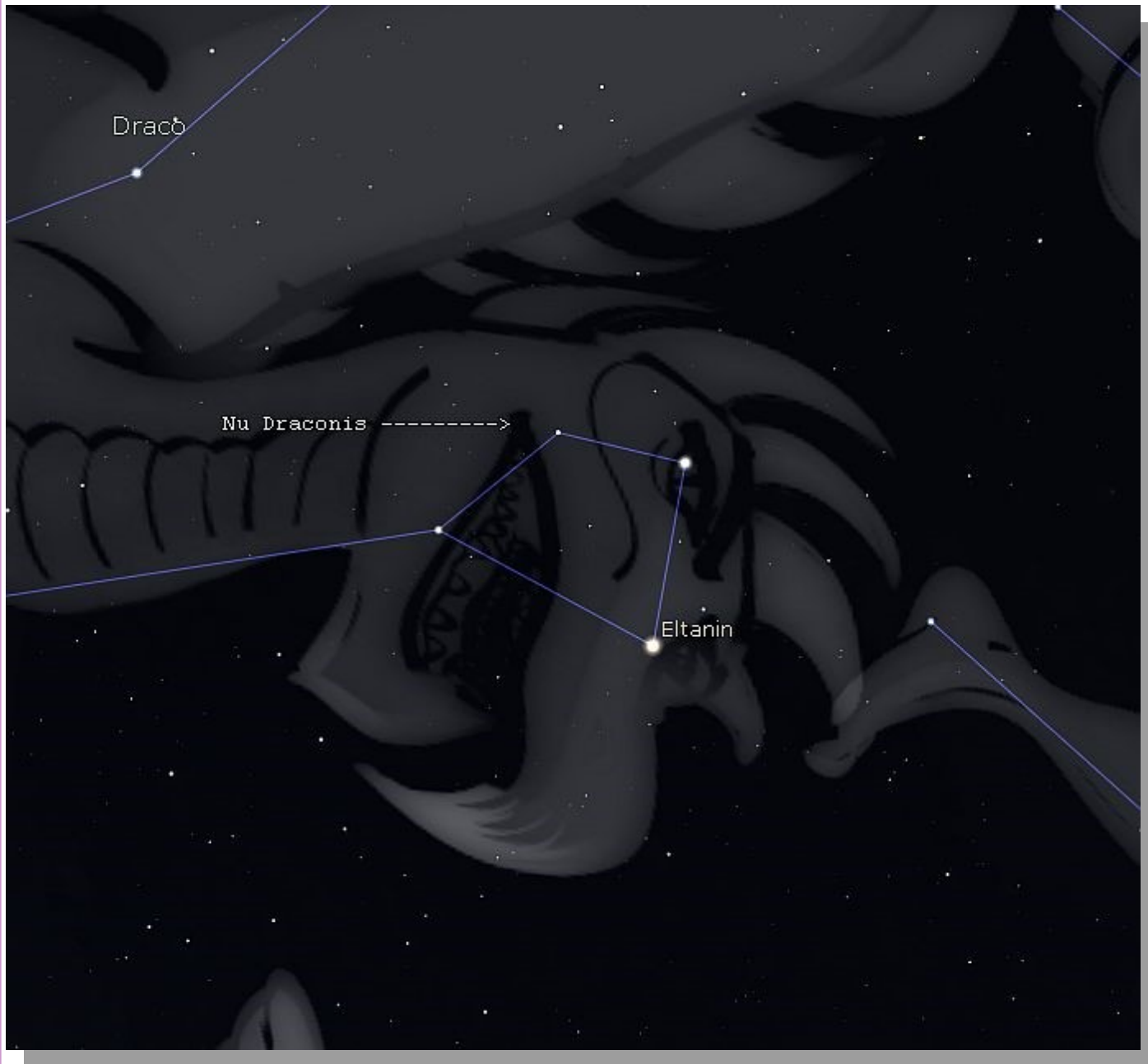
1760 Unionville Wawaset Rd
West Chester, PA 19382
(610) 793-1090

<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: Nu Draconis, the Dragon's eyes, or the Cat's Eyes

by Don Knabb, CCAS Observing Chair & Treasurer



Star chart created with Stellarium, the free planetarium software

Double stars don't sound so special – they are just two stars side by side, right? Well, they are a lot more than that. The stars in a double (or triple, etc.) star can have various color, have various brightness, and can be spaced close together or far apart. One of my favorite double stars is a beautiful binocular or telescopic double in Draco the

Dragon, who is rising in the east during April. This double is often called “the eyes of the dragon” but I like Terence Dickinson's description when he says they look “like cat's eyes in a small scope”. I am referring to the star Nu Draconis.

While most folks are familiar with the Big Dipper and Little

Dipper, in the same region of the sky is a long, winding group of stars which portrays the mythological creature of a dragon named Draco. Its name is Latin for dragon. Draco is circumpolar (that is, never setting) for many observers in the northern hemisphere. It was one of the 48 con-

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Eyepiece (Cont'd)



Image of Nu Draconis in optical light - Image credit: David Ritter https://en.wikipedia.org/wiki/User:Dritter_wiki CC BY-SA 4.0 file

(Continued from page 8)

stellations listed by the 2nd century astronomer Ptolemy and remains one of the 88 modern constellations today.

Nu Draconis is named Kuma. It is the faintest star that makes the skewed box of Draco's head and is one of the favorite, and most-easily seen, double stars of the northern sky. Even steadily held binoculars will split it into two nearly identical white stars. The two stars are practically the same brightness, both appearing just a trifle brighter than fifth magnitude and separated by just over one arc minute (or about

1/30th the apparent diameter of a full moon).

The proper name "Kuma" is of obscure meaning, one source suggesting "at last," but why is anybody's guess. The star is far better known by its Greek letter name Nu Draconis, the western one of the pair Nu-1, the eastern one Nu-2. Individually of the fifth magnitude, they combine to produce a naked-eye star of magnitude four.

My favorite way to view the eyes of the dragon is in summer, lying far back on a reclining deck chair with a pair of binocu-

lars held straight up. The two stars really do look like a pair of cat's eyes reflecting at you in a dark room.

Draco is a very ancient star grouping. The earliest Sumerians considered these stars to represent the dragon Tiamat. Later the constellation became one of the creatures that Hercules killed.

One of Draco's tasks was to guard the garden of Hesperides and its golden apples that Hercules was supposed to retrieve. In the stars, Draco coils around

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Speaker Cont'd)

(Continued from page 3)

to occur. Venus might provide us with great insights into how we will evaluate exoplanets for habitability in the future.

Biosketch: Dr. Miller has been interested in science and the stars ever since he had a night out with his father at age 6 looking at the sky and discussing the possibilities of the universe. He followed every aspect of the Apollo and subsequent programs. He saved up his money as a young kid to purchase an 8-inch reflector telescope and later as an adult moved on to even larger telescopes.

He can frequently be found in his backyard or at star parties looking at the stars and sharing his love for space with the community. He has been a member of the San Francisco Sidewalk Astronomers, moved to Pennsylvania and joined the Chester County Astronomical Society, traveled to Wyoming to see the total solar eclipse, traveled to northern Sweden to see the northern lights, and many national parks for their dark skies, plus great hiking.

He is retired from a career in pharmaceutical research and marketing. One of his current activities is participating in the Astronomical Society of the Pacific's Project Astro and thereby bringing space science to grade school children. Don was recently appointed a NASA Ambassador and his presentation on Venus to the CCAS will be his first in this new and exciting role Don holds B.S. and Ph.D. degrees in Chemical Engineering.

Most Distant Galaxy (Cont'd)



Scientists will continue to observe HD1 using NASA's brand-new James Webb telescope to further confirm its distance. Webb will also be used to understand why the galaxy is so bright compared to anything that has ever been found before it. (Photo : Alex Wong/Getty Images)

(Continued from page 3)

ies directly in the early Universe.”

“Large telescopes currently in operation have yielded the most distant objects so far,” they added.

“These highest redshift objects have posed various interesting questions for astronomy. For example, the most distant quasars at redshift $z > 7$ raised a serious problem to form blackholes as massive as one billion solar masses in the limited cosmic time.”

“Thus, searching for the most distant objects is not only the simplest frontier of the knowledge of human beings but also has a great power to reveal the formation physics of various objects in the early Universe.”

HD1 is located some 13.5 billion light-years away and may be home to the oldest stars in the Universe.

“HD1 is extremely bright in ultraviolet light,” Dr. Pacucci said.

“Some energetic processes are occurring there or, better yet, did occur some billions of years ago.”

At first, Dr. Pacucci and colleagues assumed HD1 was a standard starburst galaxy, a galaxy that is creating stars at a high rate.

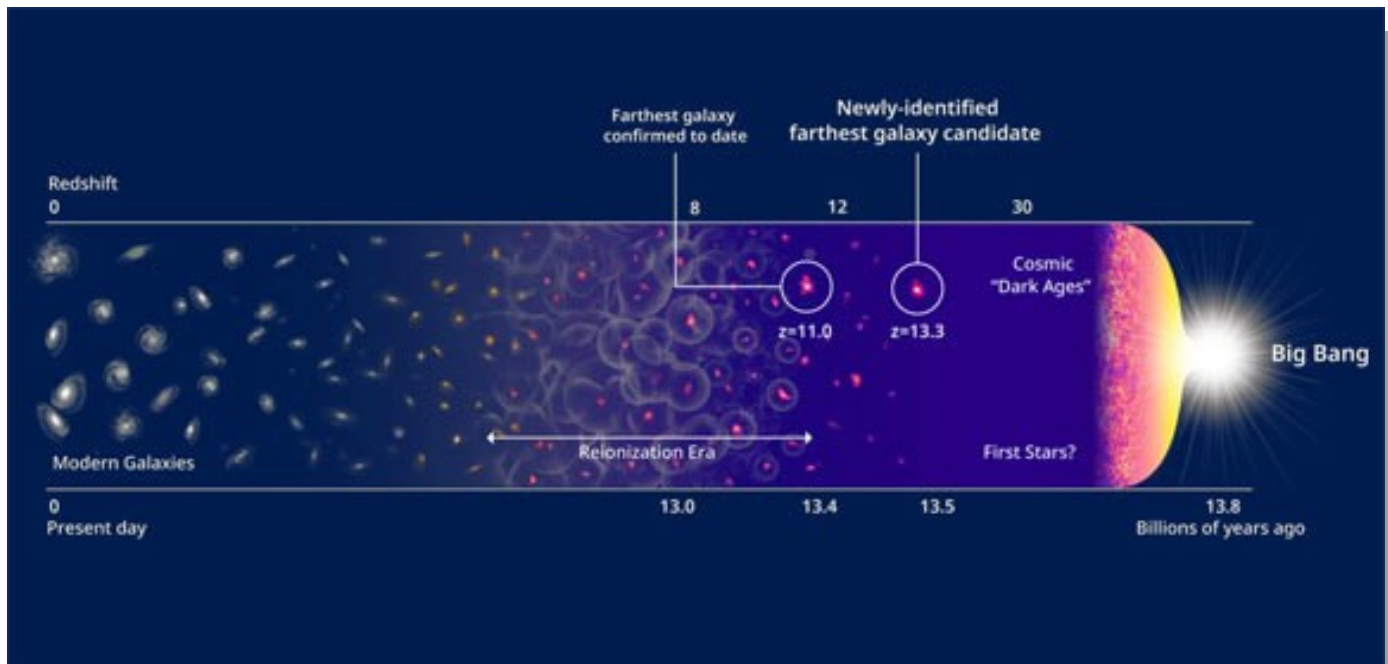
But after calculating how many stars HD1 was producing, they obtained an incredible rate — HD1 would be forming more than 100 stars every single year. This is at least 10 times higher than what we expect for these galaxies.

That's when the astronomers began suspecting that HD1 might not be forming normal, everyday stars.

“The very first population of

(Continued on page 11)

Most Distant Galaxy (Cont'd)



Timeline displays the earliest galaxy candidates and the history of the Universe. Image credit: Harikane et al., arXiv: 2112.09141 / NASA / EST / P. Oesch / Yale University.

(Continued from page 10)

stars that formed in the Universe were more massive, more luminous and hotter than modern stars,” Dr. Pacucci said.

“If we assume the stars produced in HD1 are these first, or population III, stars, then its properties could be explained more easily.”

“In fact, population III stars are capable of producing more UV light than normal stars, which could clarify the extreme ultraviolet luminosity of HD1.”

A supermassive black hole, however, could also explain the extreme luminosity of HD1.

As it gobbles down enormous amounts of gas, high energy photons may be emitted by the region around the black hole.

If that’s the case, it would be by far the earliest supermassive black hole known to humankind,

observed much closer in time to the Big Bang compared to [GN-z11](#), the current record-holder for the furthest galaxy.

“HD1 would represent a giant baby in the delivery room of the early Universe,” said Professor Avi Loeb, an astronomer at the Harvard & Smithsonian Center for Astrophysics.

“It breaks the highest quasar redshift on record by almost a factor of two, a remarkable feat.”

The discovery is described in two papers published in the [Astrophysical Journal](#) and the [Monthly Notices of the Royal Astronomical Society Letters](#).

Sources

Yuichi Harikane et al. 2022. A Search for H-Dropout Lyman Break Galaxies at $z\sim 12-16$. *ApJ*, in press; arXiv: 2112.09141

Fabio Pacucci et al. 2022. Are the Newly-Discovered $z\sim 13$ Drop-out Sources Starburst Galaxies or Quasars? *MNRASL*, in press; arXiv: 2201.00823

Distant Star (Cont'd)

(Continued from page 6)

Webb Space Telescope to examine Earendel (SN: 10/6/21). The telescope, also known as JWST, will begin studying the distant universe this summer.

JWST may uncover objects from even earlier times in the universe’s history than what Hubble can see because the new telescope will be sensitive to light from more distant objects. Welch hopes that the telescope will find many more of these gravitationally lensed stars. “I’m hoping that this record won’t last very long.”

Questions or comments on this article? E-mail us at feedback@sciencenews.org

CITATIONS

B. Welch et al. A highly magnified star at redshift 6.2. *Nature*. Vol. 603, March 30, 2022, p. 815. doi: 10.1038/s41586-022-04449-y.

NASA Night Sky Notes: Springtime Catspotting—Lynx and Leo Minor

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.

Many constellations are bright, big, and fairly easy to spot. Others can be surprisingly small and faint, but with practice even these challenging star patterns become easier to discern. A couple of fun fainter constellations can be found in between the brighter stars of Ursa Major, Leo, and Gemini: **Lynx** and **Leo Minor**, two wild cats hunting among the menagerie of animal-themed northern star patterns!

Lynx, named for the species of wild cat, is seen as a faint zigzag pattern found between Ursa Major, Gemini, and Auriga. Grab a telescope and try to spot the remote starry orb of globular cluster NGC 2419. As it is so distant compared to other globular clusters - 300,000 light years from both our solar system and the center of the Milky Way - it was thought that this cluster may be the remnants of a dwarf galaxy consumed by our own. Additional studies have muddied the waters concerning its possible origins, revealing two distinct populations of stars residing in NGC 2419, which is unusual for normally-homogenous globular clusters and marks it as a fascinating object for further research.

Leo Minor is a faint and diminutive set of stars. Its “triangle” is most noticeable, tucked in between Leo and Ursa Major. Leo Minor is the cub of Leo the Lion, similar to Ursa Minor being the cub to the Great Bear of Ursa Major. While home



to some interesting galaxies that can be observed from large amateur scopes under dark skies, perhaps the most intriguing ob-

ject found within Leo Minor’s borders is Hanny’s Voorwerp. This unusual deep-space object is thought to be a possible “light echo” of a quasar in neighboring galaxy IC 2497 that has recently “switched off.” It was found by Hanny van Arkel, a Dutch schoolteacher, via her participation in the Galaxy Zoo citizen science project. Since then a few more intriguing objects similar to Hanny’s discovery have been found, called “Voorwerpjes.”

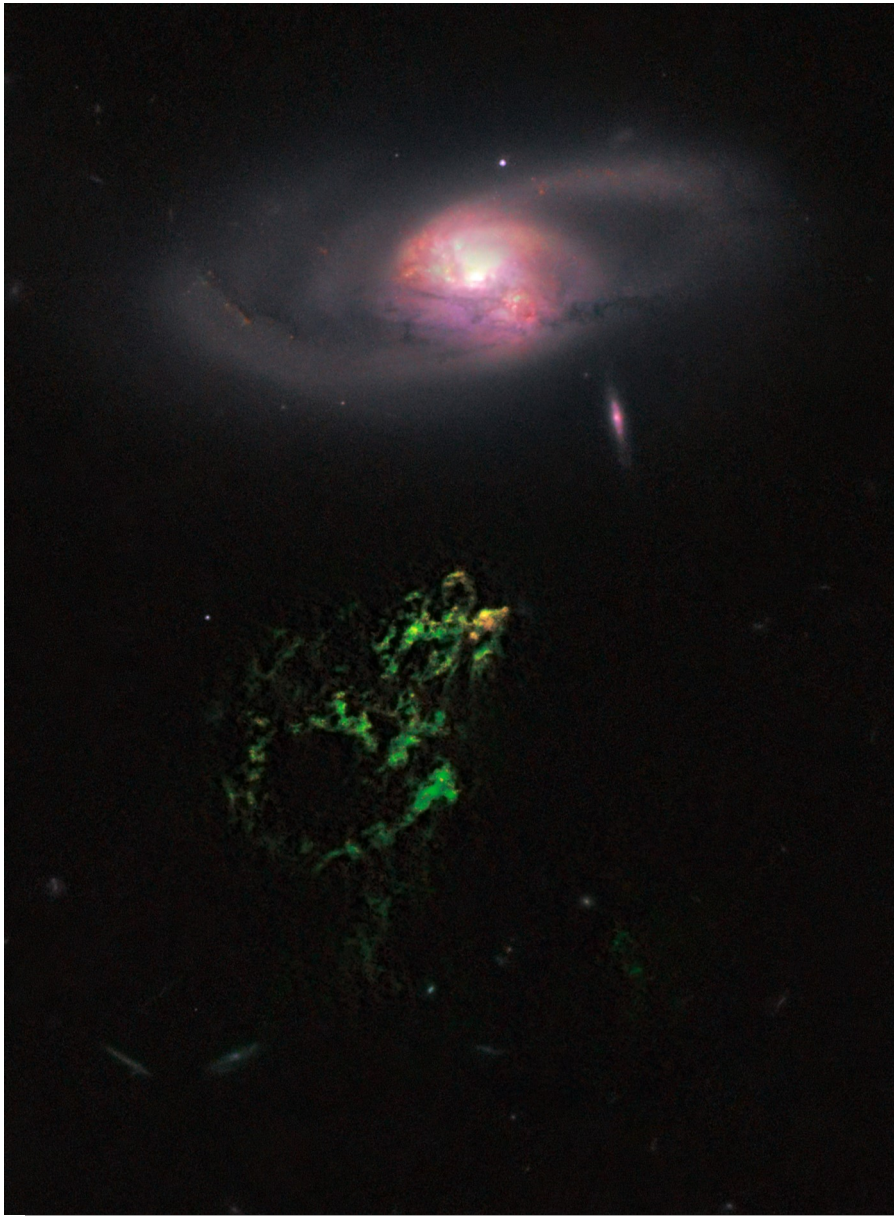
Lynx and Leo Minor are relatively “new” constellations, as

(Continued on page 13)



Map of the sky around Lynx and Leo Minor. Notice the prevalence of animal-themed constellations in this area, making it a sort of celestial menagerie. If you are having difficulty locating the fainter stars of Leo Minor and Lynx, don't fret; they are indeed a challenge. Hevelius even named the constellation as reference to the quality of eyesight one needs in order to discern these faint stars, since supposedly one would need eyes as sharp as a Lynx to see it! Darker skies will indeed make your search easier; light pollution, even a relatively bright Moon, will overwhelm the faint stars for both of these celestial wildcats. While you will be able to see NGC 2419 with a backyard telescope, Hanny's Voorwerp is far too faint, but its location is still marked. A few fainter constellation labels and diagrams in this region have been omitted for clarity. Image created with assistance from Stellarium

Night Sky Notes (Cont'd)



Hanny's Voorwerp and the neighboring galaxy IC 2497, as imaged by Hubble. Credits: NASA, ESA, W. Keel (University of Alabama), and the Galaxy Zoo Team Source: hubblesite.org/contents/news-releases/2011/news-2011-01.html

(Continued from page 12)

they were both created by the legendarily sharp-eyed European astronomer Johannes Hevelius in the late 1600s. A few other constellations originated by Hevelius are still in official use: Canes Venatici, Lacerta, Scutum, Sextans, and Vulpecula. What if your eyes aren't quite as sharp as Johannes Hevelius – or if your weather and light pollu-

tion make searching for fainter stars more difficult than enjoyable? See if you can spot the next Voorwerp by participating in one of the many citizen science programs offered by NASA at science.nasa.gov/citizenscience! And of course, you can find the latest updates and observations of even more dim and distant objects at nasa.gov.

Eye-piece (Cont'd)

(Continued from page 9)

Polaris and we now see Hercules standing on Draco's head.

The Dragon's head is the most conspicuous part of the constellation: an irregular quadrangle in the night sky not quite half the size of the Big Dipper's bowl. The brightest star is Eltanin, a second magnitude star, shining with an orange color.

Information sources:

- Sky Safari Pro planetarium software
- Dickinson, Terence 2006. *Nightwatch: a practical guide to viewing the universe*. Buffalo, NY. Firefly Books
- <http://stars.astro.illinois.edu/sow/kuma.html>
- <http://www.space.com/16399-double-stars-july-night-sky.html>

Minutes (Cont'd)

(Continued from page 2)

petuate a random hopping motion around the body of the object. Instrumentation on the spacecraft will track the poppers and precisely estimate their trajectories and continuously refine a high-resolution map of the body's gravity field, and thus, it's internal mass distribution.

- This novel concept garnered Dr. Hockman the NAIC Award (NASA Innovative Advanced Concepts).
- He also spoke of a tethered

(Continued on page 14)

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).



Minutes (Cont'd)

(Continued from page 13)

balloon concept called Tobias - Tethered Observatory for Balloon-based Imaging & Atmospheric Sampling which could potentially probe below the dense cloud layer of Venus to map the surface and collect atmospheric samples.

- Novel ways to design and adapt robotics are crucial to our exploration and understanding the other worlds around us.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

March 2022 Financial Summary

Beginning Balance	\$1,473
Deposits	\$150
Disbursements	-\$0
Ending Balance	\$1,623

New Member Welcome!

Welcome to our new CCAS members Randy Rainville from Glen Mills, PA, and Frank Colosimo from New Ringgold, PA, and Sadhu Kataria from Malvern, 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

PENNSYLVANIA OUTDOOR



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

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.