



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 28, No. 9 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016 September 2020

In This Issue

CCAS Summer/Autumn Events	2
Classic La Para	2
September 2020 Meeting Info	2
CCAS Guest Speaker Profile.....	3
The Sky Over Chester County:	
September 2020.....	4
September 2020 Observing Highlights.....	5
Return to Cherry Springs State Park.....	6
Massive Black Hole Merger Puzzles	
Astronomers	7
Thru the Eyepiece: Coat Hanger Cluster	8
NASA Night Sky Notes: Summer	
Triangle Corner—Altair	10
Arecibo Observatory Suffers Damage	12
CCAS Directions: Brandywine	
Red Clay Alliance	13
Membership Renewals	14
New Member Welcome.....	14
CCAS Directions:	
WCU Map.....	14
Treasurer's Report	14
CCAS Information	
Directory	15-16

Van den Bergh 131 and 132 in Cygnus



Photo by CCAS President Dave Hockenberry. Image acquired with Hyperion 12.5" astrograph, QSI 583wsg camera, Astro-Physics 1200 mount, Lodestar X2 guide camera off-axis and SX Active Optics. Image capture, Observatory control with MaxIm DL and APCC. Data accumulated between 9/15/18 and 7/18/20 Luminance 900 second exposures X 34. Red Green and Blue exposures 600 seconds X 16, 15, and 23 respectively. Image processing with CCDStack and Photoshop CC. See pg. 13 for more info.

Membership Renewals Due

09/2020	Armored Holloway Johnson Lee Lurcott, E. Squire
10/2020	Conrad Lane Rosenblatt Wirth
11/2020	Baker Bentley Buczynski Holenstein Kerkele Leiden Taylor

September 2020 Dates

- 2nd** • Full Moon, the Full Corn Moon or the Full Dog Salmon Moon, 1:22 A.M. EDT.
- 10th** • Last Quarter Moon, 5:25 A.M. EDT.
- 17th** • New Moon, 7:00 A.M. EDT.
- 22nd** • Fall equinox, 9:30 A.M. EDT.
- 23rd** • First Quarter Moon, 9:54 P.M. EDT.
- 24th-25th** • The Moon, Jupiter and Saturn form a large triangle.
- 25th** • The Lunar Straight Wall is visible.



CCAS Upcoming Nights Out

In addition to our monthly observing sessions at the Myrick Conservancy Center, BRC (see pg. 2), 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.

☼ **Monthly observing sessions at Myrick Conservancy Center, BVA, and special observing dates have been cancelled until further notice as part of the national effort to limit the spread of the coronavirus. For more information about future observing opportunities, contact our Observing Chair, Don Knabb.**

Summer/Autumn Society Events

September 2020

8th • CCAS Monthly Meeting, ONLINE via Zoom. Meet & Greet online for members from 7:00 to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. Guest Speaker: Dr. Sara Seager, MIT. Her presentation is entitled, "TESS Exoplanets and Beyond – The Search for Habitability and Signs of Life."

14th • Beginner Astronomy Class: Spaceship Earth. 7-8 p.m. EDT. Online via Zoom.

15th-18th • Cherry Springs Camping & Observing Trip, [Cherry Springs State Park](#), Coudersport, PA.

17th • The von Kármán Lecture Series: [Visualizing Space Exploration: AR, VR & Emerging Tech](#). Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the October 2020 edition of [Observations](#).

21st • Beginner Astronomy Class: Our Moon—Phases and Faces. 7-8 p.m. EDT. Online via Zoom.

22nd • September Equinox; first day of Autumn, 9:30 am EDT.

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

28th • Beginner Astronomy Class: Other Kids on the Block. 7-8 p.m. EDT. Online via Zoom.

October 2020

5th • Beginner Astronomy Class: Star Charts and Planetarium Software. 7-8 p.m. EDT. Online via Zoom.

12th • Beginner Astronomy Class: Using a Telescope. 7-8 p.m. EDT. Online via Zoom.

13th • CCAS Monthly Meeting, ONLINE via Zoom. Meet & Greet online for members from 7:00 to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. CCAS Member Speaker: John Conrad, NASA Solar System Ambassador, will present "Global Climate Change – The View from Space: A 2020 Update."

15th • The von Kármán Lecture Series: [Galaxy of Horrors: Terrifying Real Planets](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

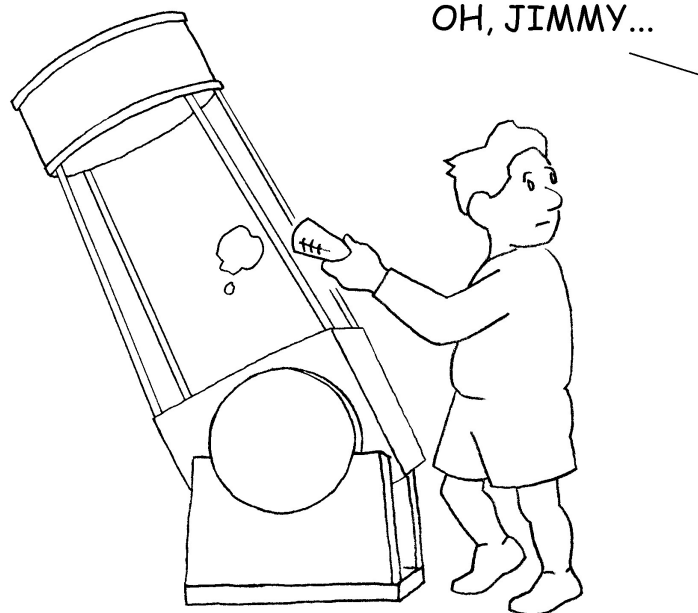
19th • Beginner Astronomy Class: Beyond Naked-Eye Observing. 7-8 p.m. EDT. Online.

20th • Open call for articles and photographs for the September 2020 edition of [Observations](#).

26th • Deadline for newsletter submissions for the September 2020 edition of [Observations](#).

Classic La Para by Nicholas La Para

La Para



NEVER CLEAN YOUR OPTICS UNLESS YOU HAVE TO

[Editor's Note: The cleaning theme continues! Here's to the neat-freaks out there again who like to keep both the interiors and exteriors extra clean this summer. JCH]

September 2020 CCAS Meeting Agenda by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on September 9, 2020, starting at 7:30 p.m. The meeting will be held ONLINE via [Zoom.us](#). Our guest speaker will be Dr. Sara Seager, Professor of Planetary Science, Professor of Physics, and Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology. Her presentation is entitled, "TESS Exoplanets and Beyond – The Search for Habitability and Signs of Life." See page 2 for more details about our guest speaker and her presentation.

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 2020-2021 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

September 2020 Guest Speaker: Dr. Sara Seager from the Massachusetts Institute of Technology

by Bruce Ruggeri, CCAS Program Chair

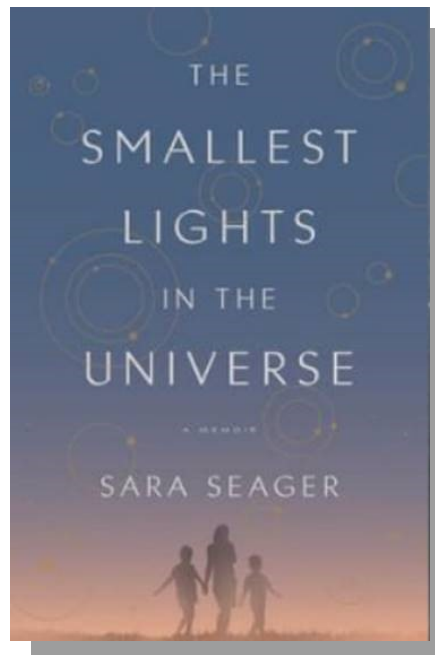


CCAS September 2020 Guest Speaker: Dr. Sara Seager

On Tuesday, September 8, 2020, Dr. Sara Seager joins us from MIT where she is Professor of Planetary Science, Professor of Physics, and Professor of Aeronautics and Astronautics. She will present “TESS Exoplanets and Beyond – The Search for Habitability and Signs of Life.”

Presentation Synopsis: NASA’s latest planet-finding mission TESS monitors the brightness of hundreds of thousands of stars per month, searching for drops in brightness that indicates an exoplanet transiting its host star. Computer algorithms detrend the data and flag threshold crossing events, followed by human or computer identification of planet candidates. A worldwide team of hundreds of astronomers then follow-up planet

candidates with specialized telescopes to confirm planet status.



Dr. Seager’s memoir was one of Amazon’s [Best Books of August 2020](#).

The TESS mission is capable of finding small rocky exoplanets transiting small red dwarf stars, including some planets orbiting in their host star’s “habitable zone”. Such planets will be followed up with future telescopes for atmosphere studies—for the search for signs of habitability and signs of life by way of atmospheric “biosignature gases.”

I will review the TESS mission’s latest findings and additionally present a next-generation space telescope concepts that aim to reach the ultimate goal of finding and identifying another Earth.

About Our Guest Speaker: Sara Seager is the Class of 1941 Professor of Planetary Science, Professor of Physics, and Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology. Her past research is credited with laying the foundation for the field of exoplanet atmospheres, while her current research focuses on the search for signs of life on exoplanets by way of atmospheric biosignature gases.

Professor Seager has been involved with a number of space-based exoplanet searches. She recently completed duties as the Deputy Science Director for the MIT-led NASA mission TESS, as the PI for the on-orbit JPL/MIT CubeSat ASTERIA, and as a lead for Starshade Rendezvous Mission (a space-based mission concept under technology development for direct imaging discovery and characterization of Earth analogs).

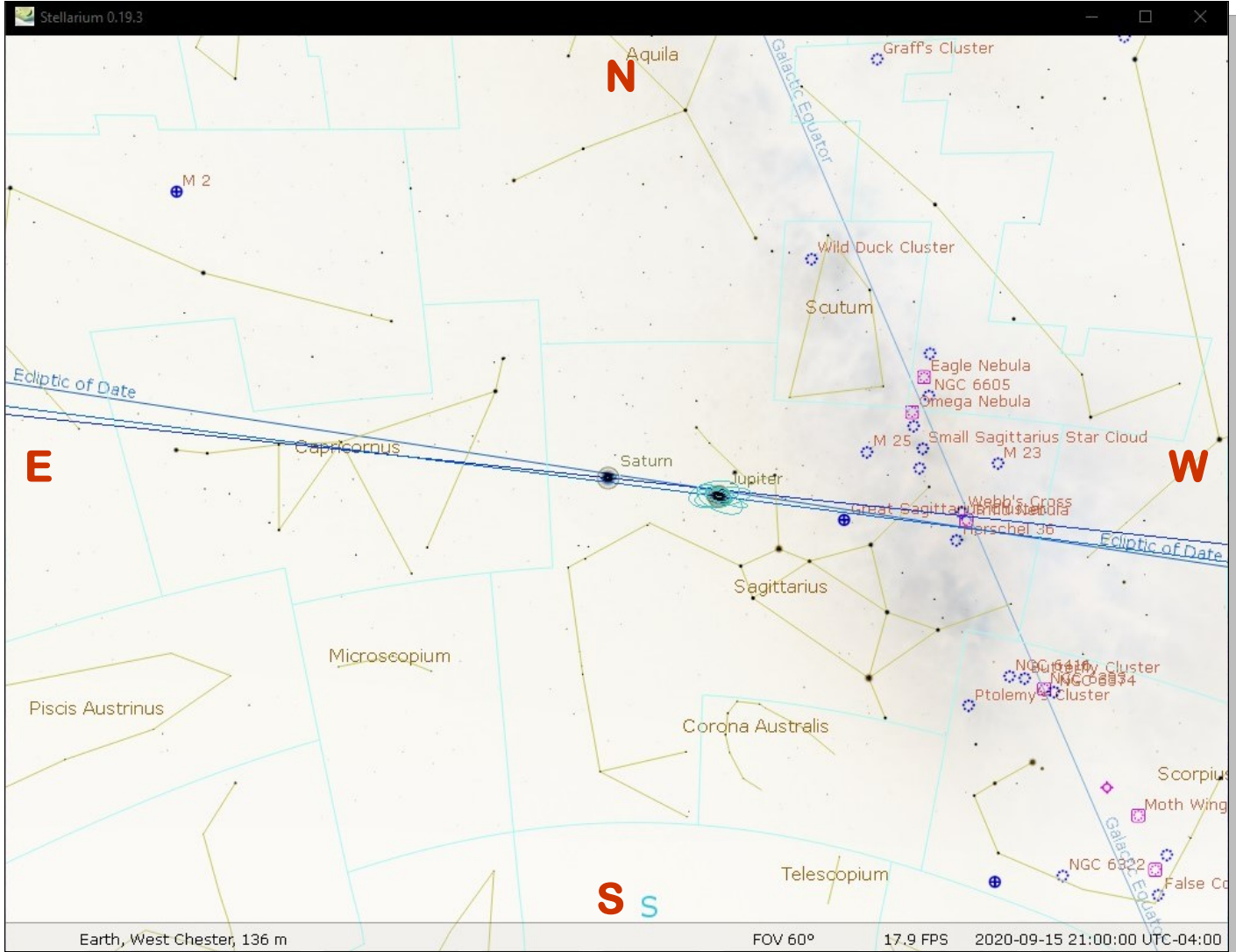
Before joining MIT in 2007,

(Continued on page 14)

The Sky Over Chester County

September 15, 2020 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
09/01/2020	6:02 a.m. EDT	6:30 a.m. EDT	7:32 p.m. EDT	8:00 p.m. EDT	13h 02m 13s
09/15/2020	6:16 a.m. EDT	6:43 a.m. EDT	7:10 p.m. EDT	7:37 p.m. EDT	12h 26m 19s
09/30/2020	6:31 a.m. EDT	6:58 a.m. EDT	6:45 p.m. EDT	7:12 p.m. EDT	11h 47m 16s

Moon Phases					
			Full Moon	09/02/2020	1:22 a.m. EDT
Last Quarter	09/10/2020	5:25 a.m. EDT	New Moon	09/17/2020	7:00 a.m. EDT
First Quarter	09/23/2020	9:54 p.m. EDT			

September 2020 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	Full Moon, the Full Corn Moon or the Full Dog Salmon Moon, 1:22 A.M. EDT
10	Last Quarter Moon, 5:25 A.M. EDT
11	Neptune is at opposition so it is visible all night
17	New Moon, 7:00 A.M. EDT
22	Fall equinox, 9:30 A.M. EDT
23	First Quarter Moon, 9:54 P.M. EDT
24/25	The Moon, Jupiter and Saturn form a large triangle
25	The Lunar Straight Wall is visible

The Best Sights This Month: Planets rule the evening and late night sky with Jupiter and Saturn in the south just after the sky darkens and Mars rising less than an hour after sunset by the end of the month. By month's end Mars is actually a bit brighter than mighty Jupiter!

Mercury: Mercury is not well positioned for observation during September.

Venus: Our sister planet rises over 3 hours before the Sun and shines like a beacon in the predawn sky at magnitude -4.2.

Mars: The red planet will be a real highlight during October when it reaches opposition. But it is no 2nd fiddle during September, rising about an hour after sunset by month's end.

Jupiter: The king of the planets and its pal Saturn rule the early evening sky! The distance between these two rulers of the solar system has been slowly increasing, but in mid-September that reverses and they slowly draw nearer together until a close conjunction in December.

Saturn: The rings of Saturn are tilted at an angle of 23° which makes them really stand out against the

background sky. Set up your telescope and zoom in at high magnification to enjoy the Cassini Division, that gap between the inner and outer rings.

Uranus and Neptune: Both distant gas giants are best viewed in the hours before dawn. Neptune reaches opposition on September 11 so it rises at sunset and is visible all night.

The Moon: Full moon occurs on September 2nd. This full Moon is the Full Corn Moon or the Fruit Moon. Native Canadians called this the Moose Calling Moon or the Dog Salmon Moon.

Constellations: The September sky is dominated by the constellations of the Summer Triangle; Lyra, Cygnus and Aquila. But stay out a little later and the Great Square of Pegasus is rising and you can find our neighbor galaxy Andromeda with binoculars. Stay up a bit later yet and you will get a preview of the fall and winter constellations with the beautiful Pleiades leading the charge.

Messier/Deep Sky: September is your last chance of 2020 to catch the Messier objects in the southern constellations of Sagittarius and Scorpius. If you can find a clear view of the southern horizon you can find M4, M6, M7, M17, M8, M22 and more! On the other side of the sky, if you stay out late, you can catch the open star clusters in Auriga: M36, M37 and M38.

Comets: Although it fails to compare to Comet NEOWISE, you can find 9th magnitude Comet 88P/Howell in the southern sky throughout September. Discovered by Ellen Howell from Palomar Mountain in 1981, this comet should cast a green glow in long exposure photos. The September issue of Astronomy magazine has a sky map to guide you to this faint visitor to our late summer skies.

Meteor Showers: There are no significant meteor showers during September.

Return to Cherry Springs State Park, September 2020

by Don Knabb, CCAS Treasurer & Observing Chair

If the weather cooperates, several members plan to return to the dark skies of Cherry Springs State Park in mid-September. We are planning to arrive the afternoon of Tuesday September 15 and depart Friday morning September 18. The days are flexible, so if you would like to join us on those days or a day or two before or after that would be fine, although I have read that the park can get a little crowded on the weekends and there have been a few minor problems with “non-astronomers”.

The sky is unbelievable when the weather cooperates. The Milky Way stretches from horizon to horizon and many large deep sky objects such as the Double Cluster and the Andromeda Galaxy are visible to the naked eye. You don't need to have a telescope to enjoy the night sky, a chair that leans back and a pair of binoculars will keep you entertained for hours.

As during our July trip, we need to adhere to social distancing guidelines and wear masks when we are in close proximity to each other. In an abundance of caution, we cannot share eyepieces or telescopes. Also, no cars may arrive or depart after sunset or before sunrise, so plan your travel to arrive before dark. There are strict rules about lighting on the astronomer's field. No white lights are allowed and only dim red lights should be used.

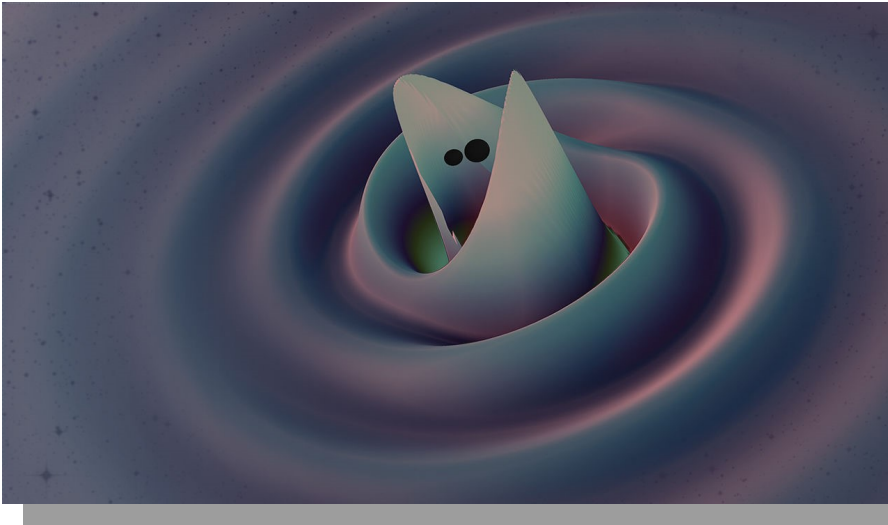
If you would like to join us, please email Don Knabb at dknabb01@comcast.net. And if you prefer not to camp there are several places within about a 20 minute drive where you can stay the night.



Several shots from the July camping & observing trip

Most Massive Black Hole Merger Yet Puzzles Astronomers

by Daniel Clery, *Science Magazine*



The merger of middleweight black holes churned up gravitational waves that were detected on Earth. Deborah Ferguson, Karan Jani, Deirdre Shoemaker, Pablo Laguna, Georgia Tech, MAYA Collaboration

Far away in the depths of space, two black holes spiral toward each other and merge. Powerful gravitational waves from that dance of death race across the cosmos until their ripples reach three giant detectors on Earth: two with the U.S.-based Laser Interferometer Gravitational-wave Observatory (LIGO) and Europe's Virgo detector in Italy.

The detectors have sensed [dozens of such cataclysms](#) over the past 5 years, but the one on 21 May 2019 was different. Not only was it the most powerful and distant merger ever seen, but the resulting black hole also belongs to a class of long-sought middleweight black holes, members of the LIGO-Virgo collaboration report today in two new studies. Puzzlingly, however, the two black holes that merged are heavier than expected: Their masses fall in a gap in which theorists believe it is impossible to make a black hole via the usual route of a collapsing star.

Stellar-class black holes are typically created when a large star runs out of its nuclear fuel and the churning engine of light and heat stops. Without that outward pressure, the star's outer layers collapse under gravity, triggering a colossal supernova and leaving behind a black hole. But in the very biggest stars, the collapse is even more catastrophic, causing a runaway thermonuclear explosion that destroys the star and leaves nothing behind. Theoretically, that means there should be a cut-off in black hole mass at about 65 solar masses.

Until May 2019, black hole mergers detected by LIGO and Virgo largely supported that mass cutoff. Then came the event known as GW190521, which lasted just one-tenth of 1 second. It wasn't spotted by the usual algorithms that scan for binary mergers (which typically last several times longer), but was picked up by a separate pipeline that looks for "things that go bang," says Nelson Christensen, a physicist at the

Cote d'Azur Observatory in Nice and a member of the LIGO-Virgo team.

Although the signal was short—just four up-and-down wave cycles—the team could still analyze it, parsing out its amplitude, its shape, and how its frequency changed over time. "It was very difficult to interpret," says team member Alessandra Buonanno, director of the Max Planck Institute for Gravitational Physics (Albert Einstein Institute). "We spent a lot of time persuading ourselves to trust what we'd found."

In two papers published on September 2, 2020—one [describing the detection](#) in *Physical Review Letters*, and one [interpreting the data](#) in *The Astrophysical Journal Letters*—the joint LIGO-Virgo team says the model that best fits the data is of two black holes—weighing in at about 66 and 85 solar masses—merging into a black hole of 142 Suns. The remaining eight solar masses would have been converted into gravitational wave energy. "It was quite substantially bigger than anything we'd seen," Christensen says.

A black hole with 142 solar masses instantly puts it into a class of its own. Whereas astronomers have long known of smaller black holes and of the giants in galactic centers made of millions or billions of Suns, those of medium size—from 100 to 100,000 solar masses—have been [conspicuously absent](#). Astronomers believe they are needed as building blocks for the supermassive black holes, and

(Continued on page 9)

Through the Eyepiece: The Coat Hanger Cluster, Cr 399

by Don Knabb, CCAS Treasurer & Observing Chair



Picture credit: Robert J. Hawley, licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 United States License, <http://www.almadenobservatory.net/CR399/index.html>

One of the most fun shapes in the sky to share with friends and family is the Coat Hanger Cluster, also known as Brocchi's Cluster or Collinder 399. This is a group of stars in the constellation Vulpecula that looks like a coat hanger, thus the name.

Pictures don't really provide the joy of discovery one feels when you find this group of stars, but below is one of the best photos I have seen of the Coat Hanger Cluster.

Brocchi's Cluster was first described by the Persian astronomer

Al Sufi in his Book of Fixed Stars in 964 and was independently rediscovered by Giovanni Hodierna in the seventeenth century. In the 1920s, D. F. Brocchi, an amateur astronomer and chart maker for the American Association of Variable Star Observers, created a map of this object for use in calibrating photometers.

The asterism is made up of ten stars ranging from fifth to seventh magnitude which form the conspicuous coat hanger, a straight line of six stars with a

"hook" of four stars on the south side. An additional thirty or so fainter stars are sometimes considered to be associated as well.

I often see this cluster under a very dark sky as an unresolved patch of light, but this is not possible in Chester County skies. Unless you have a telescope with a wide field of view, binoculars are the best equipment to use to view this object.

CR 399 is found by slowly sweeping across the Milky Way

(Continued on page 9)

Eyepiece (Cont'd)



Photo credit: Stellarium planetarium software

(Continued from page 8)

along an imaginary line from the bright star Altair toward the even brighter star Vega. About one third of the way toward Vega, the Coat Hanger should be spotted easily against a darker region of the Milky Way. Or you can scan upward from the tail of the arrow constellation, Sagitta, as seen in the screen print from Stellarium below.

Several independent studies since 1998 have determined that this object is not a true cluster at all, but rather just a chance alignment of stars. These recent studies have generally based their findings on improved measurements of parallax and proper motion provided by the Hipparcos satellite.

I have been able to successfully coach several inexperienced observers to find the Coat Hanger Cluster with hand held binoculars. This is a great time of year to look for it with the Summer Triangle high in the sky. When seeing this object for the first time a "Wow!" is usually heard from the person at the binoculars. A more certain method to share this wonder of the sky is to mount your binoculars on a tripod for even children to see.

Information credits:

- Dickinson, Terence 2006. Night-watch: a practical guide to viewing the universe. Buffalo, NY. Firefly Books
- http://en.wikipedia.org/wiki/Brocchi%27s_Cluster
- <http://www.seds.org/messier/xtra/ngc/brocchi.html>

Black Holes (Cont'd)

(Continued from page 7)

there is indirect evidence for their existence, but this may be the most convincing sighting yet, albeit right at the bottom of the range. "This is just a hint that there is something in this range of masses," says astrophysicist Avi Loeb of Harvard University who was not involved in the study.

Perhaps more interesting to astrophysicists are the origins of the two merging black holes. The lighter one is right on the cusp of the mass gap, so it could well have formed from a single gargantuan star. But 85 solar masses is hard to explain away. "It's exciting because it was unexpected," Loeb says. "The mass gap was robust, but now the door is open to new models."

In their interpretive paper, the team looked at many possible explanations. The black holes could be primordial, having hung around since the maelstrom of the early universe before the first stars were born. Or they could have been small black holes, with a merger that was magnified by gravitational lensing. Or perhaps—more exotically—the ripples came from cosmic strings, hypothetical defects in the vacuum left over from the big bang. But none of these explanations fitted the data as well as a pair of merging heavyweights. So, the team fell back on "good old Occam's razor," Christensen says: The simplest explanation is probably correct.

Loeb believes the heavyweights are probably "multigenerational," in which

(Continued on page 13)

NASA Night Sky Notes: Summer Triangle Corner—Altair

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.

Altair is the final stop on our trip around the Summer Triangle! The last star in the asterism to rise for Northern Hemisphere observers before summer begins, brilliant Altair is high overhead at sunset at the end of the season in September. Altair might be the most unusual of the three stars of the Triangle, due to its great speed: this star spins so rapidly that it appears “squished.”

A very bright star, Altair has its own notable place in the mythologies of cultures around the world. As discussed in our previ-



ous edition, Altair represents the cowherd Niulang in the ancient Chinese tale of the “Cowherd and the Weaver Girl.” Altair is the brightest star in the constellation of Aquila the Eagle; while described as part of an eagle by ancient peoples around the Mediterranean, it was also seen as part of an eagle by the Koori people in Australia! They saw the star itself as representing a wedge-tailed eagle, and two nearby stars as his wives, a pair

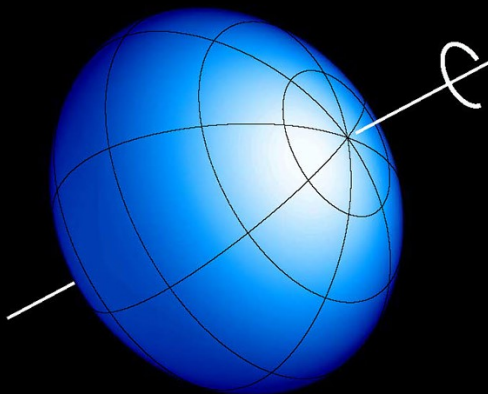
of black swans. More recently one of the first home computers was named after the star: the Altair 8800.

Altair’s rapid spinning was first detected in the 1960s. The close observations that followed tested the limits of technology available to astronomers, eventually resulting in direct images of the star’s shape and surface by using a technique called *interferometry*, which combines the light from two or more instruments to produce a single image. Predictions about how the surface of a rapidly spinning massive star would appear held true to the observations; models predicted a squashed, almost “pumpkin-like” shape instead of a round sphere, along with a dimming effect along the widened equator, and the observations confirmed this! This equa-

(Continued on page 11)

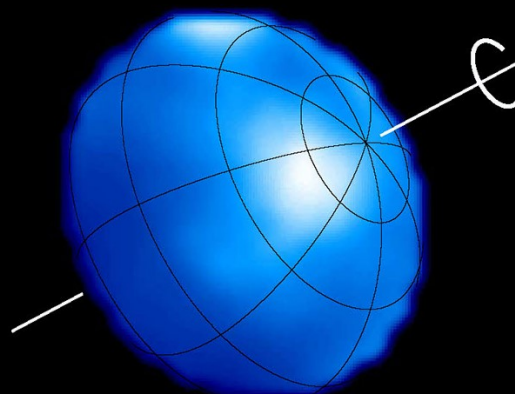
Model of a fast-spinning star

Actual image of Altair from the CHARA Interferometer



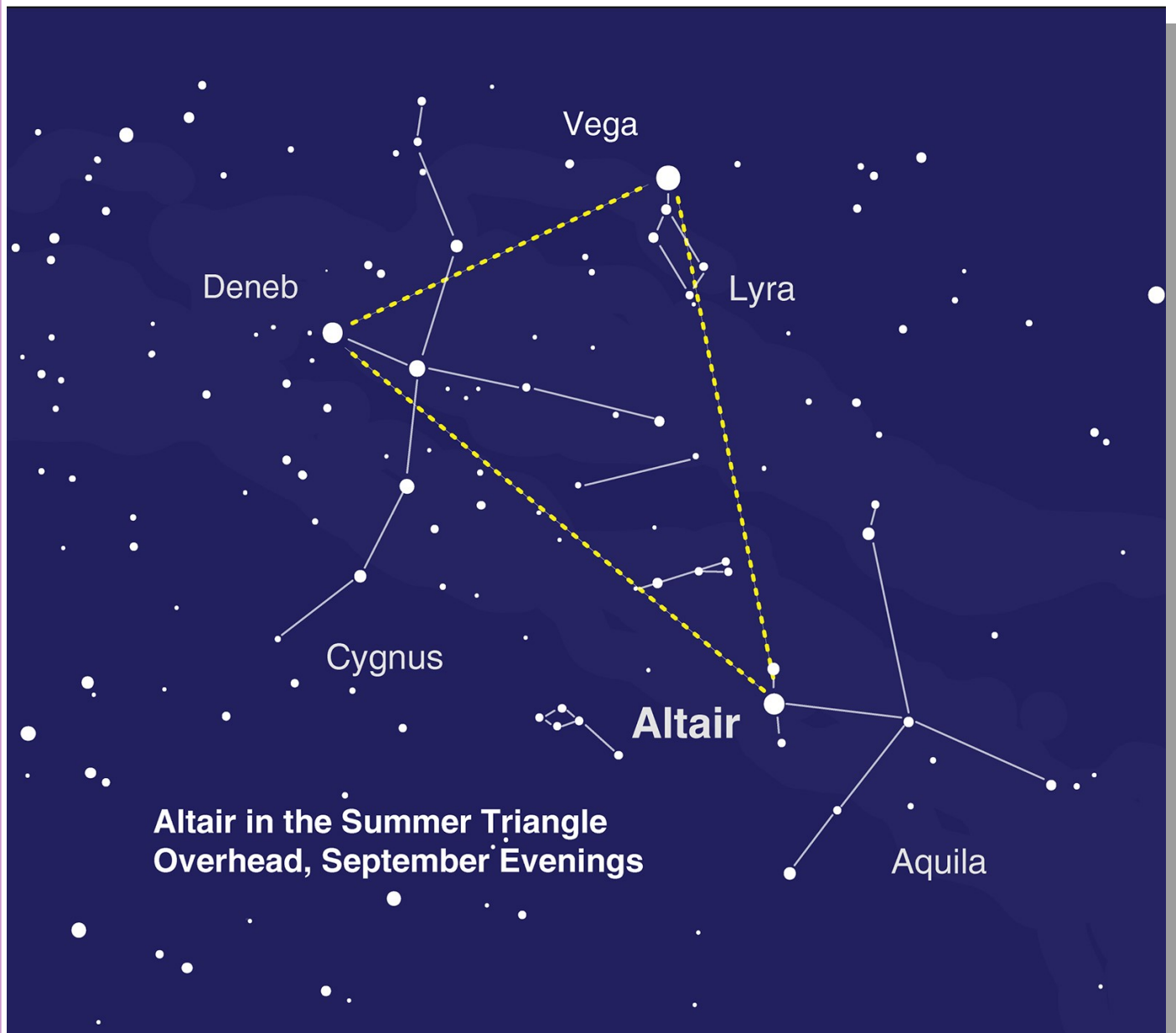
Equator bulges and darkens as star spins faster

2.8 revolutions/day



The image on the right was created using optical interferometry: the light from four telescopes was combined to produce this image of Altair’s surface. Image credit: Ming Zhao. More info: bit.ly/altairvsmodel

Night Sky Notes (Cont'd)



Altair is up high in the early evening in September. Note Altair's two bright "companions" on either side of the star. Can you imagine them as a formation of an eagle and two swans, like the Koori?

(Continued from page 10)

torial dimming is due to a phenomenon called *gravity darkening*. Altair is wider at the equator than it is at the poles due to centrifugal force, resulting in the star's mass bulging outwards at the equator. This results in the denser poles of the star being hotter and brighter, and the less dense equator being cooler and therefore dimmer. This doesn't

mean that the equator of Altair or other rapidly spinning stars are actually dark, but rather that the equator is dark in comparison to the poles; this is similar in a sense to sunspots. If you were to observe a sunspot on its own, it would appear blindingly bright, but it is cooler than the surrounding plasma in the Sun and so appears dark in contrast.

As summer winds down, you can still take a Trip Around the Summer Triangle with this activity from the Night Sky Network. Mark some of the sights in and around the Summer Triangle at: bit.ly/TriangleTrip. You can discover more about NASA's observations of Altair and other fast and furious stars at nasa.gov.

Arecibo Observatory in Puerto Rico Suffers Serious Damage After Cable Breaks

by Mike Wall, Space.com



The iconic Arecibo Observatory's giant radio telescope dish suffered serious damage on Aug. 10, 2020 when a support cable broke. (Image credit: University of Central Florida)

The iconic [Arecibo Observatory](#) in Puerto Rico has gone dark, at least for a little while.

One of the telescope's supporting cables snapped early Monday morning (Aug. 10), ripping a 100-foot-long (30 meters) gash in the giant radio dish, [according to the University of Central Florida](#) (UCF). The observatory has been shut down while engineers assess the damage and formulate a fix.

"We have a team of experts assessing the situation," Arecibo director Francisco Cordova said in a UCF Today statement. "Our focus is assuring the safety of our staff, protecting the facilities and equipment and restoring the facility to full operations as soon as possible, so it can continue to assist scientists around the world."

The 1,000-foot-wide (300 m) Arecibo got up and running in 1963. It was the world's largest single-dish radio telescope until 2016, when China's [Five-hundred-meter Aperture Spherical Telescope](#) claimed the mantle.

Arecibo has done a wide variety of work during its long life, from tracking and imaging near-Earth asteroids to listening for possible signals from [advanced alien civilizations](#). And its communication attempts have not all been one-way: In 1974, scientists used the observatory to beam the pictorial "Arecibo Message" toward M13, a globular cluster that lies 25,000 light-years from Earth.

The observatory's fame extends beyond the astronomical community. The climactic scenes of the 1995 James Bond

movie "Goldeneye" were filmed there, and Arecibo played a prominent role in the 1997 science fiction film "Contact," based on the book by Carl Sagan.

Arecibo has bounced back from damage before. For example, [Hurricane Maria knocked the observatory offline](#) when it slammed into Puerto Rico with devastating force in September 2017. But Arecibo's lights came back on just a few months later, in December.

Arecibo is a U.S. National Science Foundation facility. The observatory is managed by UCF, in collaboration with the Universidad Ana G. Méndez and Yang Enterprises Inc.

Mike Wall is the author of "Out There" (Grand Central Publishing, 2018; illustrated by Karl Tate), a book about the search for alien life. Follow him on Twitter @michaeldwall. Follow us on Twitter @Spacedotcom or Facebook.

Van den Bergh 131 & 132

Van den Bergh 131 and 132 are blue reflection nebulae about 6000 light-years distant just south of Deneb in the constellation Cygnus. VdB 131 is the blue nebula surrounding the brighter star in the lower left, and VdB 132 is near the center. The other blue nebula to the right is NGC 6194. The red nebula in the peripheral field is a small section of the large H-2 region IC 1318. The left side of the image also contains Parsamian 22, which is the small orange-white comma-shaped object with a small star in the middle. This is a bipolar nebula when examined with polarized filters, and may represent a circumstellar disc of gas and dust in the process of decay. At the lower left corner near the bottom of the image is a fainter star that looks like it has floppy “ears” hanging off the sides. This is Variable star V1515, an FU-Orionis type extremely variable pre-main sequence star. The “ears” are thought to represent transference of mass from the variable star’s accretion disc to a young, low mass star (not visualized in this image). Many of the closer Van den Bergh objects are found along Gould’s Belt, which contains rich star fields of the Milky Way galaxy seen in the background here.

Black Holes (Cont’d)

(Continued from page 9)

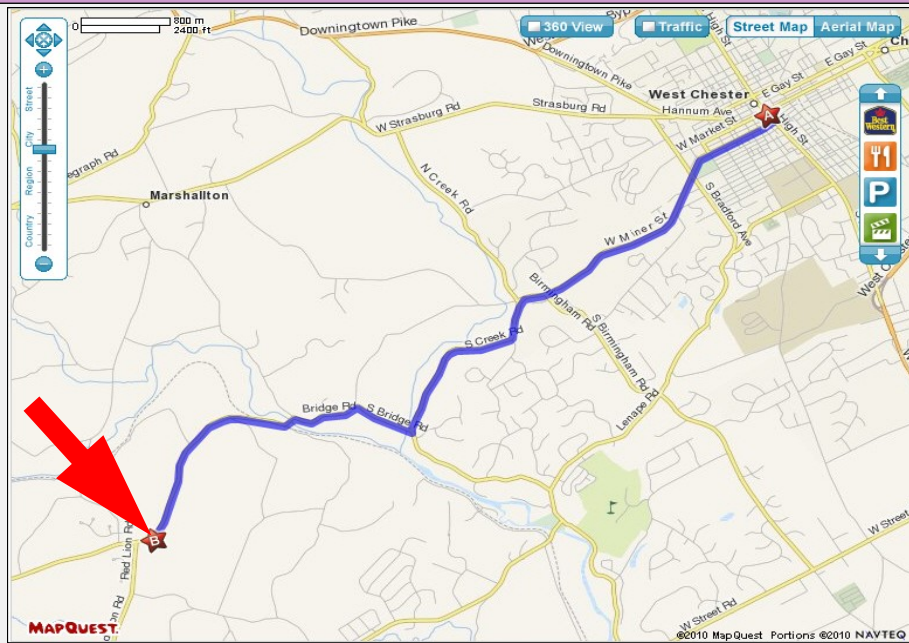
smaller black holes in dense star-forming areas merge multiple times to produce masses above the cutoff. Galaxies are often surrounded by dense clumps of stars called globular clusters. These can contain hundreds of thousands of ancient stars: ideal breeding grounds for black holes. As the black holes sink toward the center of the globular cluster, they are more likely to merge with others. “These environments are specialized, which is why we are only finding them now,” he says, after LIGO and Virgo have sensed more than 60 mergers.

But the clusters are likely to contain black holes of varying masses, and lopsided mergers produce asymmetric blasts that can kick the new black hole out

of the cluster at up to 1000 kilometers per second. For clusters to be nurseries for black holes in the mass gap, the recoils need to be low and the clusters must be massive enough to keep them from escaping, Loeb says.

LIGO and Virgo are being upgraded and are set to restart observations in 2022 with increased sensitivity, allowing them to survey three times as much of the cosmos. Finding more such heavyweight mergers will “teach us about the astrophysics of such stellar nurseries,” Loeb says. “The more events we have, the more clues about their origins.”

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

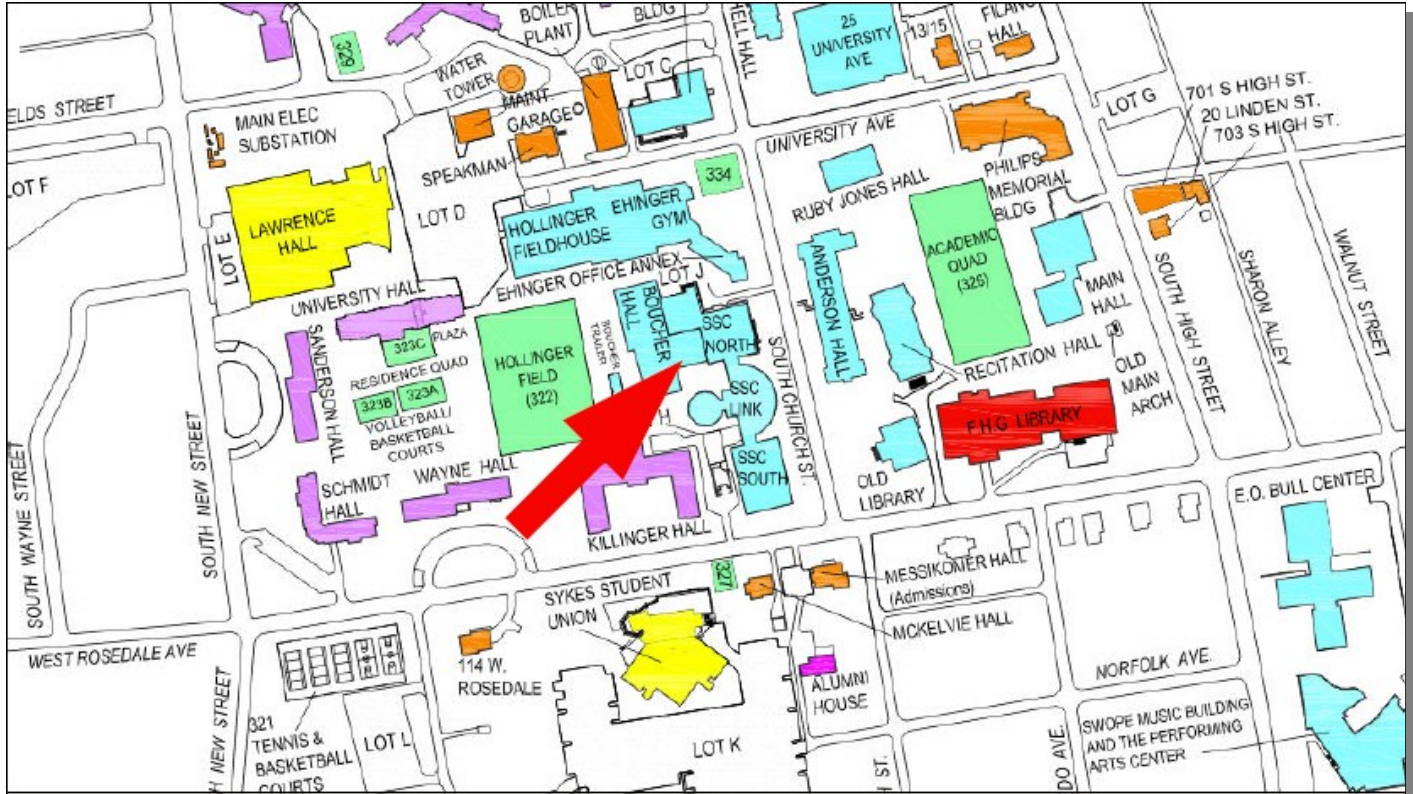
<http://brandywinewatershed.org/>

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.

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).



Seager (Cont'd)

(Continued from page 3)

Professor Seager spent four years on the senior research staff at the Carnegie Institution of Washington preceded by three years at the Institute for Advanced Study in Princeton, NJ. Her PhD is from Harvard University, and her BSc from the University of Toronto.

Professor Seager is also a member of the National Academy of Sciences and a 2013 MacArthur Fellow. She is the author of "The Smallest Lights in the Universe: A Memoir." Asteroid 9729 is named in her honor.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

Aug. 2020 Financial Summary

Beginning Balance	\$613
Deposits	\$65
Disbursements	<u>-\$0</u>
Ending Balance	\$678

New Member Welcome!

Welcome new CCAS members Michael Manigly and William Reilly, both from West Chester, 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
21103 Striper Run
Rock Hall, MD 21661

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
410-639-4329

Public Relations: Ann Miller
610-558-4248



CCAS Membership Information

The present membership rates are as follows:

REGULAR MEMBER.....\$25/year
SENIOR MEMBER.....\$10/year
STUDENT MEMBER.....\$ 5/year
JUNIOR MEMBER.....\$ 5/year
FAMILY MEMBER.....\$35/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 Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$32.95**, much less than the newsstand price of \$66.00, and also cheaper than individual subscriptions (\$42.95)! Buying a subscription this way also gets you a 10% discount on other Sky Publishing merchandise.

To **start** a new subscription, make **sure** you make out the check to the **Chester County Astronomical Society**, note that it's for *Sky & Telescope*, and mail it to Don Knabb.

To **renew** your "club subscription" contact Sky Publishing directly. Their phone number and address are in the magazine and on their renewal reminders. If you have **any** questions call Don first 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). If you want to participate in this special Society discount offer, **contact our Treasurer Don Knabb.**