Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

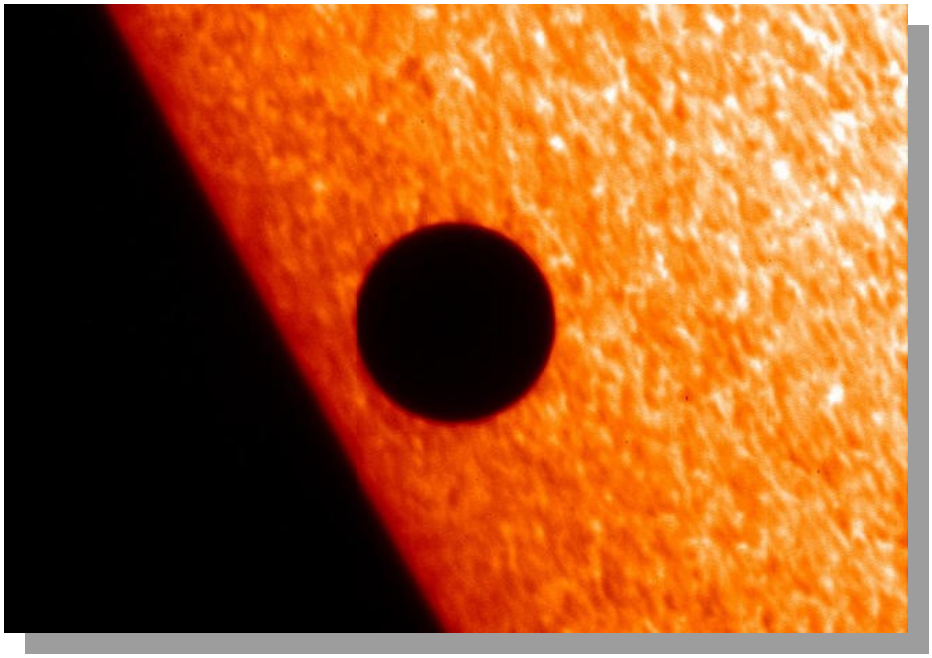
Vol. 27, No. 11 ***Three-Time*** *Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016* *November 2019*

In This Issue

Membership Renewals Due

11/2019	Baker
	Bentley
	Buczynski
	Holenstein
	Kerkel
	McNeal & Talunas
	Smith
	Taylor
	Zacharkiw
12/2019	Bogusch
	Damerau
	DellaPenna
	Etherington
	Kozik
	Marshall
	Moynihan
	O'Leary
01/2020	Kellerman
	Kovacs
	McElwee

Mercury Transit 2019



Get ready for the upcoming transit of Mercury on November 11, 2019. Weather permitting, we will experience the entire transit, starting at 7:30 a.m. EST and finishing around 1:00 p.m. EST.
Image retrieved from https://www.wusf.org/

November 2019 Dates

3rd • Daylight Saving Time ends, 2:00 a.m.

4th • First Quarter Moon, 5:23 a.m. EST.

12th • Full Moon, the Full Beaver Moon or the River's Freezing Moon, 8:34 a.m. EST.

18th • The Leonid meteor shower peaks in the predawn hours.

19th • Last Quarter Moon, 4:10 p.m. EST.

26th • New Moon, 10:05 a.m. EST.

28th • The Moon, Jupiter, Venus and Saturn form a line in evening twilight.

CCAS Holiday Party

Barb and Don Knabb have graciously offered to host the annual CCAS holiday party at their home on Saturday, December 7th, at 6:00 p.m. Their address is 988 Meadowview Lane and their phone number is 610-436-5702. A Google Maps search will provide good directions to their house. Their home is at the end of a cul-de-sac and 988 is on the mailbox. They have a long driveway and the house has a garage facing the street.

Please RSVP to dknabb01@comcast.net if you plan to attend. More information will be included in the December 2019 edition of Observations and will be included in a follow-up email to all club members.

Autumn / Winter Society Events

November 2019

1st • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset. Last monthly observing session for 2019.

3rd • Daylight Saving Time ends, 2:00 a.m. Turn clocks back one hour.

12th • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. The meeting starts immediately after at 7:30 p.m. Guest Speaker: Phil Rossomando, CCAS member and Instructor, Immaculata University will present "Interstellar Space Travel – Science Fiction or Future Reality?"

14th-15th • The von Kármán Lecture Series: Science From the International Space Station, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the December 2019 edition of Observations.

26th • Deadline for newsletter submissions for the December 2019 edition of Observations.

December 2019

6th • West Chester University Planetarium Show: "Other Earths," in the Schmucker Science Building. The show starts at 7 p.m. and runs approximately one hour in length. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

7th • CCAS Annual Holiday Party at the home of Barb & Don Knabb. See pg. 1 for details.

20th • Open call for articles and photographs for the January 2020 edition of Observations.

21st • Winter Solstice (11:00 P.M. EST) - The South Pole of the earth will be tilted toward the Sun, which will have reached its southernmost position in the sky and will be directly over the Tropic of Capricorn at 23.44 degrees south latitude. This is the first day of winter (winter solstice) in the northern hemisphere and the first day of summer (summer solstice) in the southern hemisphere.

26th • Deadline for newsletter submissions for the January 2020 edition of Observations.

Minutes from the October 8, 2019, CCAS Monthly Meeting

by CCAS Secretary Bea Mazziotta

- Club Vice President Pete Kellerman called the meeting to order and welcomed 20 attendees.
- Kellerman announced two upcoming October events - 10/18 at Sacred Heart Academy Bryn Mawr and 10/19 Run a Muck at Rushton Woods Preserve in Newtown Square. He also noted an upcoming observing session on 11/1 at BRCA.
- Observing Chair, Don Knabb gave a tour of some notable objects in the October night sky, including the Summer Triangle, the Coat Hanger asterism, the Double Cluster in Perseus, and globular clusters including M15 and M2.
- Don also spoke of the International Astronomical Union's Minor Planet Center announcement (on 10/17/19)of the discovery of 20 new moons orbiting Saturn.
- Bruce Ruggeri, Program Chair, introduced the guest speaker, Dr. Joseph Neilson, an associate professor in the Physics Dept. of Villanova University.
- Dr. Neilson earned his PhD. in Astronomy from Harvard. His areas of expertise are black holes, neutron stars, accretion and X-ray spectroscopy. His current research focuses on how the materials in accretion discs surrounding black holes eject enormous amounts of energy while falling into the black hole. He contributed to the team of the Event Horizon Telescope that captured the first ever images of a black hole. His presentation was titled "The Many Shadows of Black Holes."

November 2019 CCAS Meeting Agenda

by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on November 12, 2019, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. Speaker: Phil Rossomando, CCAS member and Instructor, Immaculata University, will present "Interstellar Space Travel - Science Fiction or Future Reality?"

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

Heavier Elements Created by Neutron Star Collisions

by Daniel Clery, Science Magazine

Image Credit: ESO/L. Calçada/M. Kornmesser

Some of the heavier elements in the periodic table are created when pairs of neutron stars collide cataclysmically and explode, researchers have shown for the first time.

Light elements like hydrogen and helium formed during the big bang, and those up to iron are made by fusion in the cores of stars. Some heavier elements like gallium and bromine need something more, such as a supernova. Others—such as gold and uranium, which are the most neutron-rich—require a process called rapid neutron capture. Here, an atomic nucleus is bombarded with neutrons so it swells to an unstable size, but the whole thing happens so fast the element doesn't have time to split apart.

Scientists have long suspected that neutron stars, the superdense remnants of burned out suns, are needed for this sort of rapid neutron capture. But until 2 years ago, they had never witnessed such an event. That's when the GW170817 merger happened. Taking place 140 million light-years away (and imagined above, with strontium in yellow), astronomers first detected it from the gravitational waves generated by the stars crashing together.

In the new study, published today in *Nature*, researchers took a closer look at the event. Computer modeling revealed that strontium in the expanding ball of gas would absorb light at wavelengths of 350 and 850 nanometers. When they looked again at the X-shooter spectra, they found dips in the spectra at those wavelengths. The end result: five Earth masses worth of strontium.

The work confirms that at least some of the heavier elements are produced by merging neutron stars, and that neutrons stars really are made of neutrons. So next time you watch a firework display, remember that the red flashes—provided by strontium—may have started life when two dense stellar remnants crashed together before the Solar System existed.

First Data Published from Voyager 2's Pass into Interstellar Space

by Erika Carlson, Astronomy Magazine

Image Courtesy NASA

NASA's Voyager 2 spacecraft crossed into interstellar space last November. Now, one year later, scientists have published the first results from the data Voyager 2 gathered as it passed from the Sun's sphere of influence out into interstellar space.

In some ways, what Voyager 2 experienced was surprisingly different from what Voyager 1 found when it passed into interstellar space in 2012. These latest results also carry a number of other surprises for astronomers. The findings were published Monday in a series of five papers in *Nature Astronomy*.

As the Sun blows charged particles into space, it carves a bubble out of the surrounding gas and dust. Earth and the other solar system planets are nestled inside this bubble, called the heliosphere. The boundary between the heliosphere and outside space is called the heliopause. And that's what the Voyager spacecraft blew past.

Scientists are interested in the heliopause because it presents an opportunity to learn more about the Sun, interstellar space and

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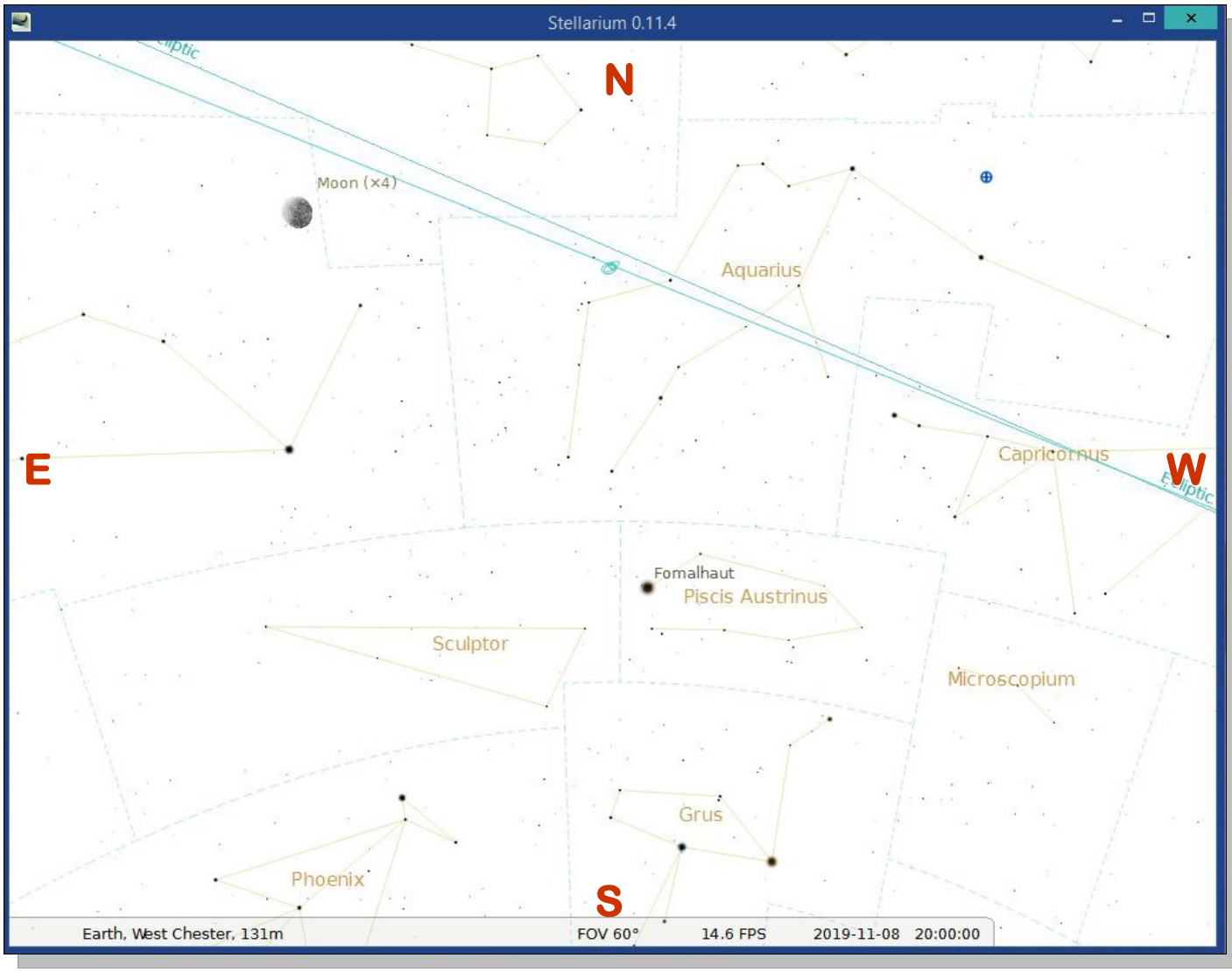
The Sky Over Chester County

November 15, 2019 at 8:00 p.m. ET

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



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
11/01/2019	7:01 a.m. EDT	7:29 a.m. EDT	5:58 p.m. EDT	6:26 p.m. EDT	10h 29m 11s
11/15/2019	6:16 a.m. EST	6:45 a.m. EST	4:44 p.m. EST	5:13 p.m. EST	9h 59m 11s
11/30/2019	6:31 a.m. EST	7:01 a.m. EST	4:36 p.m. EST	5:06 p.m. EST	9h 34m 31s

Moon Phases					
First Quarter	11/04/2019	5:23 a.m. EST	Full Moon	11/12/2019	8:34 a.m. EST
Last Quarter	11/19/2019	4:10 p.m. EST	New Moon	10/26/2019	10:05 a.m. EST

November 2019 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	**Saturn, the Moon and Jupiter from a long line after sunset**
3	**Daylight Saving Time ends at 2 a.m.**
4	**First Quarter Moon, 5:23 a.m. EST**
5	**The Lunar Straight Wall is visible**
11	**Mercury transits the Sun**
12	**Full Moon, the Full Beaver Moon or the River's Freezing Moon, 8:34 a.m. EST**
18	**The Leonid meteor shower peaks in the predawn hours**
19	**Last Quarter Moon, 4:10 p.m. EST**
24	**Venus is near Jupiter in evening twilight**
26	**New Moon, 10:05 a.m. EST**
28	**The Moon, Jupiter, Venus and Saturn form a line in evening twilight**
29	**The Moon is near Saturn**

The best sights this month: On November 11th Mercury will transit the Sun. This won't happen again until 2032, so don't miss this rare alignment of Mercury and the Sun. You'll need a telescope equipped with a solar filter to safely view the transit. Evening events this month include the Leonid meteors which peak during the predawn hours of November 18th and at the end of the month from the 27th to the 29th watch the Moon pass near Jupiter, Venus and Saturn in the early evening hours.

Mercury: As mentioned above, Mercury is the star of the month when it transits the Sun on November 11th. From there it disappears into the morning sky.

Venus: As November progresses the "evening star" slowly rises higher into the evening sky after sunset. On the 24th Venus and Jupiter are very close.

Mars: The red planet rises about two hours before sunrise during November and is a dim red speck in the sky.

Jupiter: The king of the planets continues to fall toward the west through November heading for a close encounter with Venus on the 24th, when both planets will be visible at the same time in the eyepiece of a telescope.

Saturn: Saturn is at the top of the lineup of planets and remains in Sagittarius through November.

Uranus and Neptune: November is a great month to add Uranus and Neptune to your observing list since they are both well positioned for viewing with a telescope during evening hours. Wait for an evening with steady seeing and use as much power as the viewing conditions will allow for a good view of these distant, cold worlds.

The Moon: Full moon occurs on November 12th. This full Moon is the Full Beaver Moon. For Native Americans, the time of this full moon was the time to set beaver traps before the swamps froze, to ensure a supply of warm winter furs. It is sometimes also referred to as the Frosty Moon, but I don't think they were referring to the snowman, even though the Moon kind of looks like the head of a snowman. Native Canadian tribes called this the Rivers Freezing Moon.

Constellations: Now that we are well into autumn and back to Eastern Standard Time there are many hours of star gazing possible without staying up late. If only the nights were not getting so cold! The Summer Triangle is past center stage and is heading for the western horizon. Pegasus is well up in the southern sky in the early evening, and the jewels that are the Pleiades are rising in the east. Capella in Auriga is a bright point of light above Taurus. As it gets a bit later our old friend Orion returns from his summer vacation.

Messier/deep sky: There are many deep sky treats in the autumn and early winter sky. Some of my favorites this time of year are the three open star clusters in Auriga, M36, M37 and M38. Compare the structure of these open clusters and log them as a great start in pursuit of the binocular or telescopic Messier club of the Astronomical League. Then switch to a low power eyepiece and turn your telescope to M45, the Pleiades. I never tire of staring at this amazing cluster of stars.

Comets: There are no bright comets visible during November.

Meteor showers: The Leonid meteor shower peaks during the predawn hours of November 18th. We can expect up to 15 fast moving meteors per hour, however the waning gibbous Moon will wash out the sky and reduce the number of meteors we see. But the Leonids are considered the fastest of any meteors so the chance of seeing a bright fireball is good.

Looking Up: The Alpha Persei Cluster in Perseus

by Don Knabb, CCAS Treasurer & Observing Chair

The constellation Perseus rises in the northeast around sunset this month. By 9 p.m. Perseus is about halfway up from the horizon, between Auriga and Cassiopeia. This constellation is part of the mythological soap opera involving Andromeda, Cassiopeia, Cepheus, Pegasus and Perseus. But that's a story for another time. Its brightest star, Alpha Persei, is a member of a large cluster of stars. This cluster is easily observed with the naked eye, but any pair of binoculars will show you many more members of the group.

The Alpha Persei Cluster, also known as Melotte 20 or Collinder 39, is an open cluster, although it is much larger than most of the objects we call open clusters, spanning about three degrees. It is also known as the Alpha Persei Moving Group. To the naked eye, the cluster consists of several blue spectral type B stars. The most luminous member is the 2nd magnitude white-yellow supergiant Mirfak, also known as Alpha Persei. Below is a view of the cluster created with Stellarium planetarium software.

To find the cluster, just look at Mirfak, the brightest star in Perseus. Most of the brighter stars are just south of Mirfak but there many pleasing patterns of stars winding around this bright star. More poetic stargazers refer to the stars as the "Attendants of Mirfak". On the opposite page is a star chart of Perseus and the surrounding area of the sky.

This star group is truly associated and moves through space together. The group is just 50 million years old, so most stars

Star chart credit: Stellarium, the free planetarium software: http://stellarium.org/

are still young and blue-white. In time, the stars will be pulled away by the gravity of other stars and dust clouds and they will disperse into the Perseus Arm of the Milky Way

The cluster is more than just a pretty sight, though. It may mark "ground zero" for a cataclysm that wracked our part of the galaxy 50 million years ago.

The Alpha Persei cluster is 600 light-years from Earth. That puts it near the center of an enormous ring of bright stars known as Gould's Belt, which encircles our position in the galaxy. At its widest, the belt is more than 2,000 light-years in diameter. It contains many of the brilliant stars in Orion, Scorpius, and many other constellations. Yet no one knows what caused it.

But astronomers do know that Gould's Belt is expanding. By tracing that expansion, they've deduced that it originated around the same time as the Alpha Persei cluster. Although this might be just a coincidence, it suggests that the two are related. Perhaps a giant gas cloud hit the Milky Way and caused the formation of the Alpha Persei cluster. Then supernova explosions in the cluster pushed away gas, triggering the birth of more stars in an expanding ring that we now see as Gould's Belt.

Other star clusters are more spectacular. But the Alpha Persei cluster may hold an important clue to one of the biggest mys-

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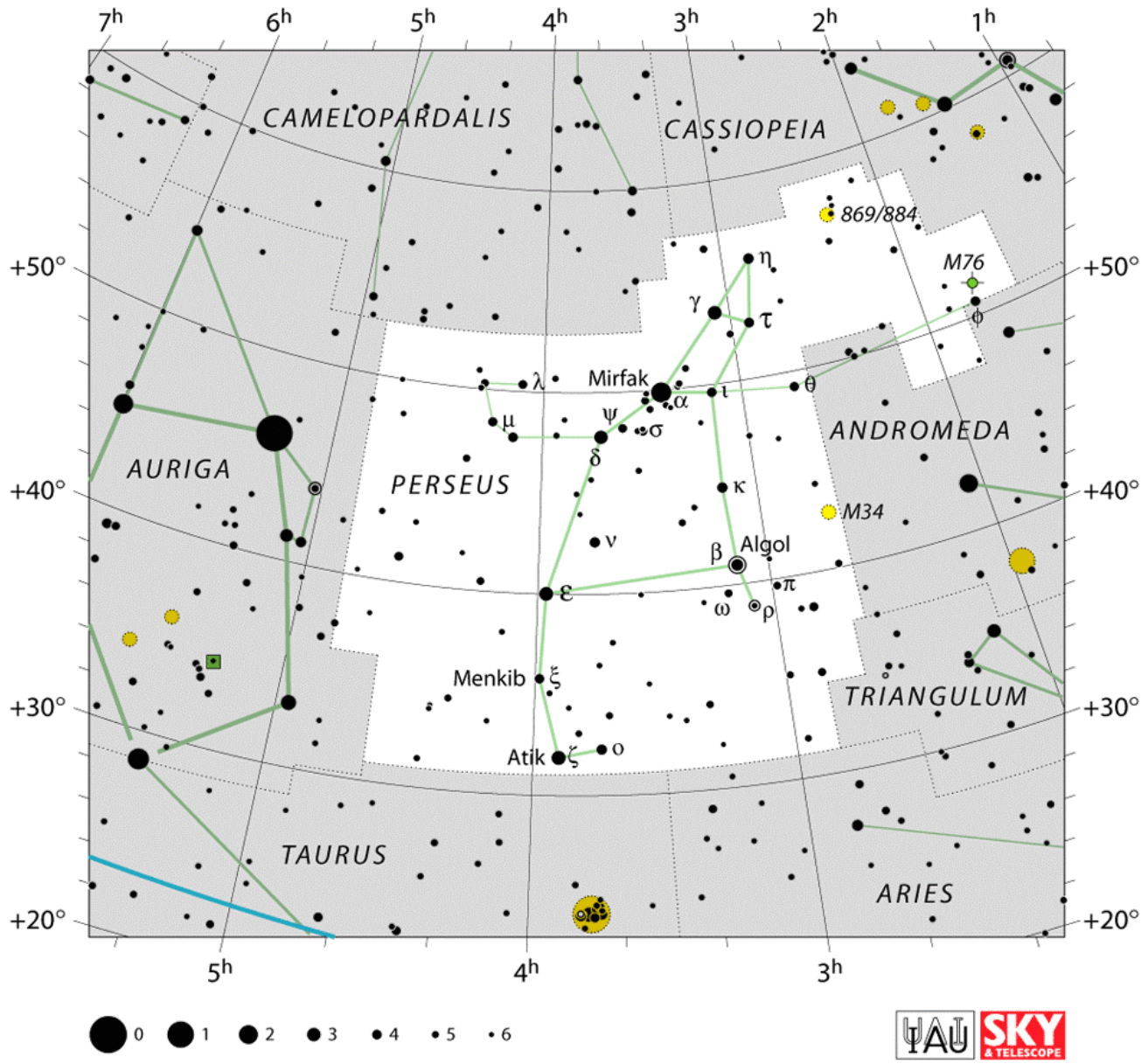
Looking Up (Cont'd)



Sky map credit: IAU and Sky & Telescope magazine

(Continued from page 6)

teries surrounding our part of the galaxy.

Information credits:

- http://www.oneminuteastronomer.com/4486/alpha-persei-cluster/
- http://stardate.org/radio/program/alpha-persei-cluster
- iPad application Sky Safari Pro
- http://en.wikipedia.org/wiki/Alpha_Persei_Cluster
- http://en.wikipedia.org/wiki/Alpha_Persei

Voyager 2 (Cont'd)

(Continued from page 3)

the interactions between them. To understand what's happening at and near this boundary, they study the information the Voyager probes collected about magnetic fields and charged particles on either side of the heliopause.

When Voyager 1 crossed the heliopause in 2012 and measured magnetic fields inside and outside the boundary, there was no significant change in the direction of the magnetic fields. That surprised scientists. Astronomers expected there might be a difference between the magnetic field direction inside the heliosphere, where magnetic fields

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In Memoriam: Nicholas La Para

by CCAS Member Kathy Buczynski

For those of you who knew Nicholas you knew of his enthusiasm for this science of Astronomy. Nicholas was an active member of our Society for a number of years. He participated in most aspects of our club, including National Astronomy Day exhibits at the Exton Square Mall, an instructor of our classes, a frequent participant in our monthly observing sessions and the Hercules Cluster meetings held on Tuesday evenings in West Goshen.

Our Society was lucky to have him. On Astronomy Days at the Exton Mall, Nicholas brought his Solar Scope (John, if you know the name of this scope, please enter it here) and shared it with many people who passed by and were curious. Always giving them an explanation of what they were seeing.

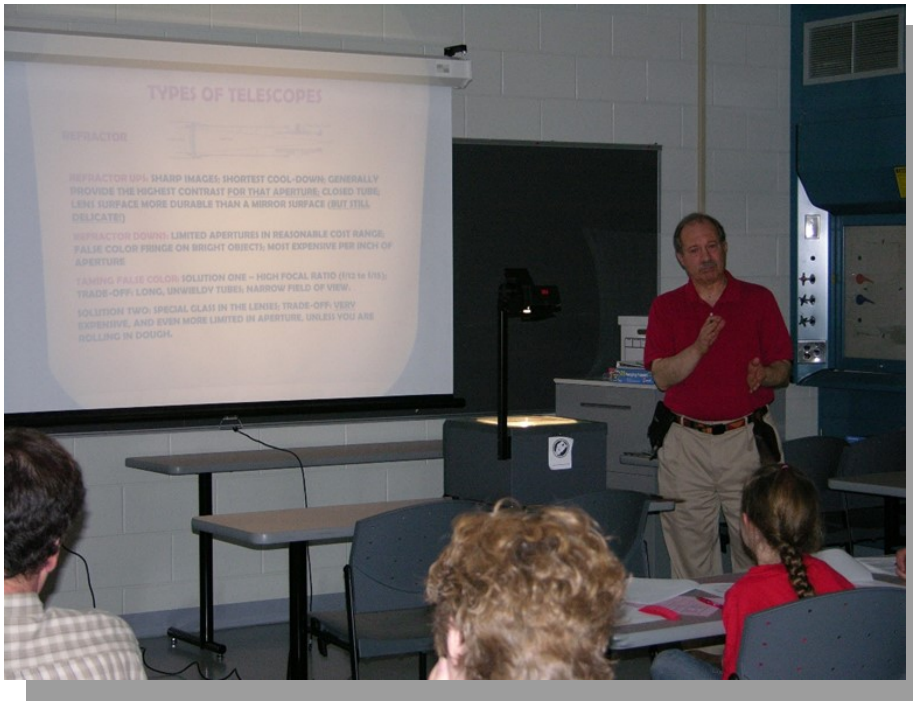
Nicholas was an instructor in the first years of our outreach classes and taught the class on equipment. His expertise was gained by the experience he had with his own equipment! Throughout his astronomy career he owned many telescopes, eyepieces and filters, including a Dobsonian which he would bring to Hercules Cluster meetings held in my neighborhood.

On one particular Tuesday night while observing the southern sky, Nicholas proclaimed "What is that?" as he looked though the eyepiece. At that point, there were only the two of us observing in the field. Since Nicholas had floaters in his eyes, I ignored him at first thinking he was just fighting his vision.

When he said it again, I went over to look through his eyepiece. He positioned the object in the field of view so that it would drift into the center of the eyepiece. When I looked in, this object was not drifting out as a

(Continued on page 9)

Nicholas assisting at one of our many Astronomy Day events at the Exton Mall.



Nicholas teaching about equipment during our Introduction to Astronomy class.

In Memoriam (Cont'd)

Nicholas La Para November 27, 1937 – October 3, 2019

(Continued from page 8)

normal rotation of the Earth would normally move an object. It was moving relatively fast and in a south to north trajectory. There were four circles (Nicholas remembered it as dots) floating in space together in a south to north direction. They were obviously tethered and traveling together around the Earth. We followed this object, trading views at the eyepiece until it went directly over us. The Dob was not easily adjusted to following it from zenith through the northern sky.

When we couldn't follow it anymore, we looked at each other and he said "Are you going to tell anybody?" I giggled and confirmed that the two of us saw it, so sure, I would tell people about it and try to find out what it was! After some phone calls to what I thought were experts, no luck. The rudimentary Internet at the time gave me information on tethered satellites that are used by the military and some that were used for auroral observations.

It was an observation I shared with Nicholas and will never forget it.

Astronomy was not the only interest of Nicholas. With a Bachelor's degree in Chemistry from Lehigh University and a Master's and Doctorate degree from the University of Pittsburgh in Philosophy, he taught Philosophy at Lehigh for 13 years. He then switched careers and with a Master's in Operations Research from Lehigh, he became an analyst at Air Products in Allentown, then at Dupont in Newark, DE.

But that's not all. His other interests included, meditation, Tai Chi, writing poetry, fiction and songs. His life-long interest in fine art lead to expressing himself in a variety of media including cartooning. He was a repeat contributor to our newsletter, Observations, with many cartoons on astronomy. He also contributed to his community's newsletter with cartoons on senior life.

At his memorial service, Cynthia read a poem (*see left*) written by Nicholas. He had just finished it in June and asked for it to be read at his memorial service.

Nicholas La Para is survived by his wife of 56 years, Cynthia, and his brother Christopher and his family.

If you send me letters,
send them in the wind,
for that is where I am now.

There, or an ocean splash,
or dust or silt or clay
in crevices of rocks,
in that muddy drainage after rain,
some inelegant stuff picked up on shoes.

I may be in the air
shuttled by sunlight,
swimming in clouds.

If I'm lucky, I'll be something green and tasty,
broccoli, say, or an artichoke.

I might even be in you—Hi, just passing through!

And when our tired sun at last sighs, expands,
burns earth to cinders,
I'm on my way to the stars.

Nicholas La Para
2014-04-21 to 2019-06-05

Stabilized Mobility

by CCAS Member Steve Leiden

As the time has gone by, I have realized that time spent setting up, doing observing/AP then tearing down my CGEM DX based C11 was taking up precious time and energy. I wanted a way to stow away my telescope under my roof with a four foot overhang, and then easily bring it out for observing/AP. A brief search of the I-net found a solution in the ScopeBuggy sold by ScopeBuggy.com.

I purchased my ScopeBuggy in August of 2016. This has provided the desired mobility making the setup more flexible. Upon arrival at my home, there were several issues involving miss-drilled and misaligned holes. The seller suggested I fix this myself, saying, "Just get out your drill."

OK, now the holes lined up. In addition, the OEM pneumatic wheels would probably be flat at a most inopportune time. So they were replaced with Harbor Freight "Worry Free" wheels. A file was employed to remove excess welding material and the HF wheels just fit. Now, here is a rather workable product that adds mobility and the desired flexibility.

While preparing this article, a Google search located a Cloudy Nights thread on the ScopeBuggy where the person who just purchased a ScopeBuggy, in 2016 too, saw many of the same issues as mine. He experienced the same difficulty with support from the owner of the company selling the buggy. (I guess we both got buggy buggies.)

The cart came with bolts with a head for hand tightening that, for just one of the tripod legs, had too tight a location, so a new solution had to be considered.

Tightening the nuts with the box-end wrench.

I decided to purchase 6 inch stainless steel bolts (found on Amazon; don't even try Home

(Continued on page 11)

Classic La Para

Stabilized Mobility (Cont'd)

Ready for observing on the back deck.

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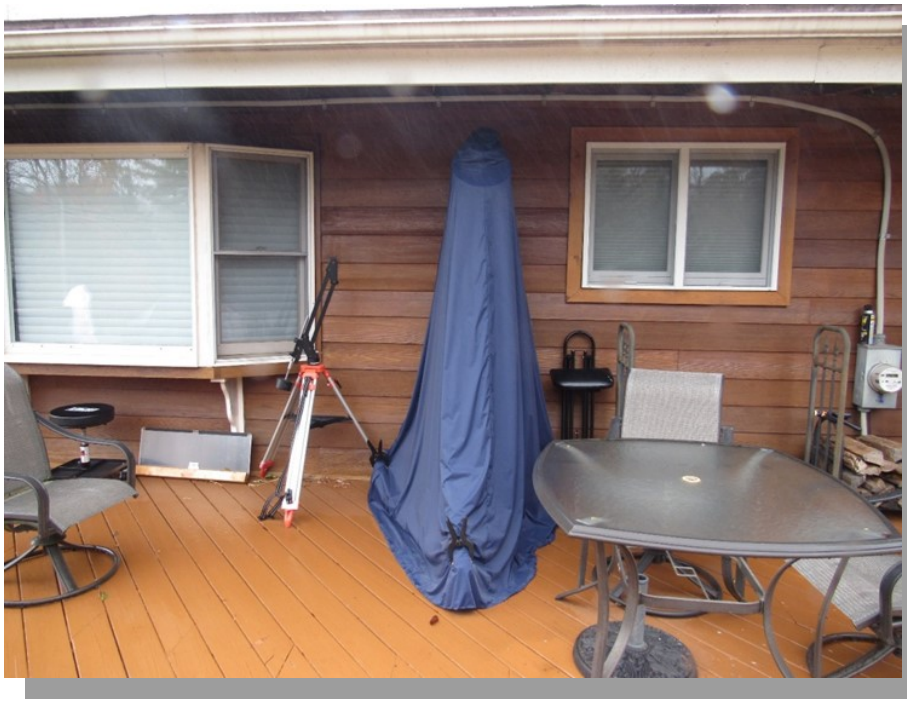
Depot), so 6 were ordered (3 for backup). This presented a much better situation because the bolts would not rust, could be turned (up or down) with a light duty power drill saving substantial time for movement/set up/tuck away. This helps to easily raise the wheels off the deck for leveling and more stability.



Setup stored out of the elements with a water-proof tarp.

The company owner claimed to have done astrophotography with his set up on a buggy. Even with the OEM hand bolts employed (with the tips pressing on concrete for him- I guess), the setup was still too shaky for me. The tips on my bolts are pressed into Celestron Vibration Suppression Pads. With the change-over to the new bolts, I found it easy to add a nut on top of the cross bars. I can pass a box-end wrench over the head and down onto the nut to tighten (see picture opposite page).

With the 3 nuts tightened down on top of the crossbars, the cart essentially disappears. It is as stable as having the tripod situated directly on the vibration pads. This takes about 10 minutes to wheel out, raise up the wheels and lock down the cross arms. The reverse is same at the end of the session.

In the picture on the upper left of this page, the scope has been wheeled out for some daytime testing.

Typically the setup fits beautifully under the roof overhang for minimizing weather issues (See lower left), although I do have a custom-made waterproof cover.

This setup has proven to be a very good mobile setup for observing or astrophotography. If no significant rain is in the forecast, I leave the stabilized setup in place and covered for multiple sessions. For winter sessions, I expect this is to be much better than setting up and breaking down each time.

NASA Night Sky Notes: The Messenger Crosses the Sun — Mercury Transit 2019

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.

Did you know that there are two other objects in our skies that have phases like the Moon? They're the inner planets, found between Earth and the Sun: Mercury and Venus. You can see their phases if you observe them through a telescope. Like our Moon, you can't see the planets in their "new" phase, unless they are lined up perfectly between us Earthlings and the Sun. In the case of the Moon, this alignment results in a **solar eclipse**; in the case of Mercury and Venus, this results in a **transit**, where the small disc of the planet travels across the face of the Sun. Skywatchers are in for a treat this month, as Mercury transits the Sun the morning of **November 11**!

You may have seen the transit of Venus in 2012; you may have even watched it through eclipse glasses! However, this time you'll need a solar telescope to see anything, since eclipse glasses will only reveal the Sun's blank face. Why is that? Mercury is the smallest planet in our solar system, and closer to the Sun (and further away from Earth) during its transit than Venus was in its 2012 transit. This makes Mercury's disc too small to see without the extra power of a telescope. Make absolutely certain that you view the transit via a telescope equipped with a safe solar filter or projection setup. Do NOT combine binoculars with your eclipse glasses; this will instantly burn a hole through

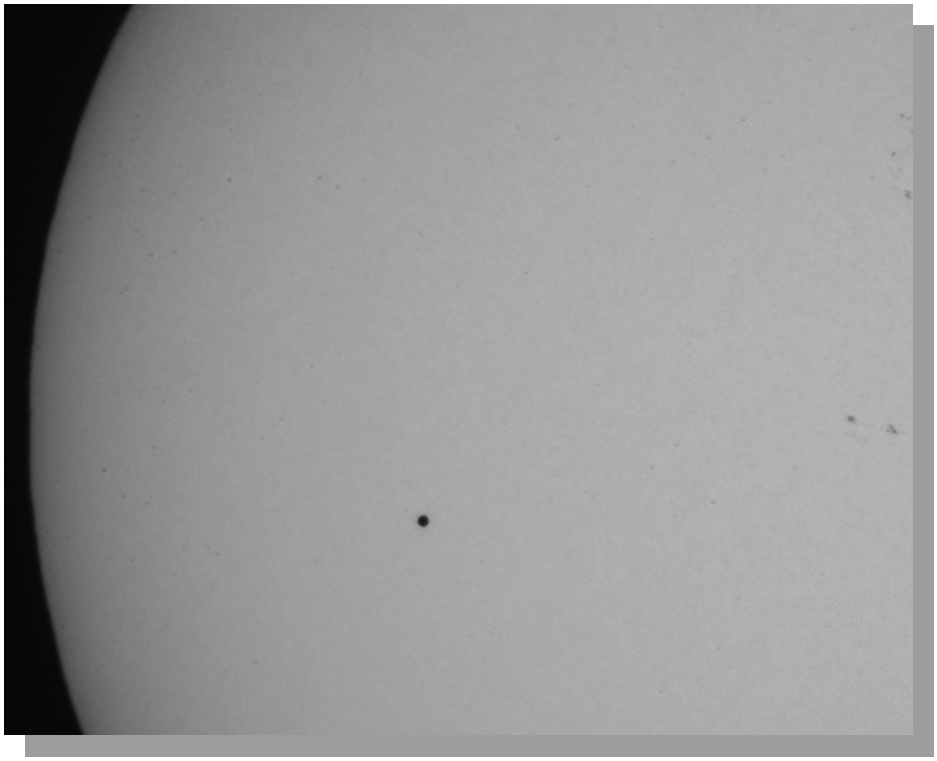
the glasses – and your eyes! While most people don't have solar telescopes handy, many astronomy clubs do! Look for clubs hosting Mercury transit observing events near you at bit.ly/findnsn (USA) or at bit.ly/awbtransit (worldwide).

What a fun opportunity to see another planet during the day! This transit is expected to last over five hours. Folks on the East Coast will be able to watch the entre transit, weather permitting, from approximately 7:35 am EST until around approximately 1:04 pm EST. Folks located in the middle of North America to the west coast will see the transit already in progress at sunrise. The transit takes hours, so if your weather is cloudy, don't despair; there will be plenty of time for skies to clear! You can find timing details and charts via eclipse guru Fred Espenak's website: bit.ly/mercurytransit2019

(Continued on page 13)

Photo of the May 9, 2016 transit of Mercury. Mercury is the small dot on the center right. Note how tiny it is, even compared to the small sunspot on the center left. Credit: Dave Huntz

Night Sky Notes (Cont'd)



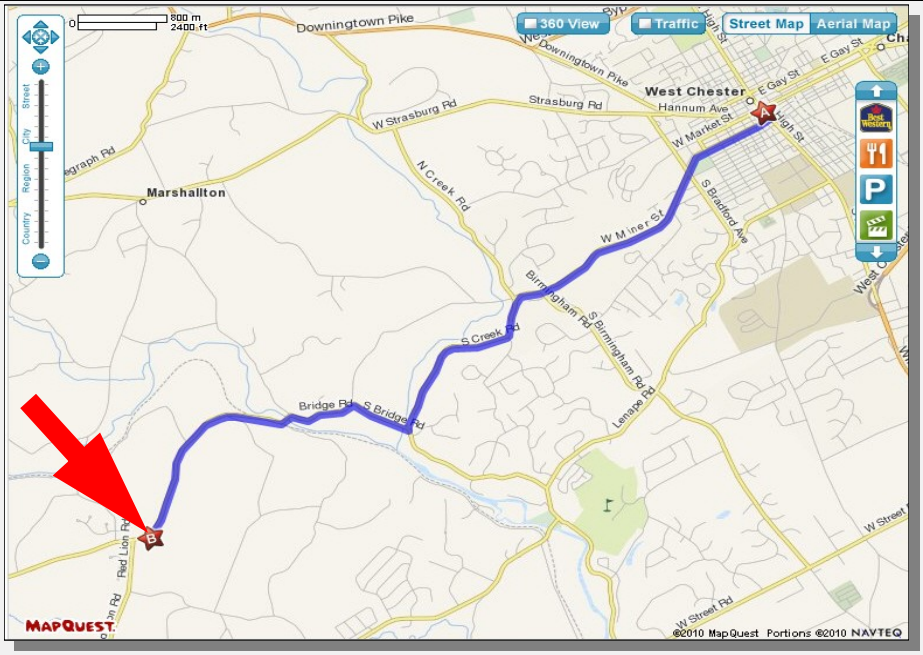
This photo from the same 2016 transit event shows Mercury a bit larger, as it should; it was taken at a higher magnification through a large 16 inch telescope! Credit: J. A. Blackwell

(Continued from page 12)

Mercury's orbit is small and swift, and so its position in our skies quickly changes; that's why it was named after the fleet-footed messenger god of Roman mythology. In fact, if you have a clear view of the eastern horizon, you'll be able to catch Mercury again this month! Look for it before dawn during the last week of November, just above the eastern horizon and below red Mars. Wake up early the morning of November 24th to see Mars, the Moon, and Mercury form a loose triangle right before sunrise.

Discover more about Mercury and the rest of our solar system at nasa.gov

CCAS Directions



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.

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.

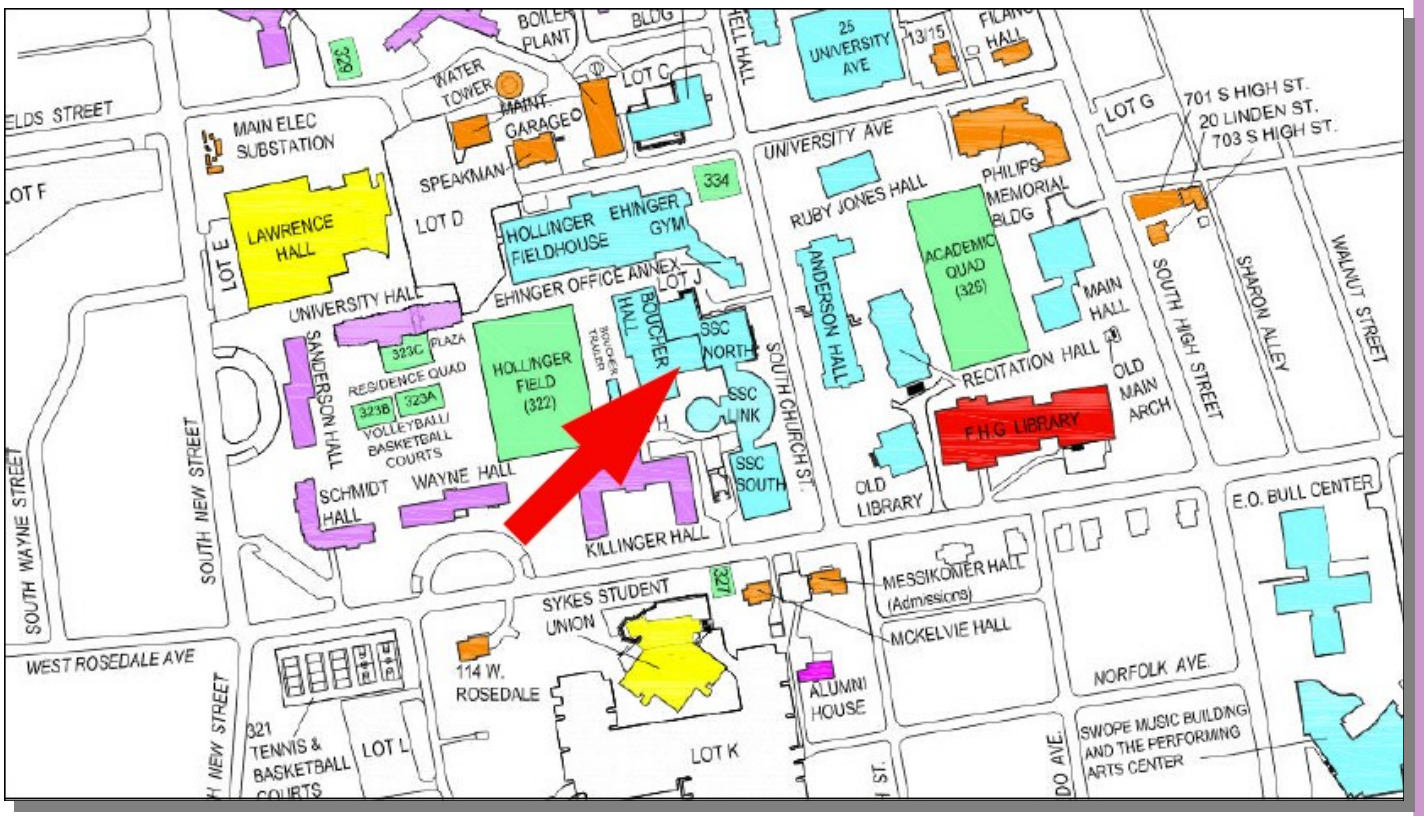
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route 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).

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).



Voyager 2 (Cont'd)

(Continued from page 7)

come from the Sun, and outside of it, where magnetic fields come from exploding stars spewing their magnetic fields into surrounding material. When Voyager 2 crossed into interstellar space, it confirmed this finding.

Another surprise is the number of particles "leaking" out from the heliosphere into interstellar space. Even after Voyager 2 crossed the heliopause, it picked up particles coming from the Sun. Voyager 1, on the other hand, didn't see such leakage. It's still an open question why this leaking is happening.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

Oct. 2019 Financial Summary

Beginning Balance	$820
Deposits	$71
Disbursements	-$0
Ending Balance	$891

New Member Welcome!

Welcome new CCAS members Janet Holloway from Philadelphia, Jeff Johnson from Chester Springs, and Hyunjin Christina Lee from Chesterbrook. 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.

CCAS Information Directory

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 LIGHTING COUNCIL

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!

Starry Night Lights

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

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

★ ★ ★ ★ ★

Spectrum Scientifics
Quality Science Products for All Ages

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 & Tele*scope 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.**