



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 25, No. 4 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016 April 2017

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CCAS Members Earn Awards



CCAS Members Bea Mazziotta & Gary Calobrisi share their NASA Night Sky Network pins at the February 2017 meeting. Members who participated in the star parties or our Chester County Night School class. See pg. 2 for more details. Image Credit: Don Knabb.

Membership Renewals Due

04/2017	Hepler Imburgia Miller Richter
05/2017	Cunningham Deis, R. Deis, M. Klapholz LaFrance O'Hara
06/2017	Hanspal Hebding Mazziotta/Calobrisi McCausland

April 2017 Dates

- 3rd** • First quarter Moon, 2:329 p.m. EDT
- 7th** • Jupiter is at opposition.
- 11th** • Full Moon, the Full Pink Moon or Birds Lay Eggs Moon, 2:08 a.m. EDT
- 19th** • Last quarter Moon, 5:56 a.m. EDT
- 22nd** • Lyrid meteor shower peaks in early morning hours
- 26th** • New Moon, 8:16 a.m. EDT



CCAS Upcoming Nights Out

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 21, 2017** - CCAS Special Observing Session, Longwood Gardens, Kennett Square, from 6:30 to 9:00 p.m. This event is part of Longwood's [Community Read](#) program.
- ☼ **Saturday, April 22, 2017** - CCAS Special Observing Session at Bucktoe Creek Preserve, Avondale, PA, from 8:30 to 10:00 p.m. The event is open to be public but registration for non-CCAS members is required through The [Land Conservancy for Southern Chester County](#) website. A small fee is required by The Land Conservancy of Southern Chester County to attend this event.
- ☼ **Saturday, April 29, 2017** - CCAS Special Observing Session celebrating International Astronomy Day, Nottingham County Park, Nottingham, PA, from 8:00 to 10:00 p.m. The event is open to the public but registration for non-CCAS members is required through the [Nottingham County Park](#) website.

Spring 2017 Society Events

April 2017

1st • CCAS Special Observing Session, Hoopes Park West Chester, PA, from 8:00 to 9:30 p.m. This event is open to the general public.

5th • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

6th-7th • The von Kármán Lecture Series: [Harnessing Our Sun's Light to Explore Our Planet and the Universe](#) at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

7th • Reservations open for the April 28th planetarium show. To make a reservation, visit the [WCU Public Planetarium Shows](#) webpage.

11th • CCAS Monthly Meeting, Room 112, Merion Science Center (former Boucher Building), West Chester University. Meet & Greet over coffee and refreshments for members and non-members alike from 7:00 to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. CCAS Member Speaker: Dennis O'Leary.

20th • Open call for articles and photographs for the May 2017 edition of [Observations](#).

21st • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

21st • CCAS Special Observing Session, Longwood Gardens, Kennett Square, from 6:30 to 9:00 p.m. This event is part of Longwood's [Community Read](#) program.

22nd • CCAS Special Observing Session at Bucktoe Creek Preserve, Avondale, PA, from 8:30 to 10:00 p.m. The event is open to be public but registration for non-CCAS members is required through [The Land Conservancy for Southern Chester County](#) website. A small fee is required by The Land Conservancy of Southern Chester County to attend this event.

26th • Deadline for newsletter submissions for the May 2017 edition of [Observations](#).

28th • West Chester University Planetarium Show: "A Total Solar Eclipse," in the Schmucker Science Building. The show starts at 7 p.m. and run approximately one hour in length. For more information and reservations, visit the [WCU Public Planetarium Shows](#) webpage.

29th • CCAS Special Observing Session celebrating International Astronomy Day, Nottingham County Park, Nottingham, PA, from 8:00 to 10:00 p.m. The event is open to the public but registration for non-CCAS members is required through the [Nottingham County Park](#) website.

May 2017

3rd • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

4th-5th • The von Kármán Lecture Series: [Going out in a Blaze of Glory: Cassini Science Highlights and Grand Finale](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

9th • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. Meet & Greet over coffee and refreshments for members and non-members alike from 7:00 to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. CCAS Guest Speaker: Ed Guinan, PhD, from Villanova University will present "Proxima Centauri B – Is Anybody Home at our Closest Star?"

13th • CCAS Special Observing Session, Anson Nixon Park, Kennett Square, starting at 8:00 p.m.

19th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

20th • Open call for articles and photographs for the June 2017 edition of [Observations](#).

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

26th • Deadline for newsletter submissions for the June 2017 edition of [Observations](#).

CCAS Member Awards Presented at the February 2017 Meeting by Don Knabb, CCAS Treasurer & Observing Chair



CCAS members earned NASA Night Sky Network pins and certificates for helping with star parties or our Chester County Night School class (above). CCAS President Roger Taylor presents Barb Knabb the Astronomical League Outreach Award (below).

April 2017 CCAS Meeting Agenda by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on April 11, 2017, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. Our speaker is CCAS member Denis O'Leary who will give us an updated on the New Horizons and the upcoming solar eclipse.

For our meeting in May, Ed Guinan, PhD, from Villanova University will present "Proxima Centauri B – Is Anybody Home at our Closest Star?"

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 2017 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

NASA: A Journey Through Space Mini-Series

by Don Knabb

I am always on the lookout for entertaining shows to watch while I am in the basement getting some exercise. Here is one I stumbled across that is available if one has an Amazon Prime subscription. I don't know what network originally broadcast this series, but it was produced in 2016.

The series is called *NASA: A Journey Through Space*. It was produced by Lionheart Film Works, a film company that produces documentaries and museum films. The series contains 6 episodes, each approximately 45 minutes in length. The series is not only about NASA. It covers everything from balloons to the Wright brothers through aviation during World War 1 and 2. Then it spends quite a bit of time on the space race and all the early NASA missions with some excellent archival footage. It wraps up with the space shuttle, the space station and the current robotic missions on Mars.

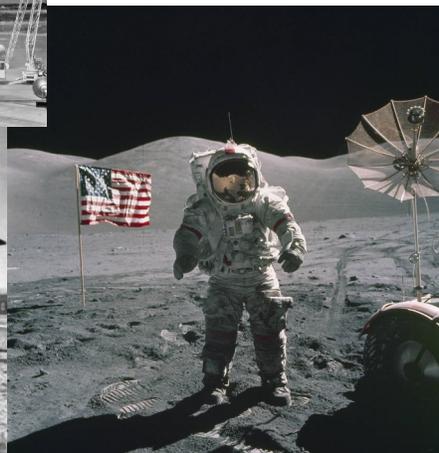
I found the series to be enjoyable, although it does have a few flaws. It recycles some of the early foot-



Image Credit: Lionheart Film Works

age in the later episodes – at one point I had to check that I hadn't selected an early episode instead of a later one. But overall the episodes are well produced and follow a logical progression as flight and space technology developed.

So, if you are a fan of all things aviation and space I think you will enjoy this series. It occupied my mind while I trudged along on the treadmill!



Images from NASA: A Journey through Space

Get Ready for Our First Image of a Black Hole

by Alison Klesman, *Astronomy Magazine*

Astronomers have just brought a telescope online that's (virtually) the size of Earth. Dubbed the Event Horizon Telescope, it's aiming to achieve something that's never been done before: imaging the space around a black hole all the way down to its event horizon.

One of its targets is Sagittarius A*, or Sgr A* for short. Sgr A* is the supermassive black hole in the center of the Milky Way, with a mass of approximately 4 million Suns. Because it's so massive and so (relatively) close at a distance of 25,600 light-years, it's the largest black hole visible in our sky. But large is a relative term as well — current estimates place the size of the black hole at 100 Astronomical Units (AU) or less. One AU is the average distance between Earth and the Sun, 93 million miles (150 million kilometers). Some estimates even indicate that the black hole could be as small as the distance between Mercury and the Sun, just 28 million miles (46 million km).

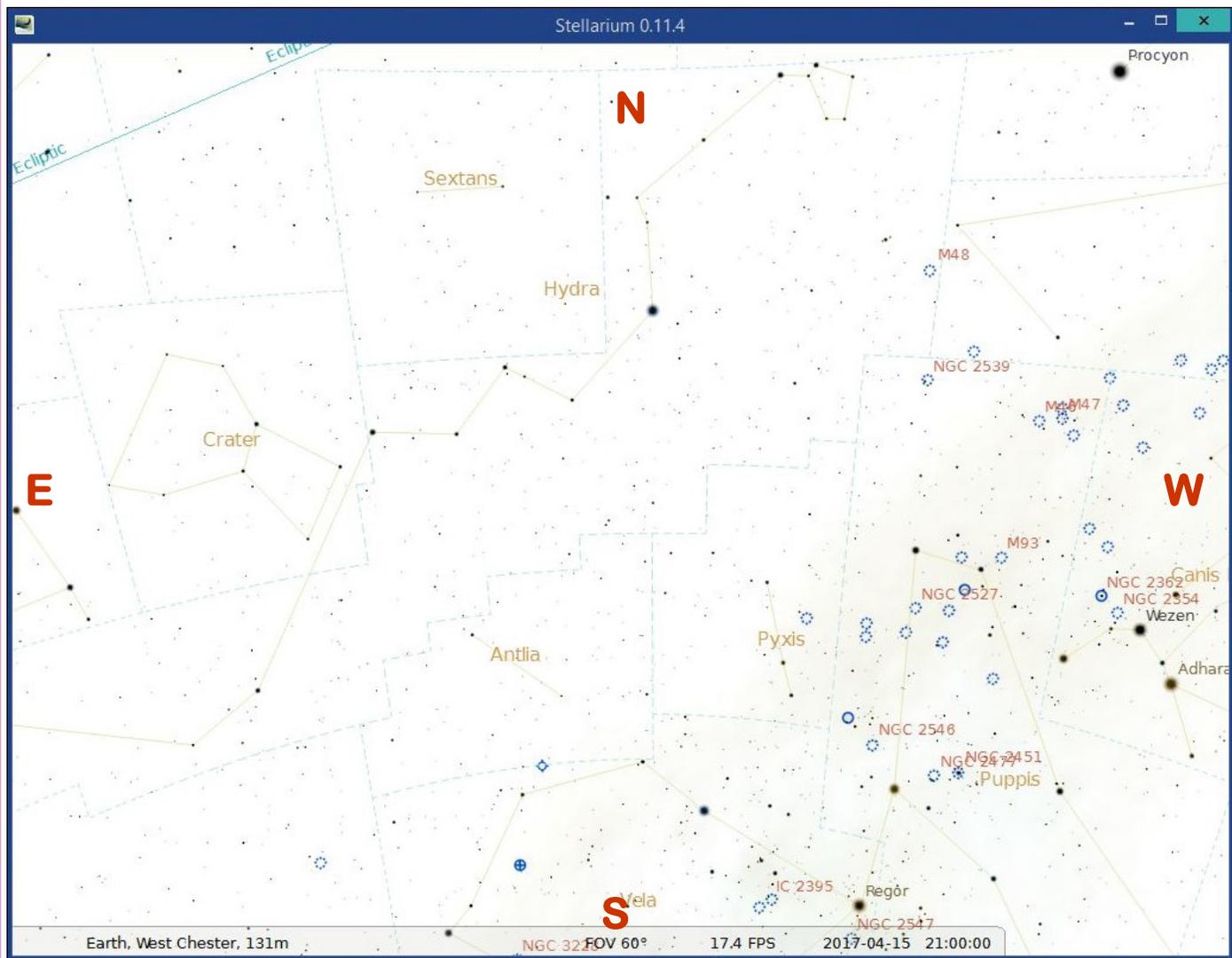
When astronomers "see" black holes, they are actually seeing light from a disk of material around the black hole, which is sitting beyond the event horizon. Anything within the event horizon itself is truly invisible, as that marks the point at which even light cannot travel fast enough to break free of the black hole's gravity and escape. But currently, astronomical instruments don't have the resolution to really see the disk closely or image its structure.

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The Sky Over Chester County

April 15, 2017 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
4/01/2017	6:17 a.m. EST	6:44 a.m. EDT	7:25 p.m. EST	7:52 p.m. EST	12h 40m 52s
4/15/2017	5:54 a.m. EDT	6:22 a.m. EDT	7:39 p.m. EDT	8:07 p.m. EDT	13h 16m 46s
4/30/2017	5:32 a.m. EDT	6:01 a.m. EDT	7:54 p.m. EDT	8:23 p.m. EDT	13h 52m 44s

Moon Phases					
First Quarter	4/03/2017	2:39 p.m. EDT	Full Moon	4/11/2017	2:08 a.m. EDT
Last Quarter	4/19/2017	5:56 a.m. EDT	New Moon	4/26/2017	8:16 a.m. EDT

April 2017 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	Mercury at greatest elongation, best apparition of 2017
3	First Quarter Moon, possible Lunar X visibility, 2:39 p.m. EDT
4	The Lunar Straight Wall (Rupes Recta) is visible
6/7	The Moon is near Regulus in Leo the Lion
7	Jupiter is at opposition
10	The Moon is near Jupiter
11	Full Moon, the Full Pink Moon or the Birds Lay Eggs Moon, 2:08 a.m. EDT
19	Last Quarter Moon, 5:56 a.m. EDT
22	The Lyrid meteor shower peaks in the pre-dawn hours
26	New Moon, 8:16 a.m. EDT
29	International Astronomy Day

The best sights this month: In April we have the opportunity to see the largest and smallest planets at their best! Jupiter reaches opposition on April 7th and it reigns supreme in the evening sky. Also, during the first few days of April we can see Mercury at its best of 2017 low in the west just after the sky begins to darken. And if you want an observing challenge, look low in the west for a very thin crescent Moon just 10 or 15 minutes after sunset on April 28th.

Mercury: April 1st is the best day of the year to see Mercury and the view remains excellent for most of the first week of the month. On the 1st it is also at its greatest eastern elongation and doesn't set until about 1 ½ hours after sunset.

Venus: Our sister planet passed us at the end of March in our race around the Sun and is now the "morning star" shining brightly in the east before dawn.

Mars: Dim Mars is visible in the west as the glow of the sunset fades. During April Mars is near the

Pleiades star cluster in the constellation Taurus the Bull. This will be a nice sight in binoculars when Mars is about 3 degrees away from the Pleiades on April 20-22.

Jupiter: The king of the planets comes to opposition – the point in the sky when it is opposite to the Sun – on April 7th, so it is visible all night and is at its closest, biggest and brightest of 2017.

Saturn: The ringed planet rises around 11:30 by the end of the month and appears high in the sky just before dawn.

Uranus and Neptune: Uranus and Neptune are not well placed for observing during April.

The Moon: Full Moon is on April 11th. 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. A tribe in Canada called this full Moon the Birds Lay Eggs Moon.

On April 27th and 28th the Moon makes a nice grouping low in the west with Mars, the Pleiades, the Hyades and Aldebaran. And if you want an observing challenge, look low in the west for a very thin crescent Moon just 10 or 15 minutes after sunset on April 28th.

Constellations: The Big Dipper, part of the constellation Ursa Major, rides high in the April sky. And if we were to poke a hole in the Dipper's bowl, water would fall on the back of Leo the Lion. Leo is joined by Boötes with the bright star Arcturus and lovely Corona Borealis, the Northern Crown. Hercules can be found rising in the east.

Messier/deep sky: April is a good month to go galaxy hunting. Look for M64 in Coma Berenices, M51, M81 and M82 in Ursa Major and M104 near bright Spica in Virgo. Of course, you will need to go hunting on a night with no bright Moon since the moonlight will wash away any hope of seeing a faint galaxy.

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Through the Eyepiece: M81 and M82, Bode's Galaxy and The Cigar Galaxy

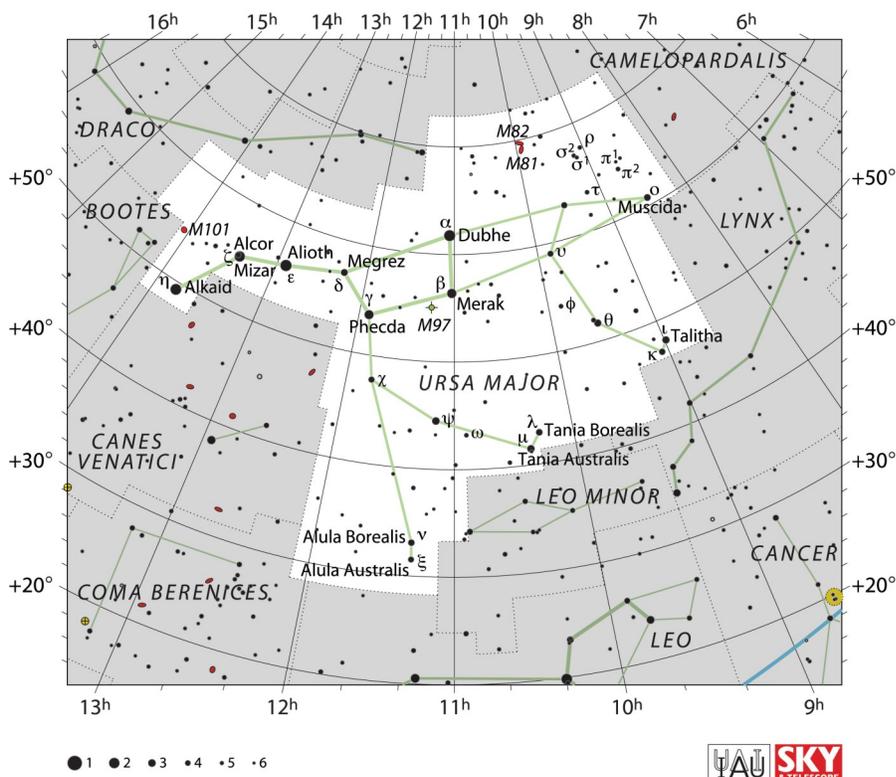
by Don Knabb, CCAS Treasurer & Observing Chair

M81 and M82 are perhaps the most famous pair of galaxies in the northern skies. They can be seen in one field of view if you use a low power/wide field eyepiece in a telescope, or in binoculars. Both galaxies are thought to be spiral galaxies but we see them from different points of view so that M81 is the classic spiral while we see M82 edge on, which gives it that "Cigar Galaxy" name.

Messier 81 was first discovered by Johann Elert Bode on December 31, 1774. Consequently, the galaxy is sometimes referred to as "Bode's Galaxy", or "Bode's Nebula". It wasn't until the early 20th century that so called "spiral nebula" were scientifically proven to be galaxies outside the realm of the Milky Way. In 1779, Pierre Méchain and Charles Messier re-identified Bode's object, which was subsequently listed in the Messier Catalog as Messier 81.

Now is a great time of year to see this pair of galaxies. About half way between the zenith and the North Star, below and to the left of the Big Dipper you can find these "smudges" in binoculars in dark skies. Better yet, use a telescope with a low power (wide field) eyepiece and you will be able to see the different shapes of the galaxies. My 2000mm focal length LX-90 with a 32mm eyepiece (62X) is just right to see both galaxies in one field of view.

Using the chart above you should be able to find M81 and M82 fairly high in the sky at this time of year.



Map credit: IAU and Sky & Telescope, <https://www.iau.org/public/themes/constellations/#uma>

M81 is considered to be one of the prettiest spirals in the sky as you can see in the photograph on pg. 7 taken by CCAS Program Chair David Hockenberry.

M82 is called a starburst galaxy. A recent – a few hundred million years is considered recent in astronomical time scales – close encounter with M81 deformed M82 and caused star formation to increase 10 fold compared to normal galaxies. At this time the centers of M81 and M82 are estimated to be 130,000 light years apart. The galaxies are approximately 12 million light years distant from us.

Recently over 100 freshly formed globular clusters have been discovered in M82 using the Hubble Space Telescope. Their formation is also thought to be due to the encounter with M81.

So join us on April 21st at the Brandywine Red Clay Alliance observing session and we'll seek out these distant neighbors of our Milky Way galaxy!

Information credits:
Pasachoff, Jay M. 2000. *A Field Guide to the Stars and Planets*.
New York, NY.: Houghton Mifflin.
http://en.wikipedia.org/wiki/Messier_82

(Continued on page 7)

Eyepiece (cont'd)



Image credit: David Hockenberry, astrophotographer

(Continued from page 6)

<http://www.seds.org/messier/m/m082.html>

<http://www.robendlerastropics.com/M82text.html>



Photo credit: NASA, ESA and the Hubble Heritage Team (STScI/AURA). Acknowledgment: J. Gallagher (University of Wisconsin), M. Mountain (STScI) and P. Puxley (NSF).

Observing Cont'd

(Continued from page 5)

Comets: During April Look for Comet 41P/Tuttle-Giacobini-Kresak in the constellation Draco the Dragon. If predictions hold true, the comet could reach 5th or 6th magnitude which will make for easy viewing in binoculars or a telescope. A sky map is in the April issue of Astronomy Magazine or on the Astronomy Magazine website.

Meteor showers: The Lyrid meteor shower occurs on the night of April 21/22. Expect up to 20 meteors per hour at the peak of the shower in the hours before dawn. This is an excellent year to watch this shower since the thin waning crescent Moon will not interfere with the “shooting stars”.

Black Hole (cont'd)

(Continued from page 3)

This is why every “image” ever shown of a black hole in a news article or textbook is an artist’s rendering, rather than an actual picture. But that’s all about to change.

The Event Horizon Telescope makes use of a technique called Very Long Baseline Interferometry (VLBI) that requires several telescopes observing the same object from different locations to create highly detailed images of very, very small sections of the sky. The farther apart the telescopes are located, the greater the detail they can achieve. The Event Horizon Telescope will link eight radio telescopes around the world, including the Atacama Large Millimeter/submillimeter Array in Chile,

(Continued on page 9)

Solar Eclipse Provides Coronal Glimpse

by Marcus Woo

With seven Earth-sized planets that could harbor liquid water on their rocky, solid surfaces, the TRAPPIST-1 planetary system might feel familiar. Yet the system, recently studied by NASA's Spitzer Space Telescope, is unmistakably alien: compact enough to fit inside Mercury's orbit, and surrounds an ultra-cool dwarf star—not much bigger than Jupiter and much cooler than the sun.

If you stood on one of these worlds, the sky overhead would look quite different from our own. Depending on which planet you're on, the star would appear several times bigger than the sun. You would feel its warmth, but because it shines stronger in the infrared, it would appear disproportionately dim.



"It would be a sort of an orangish-salmon color—basically close to the color of a low-wattage light bulb," says Robert Hurt, a visualization scientist for Caltech/IPAC, a NASA partner. Due to the lack of blue light from the star, the sky would be bathed in a pastel, orange hue.

But that's only if you're on the light side of the planet. Because

the worlds are so close to their star, they're tidally locked so that the same side faces the star at all times, like how the Man on the Moon always watches Earth. If you're on the planet's dark side, you'd be enveloped in perpetual darkness—maybe a good thing if you're an avid stargazer.

If you're on some of the farther planets, though, the dark side might be too cold to survive. But on some of the inner planets, the dark side may be the only comfortable place, as the light side might be inhospitably hot.

On any of the middle planets, the light side would offer a dramatic view of the inner planets as crescents, appearing even bigger than the moon on closest

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This artist's concept allows us to imagine what it would be like to stand on the surface of the exoplanet TRAPPIST-1f, located in the TRAPPIST-1 system in the constellation Aquarius. Credit: NASA/JPL-Caltech/T. Pyle (IPAC)

Space Place (Cont'd)

(Continued from page 8)

approach. The planets only take a few days to orbit TRAPPIST-1, so from most planets, you can enjoy eclipses multiple times a week (they'd be more like transits, though, since they wouldn't cover the whole star).

Looking away from the star on the dark side, you would see the outer-most planets in their full illuminated glory. They would be so close—only a few times the Earth-moon distance—that you could see continents, clouds, and other surface features.

The constellations in the background would appear as if someone had bumped into them, jostling the stars—a perspective

(Continued on page 10)

Black Hole (Cont'd)

(Continued from page 7)

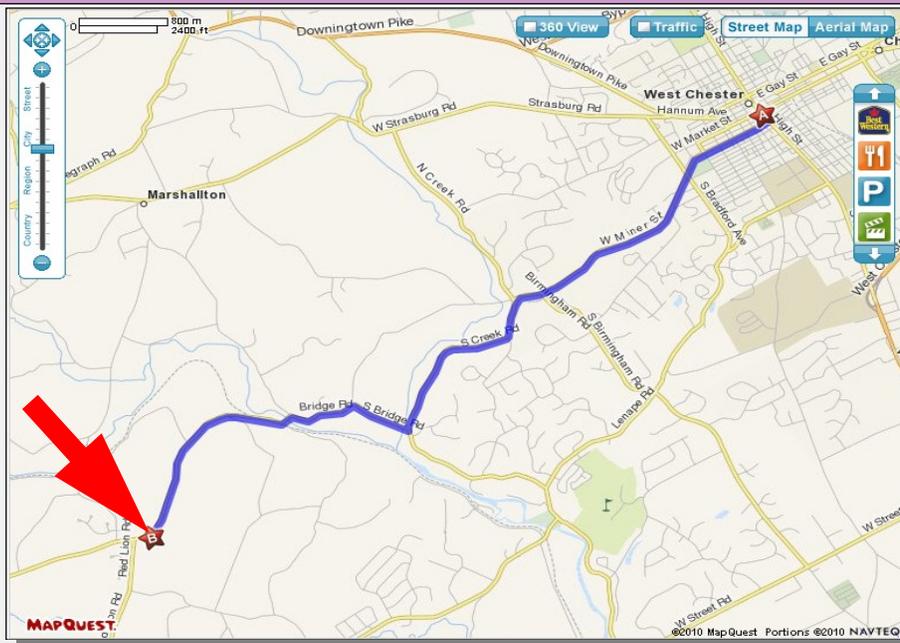
the Caltech Submillimeter Observatory in Hawaii, the Large Millimeter Telescope Alfonso Serrano in Mexico, the South Pole Telescope in Antarctica, and other facilities in France and Spain to utilize the longest baselines possible. By creating a truly Earth-sized telescope, the project should be capable of imaging the space around a black hole in exquisite detail.

This will allow astronomers to study not only the structure of the disk around the black hole, but also to test general relativity, get a better look at how the black hole actually feeds on material, and maybe even determine how the outflows and jets that are so common among black holes are actually created.

The giant telescope came online April 5 and will observe for about a week and a half, gathering data until April 14. In addition to imaging our relatively quiescent Sgr A*, it will also look at the more active supermassive black hole residing in Messier 87, a huge elliptical galaxy in the nearby Virgo Cluster. The amount of information obtained will be so immense that it's too large to transfer digitally — it will be stored physically and taken to the Max Planck Institute in Germany, and the Haystack Observatory in Massachusetts for processing.

That will take time. But in a few months, we may finally have our first picture of the region immediately around a supermassive black hole.

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).



Space Place (Cont'd)

(Continued from page 9)

skewed by the 40-light-years between TRAPPIST-1 and Earth. Orion's belt is no longer aligned. One of his shoulders is lowered.

And, with the help of binoculars, you might even spot the sun as an inconspicuous yellow star: far, faint, but familiar.

Want to teach kids about exoplanets? Go to the NASA Space Place and see our video called, "Searching for other planets like ours": <https://spaceplace.nasa.gov/exoplanet-snap/>

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

March 2017 Financial Summary

Beginning Balance	\$1,506
Deposits	\$85
Disbursements	<u>\$100</u>
Ending Balance	\$1,491

New Member Welcome!

Welcome new CCAS members Philip Rossomando from Glenmoore, PA, and Michael Dennis from Phoenixville, PA. We're glad you decided to rejoin 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:

John Hepler
21103 Stripper 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 John Hepler, the newsletter editor, at: newsletter@ccas.us.

CCAS Website

John Hepler is the Society's Webmaster. You can check out our Website at: <http://www.ccas.us>

John 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 John 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:	Roger Taylor 610-430-7768
Vice President:	Liz Smith 610-842-1719
ALCor, Observing, and Treasurer:	Don Knabb 610-436-5702
Secretary:	Ann Miller 610-558-4248
Librarian:	Barb Knabb 610-436-5702
Program:	Dave Hockenberry 610-558-4248
Education:	Kathy Buczynski 610-436-0821
Webmaster and Newsletter:	John Hepler 410-639-4329
Public Relations:	Deb Goldader 610-304-5303



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**.