Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 26, No. 4 ***Three-Time*** *Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016* *April 2018*

In This Issue

M64, The Black Eye Galaxy

Image Credit: Dave Hockenberry, CCAS Program Chair. For image details, see p. 7. See also this month's edition of "Through the Eyepiece" by Don Knabb, CCAS Observing Chair & Treasurer, pp. 6-7.

Membership Renewals Due

04/2018	Dennis Hepler Imburgia Miller Richter Rossomando
05/2018	Cunningham Fletcher Klapholz LaFrance O'Hara Ostanek
06/2018	Hanspal Harris Hebding Mazziotta & Calobrisi

April 2018 Dates

8th • Last Quarter Moon, 3:17 a.m. EDT

15th • New Moon, 9:57 p.m. EDT

18th • A thin crescent Moon is in the Hyades star cluster

21ts • National Astronomy Day

22nd • First Quarter Moon, 5:45 p.m. EDT

22nd • The Lyrid meteors peak tonight

29th • Full Moon, the Full Pink Moon or the Birds Lay Eggs Moon, 8:58 p.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.

☼ **Saturday, April 14, 2018** - CCAS Special Observing Session at Bucktoe Creek Preserve, Avondale, PA. The session is scheduled for 8:00-9:30 pm.

☼ **Saturday, April 21, 2018** - CCAS special observing session, Hoopes Park, West Chester, PA.

☼ **Friday, May 4, 2018** - Greenwood Elementary Star Party in Kennett Square, PA.

☼ **Saturday, May 19, 2018** - CCAS Special Observing Session at Anson Nixon Park, Kennett Square, PA. The session is scheduled for 8:30-10:00 pm.

Spring 2018 Society Events

April 2018

4th • 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.

10th • CCAS Monthly Meeting starting at 7:30 p.m. in Room 113, Merion Science Center (former Boucher Building), West Chester University. CCAS Member Speaker: Dennis O'Leary, presenting on upcoming InSight mission.

12th-13th • The von Kármán Lecture Series: How Will Earth's Ecosystems Survive Under a Changing Climate? Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

13th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

14th • Bucktoe Creek Preserve Star Party in Avondale, PA.

20th • Open call for articles and photographs for the May 2018 edition of Observations.

21st • National Astronomy Day. Hoopes Park Star Party in West Chester, PA.

26th • Deadline for newsletter submissions for the May 2018 edition of Observations.

May 2018

2nd • 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 • Greenwood Elementary Star Party in Kennett Square, PA.

15th • CCAS Monthly Meeting starting at 7:30 p.m. in Room 113, Merion Science Center (former Boucher Building), West Chester University. Speaker: TBA.

17th-18th • The von Kármán Lecture Series: Juno and The New Jupiter: What Have We Learned So Far?, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

18th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

19th • Anson Nixon Park Star Party in Kennett Square, PA.

20th • Open call for articles and photographs for the June 2018 edition of Observations.

26th • Deadline for newsletter submissions for the June 2018 edition of Observations.

Minutes from the March 13, 2018, CCAS Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor, CCAS President welcomed 26 members and guests to the March 13, 2018 meeting ("the March Rendition") of the Chester County Astronomical Society. He then introduced the club officers.
- Roger acknowledged the 5000 day anniversary of the Mars Rover Curiosity. It has exceeded its warranty by 4910 days and traveled 28 miles.
- Don Knabb, observing chair, presented Night Sky Network outreach awards to club members: Kathy McNeal, Walt Talunas, Sue Johnson, Steve Leiden, Harriet Rosenblatt, the late Herb Rosenblatt, Bea Mazziotti, and Gary Calabrese.
- Don reminded club members that the Astronomy Course at Chester County Night School starts Monday March 19 and runs for 6 nights at Henderson High School. Club members will be teaching the course. All are encouraged to either take the course or to assist the members who are teaching.
- Don handed out "The Evening Sky Map" that was downloaded for free from the Skymaps.com website. This is updated monthly. The printout lists the month's Sky Calendar, Tips for Observing the Night Sky, and a list of Celestial Objects that are easily seen by naked eye, binoculars, and telescope.
- Speaking of free, Don explored the night sky for the next month using the free App Stellarium. This can be downloaded to a computer, phone, or tablet.
- Upcoming Observing Events:
  - March 16-BRC club observing
  - April 13-BRC Club observing
  - April 14-Bucktoe Creek Preserve Star Party in Avondale, PA
  - April 18-Oxford Library Star Party at Oxford Recreation Park in Oxford, PA
  - April 21-Hoopes Park Star Party in West Chester, PA
  - May 4- Greenwood Elementary Star Party in Kennett Square, PA
  - May 18-BRC joint observing session with our club and BRC members
  - May 19-Anson Nixon Park Star Party in Kennett Square, PA
  - May 15-18- New Moon at Cherry Springs State Park-weather pending
- David Hockenberry introduced our evening's speaker, John Conrad: NASA Solar System Ambassador, CCAS member, and "rocket scien-

(Continued on page 7)

April 2018 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on April 10, 2018, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. CCAS Member Speaker: Dennis O'Leary, presenting on upcoming InSight mission.

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 Fall 2018 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

CCAS Member Awarded NASA Night Sky Network Astronomy Outreach Certificate

by Roger Taylor, CCAS President

L-to-R: CCAS President Roger Taylor, Patricia O'Hara, & Bill O'Hara

Retiring CCAS member Bill O'Hara was honored on March 24, 2018, with the NASA Night Sky Network Astronomy Outreach Award Certificate. CCAS President Roger Taylor present Bill and his wife, Patricia, with the certificate in their home in West Chester, PA.

Having served in the Pacific during WWII, Bill is a long-time member of CCAS, having joined the Society on July 16th, 1994. Recognizing his years of service to CCAS, founder Ed Lurcott noted that Bill had helped at many outreach events over the years. He observed with an Edmund Astroscan – that bright red telescope with a big ball at one end that contained a 4 inch mirror. Bill was also the CCAS librarian for a time and housed the library in his residence.

CCAS Original Astrophotography

by Don Knabb, CCAS Program Chair & Treasurer

A lineup of the Moon, Venus and Mercury, taken on March 18, 2018. It was spectacular to see! Image details: The camera was a Canon EOS 7D set to manual mode and the lens was an EF28-135mm set to 130mm; the exposure was 1/5 second with the aperture set at 5.6; the ISO sensitivity was set to 1000. Digital development was processed with Canon Digital Photo Professional software. Dave Hockenberry removed some hot pixels with Photoshop.

Cherry Springs Camping Trip

by Don Knabb

Cherry Springs State Park is renowned as having a very dark night sky. The park caters to amateur astronomers. Pete Kellerman has been to Cherry Springs many times and has good things to say about the park. Barb and I have never been there, so this year we want to change that. Therefore, we have planned to go to Cherry Springs, arriving Tuesday, May 15 and departing Friday, May 18. New Moon is on May 15th, so the sky will be very dark.

There are two camping areas in the park. There are 30 campsites that can be reserved, some for tent camping, some for RV camping. The astronomy field also has campsites—I don't know how many—that are available on a "first come, first served" basis. No non-red lighting is permitted on the astronomy field.

Reserved campsites are $15 per

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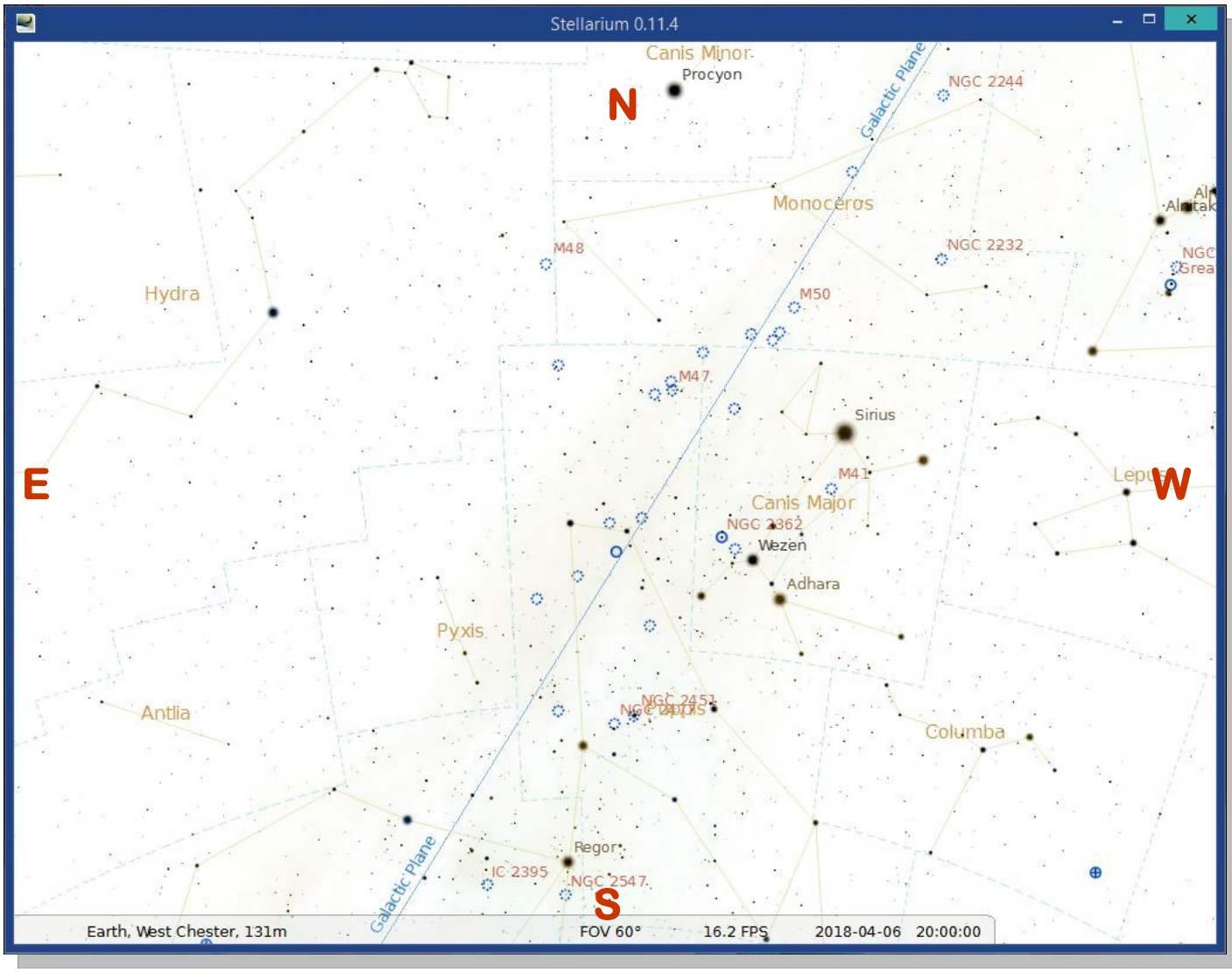
The Sky Over Chester County

April 15, 2018 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
04/01/2018	6:17 a.m. EDT	6:44 a.m. EDT	7:24 p.m. EDT	7:52 p.m. EDT	12h 40m 13s
04/15/2018	5:54 a.m. EDT	6:22 a.m. EDT	7:39 p.m. EDT	8:06 p.m. EDT	13h 16m 09s
04/30/2018	5:32 a.m. EDT	6:02 a.m. EDT	7:54 p.m. EDT	8:23 p.m. EDT	13h 52m 11s

Moon Phases					
Last Quarter	04/08/2018	3:17 a.m. EDT	New Moon	04/15/2018	9:57 p.m. EDT
First Quarter	04/22/2018	5:45 p.m. EDT	Full Moon	04/29/2018	8:58 p.m. EDT

April 2018 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

8	**Last Quarter Moon, 3:17 a.m.**
15	**New Moon, 9:57 p.m.**
16	**Observing challenge - look for a 21-hour old Moon low in the west**
18	**A thin crescent Moon is in the Hyades star cluster**
21	**International Astronomy Day**
22	**First Quarter Moon is near M44, the Beehive Cluster, 5:45 p.m.**
22	**The Lunar X is visible around 5 p.m.**
22	**The Lyrid meteors peak tonight**
23	**The Lunar Straight Wall is visible**
29	**Full Moon, the Full Pink Moon or the Full Birds Lay Eggs Moon, 8:58 p.m.**

The best sights this month: Venus rules the early evening sky as it shines brightly in the fading glow of the sunset. By the end of the month Jupiter will be rising just after sunset and climbing to a decent viewing height by 11:00. The Lunar X will be visible around 5:00 p.m. on April 22nd. The view won't be as dramatic as it would be after dark, but I'm going to give it a try. It may be Earth Day, but it is still a good day to look at the Moon!

Mercury: Mercury is poorly positioned for viewing during April.

Venus: Our sister planet is rising higher into the evening sky with every day. Shining near magnitude -4, Venus is easily visible in the west while the sky is still bright with the glow of the sunset. On April 24th Venus is near the Pleiades.

Mars: If you want to get up in the middle of the night there is a good show with Mars and Saturn rising close together around 2:00 a.m. I'll wait for this summer to enjoy these planets.

Jupiter: We are catching up to Jupiter in our race around the Sun, and by month's end the king of the planets will be rising only a half hour after sunset. I've enjoyed seeing Jupiter shining brightly in the south when I look out the window after getting up in the middle of the night to use the litter box.

Saturn: As mentioned above, Saturn is still an early morning object and will come into evening viewing hours in a couple of months.

Uranus and Neptune: Neither gas giant is in good position for viewing during April.

The Moon: The Moon is full on April 29th. Native Americans called this the Full Pink Moon. This name came from the herb moss pink, or wild ground phlox, which is one of the earliest flowers of the spring. Other names for this full Moon are the Full Sprouting Grass Moon and among coastal tribes the Full Fish Moon because this was the time that the shad swam upstream to spawn. Native Canadians called this The Full Birds Lay Eggs Moon.

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

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

Comets: There are no bright comets visible during April

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Through The Eyepiece: M64, the Black Eye Galaxy or Evil Eye Galaxy

by Don Knabb, CCAS Treasurer & Observing Chair

Springtime is galaxy viewing time, and a good place to begin your quest is Messier 64, The Black Eye or Evil Eye Galaxy. M64 is in the constellation Coma Berenices which is well up in the eastern sky during April evenings.

The Black Eye Galaxy is a galaxy which was discovered by Edward Pigott in March 1779, and independently by Johann Elert Bode in April of the same year, as well as by Charles Messier in 1780. It has a spectacular dark band of absorbing dust in front of the galaxy's bright nucleus, giving rise to its nicknames of the "Black Eye" or "Evil Eye" galaxy. M64 is well known among amateur astronomers because of its appearance in small telescopes.

So how did it get the name "Black Eye Galaxy"? We have Sir William Herschel to thank for that: "A very remarkable object, much elongated, about 12′ long, 4′ or 5′ broad, contains one lucid spot like a star with a small black arch under it, so that it gives one the idea of what is called a black eye, arising from fighting."

John Herschel perpetuated it when he wrote in his own notes: "The dark semi-elliptic vacancy (indicated by an unshaded or bright portion in the figure,) which partially surrounds the condensed and bright nucleus of this nebula, is of course unnoticed by Messier. It was however seen by my Father, and shown by him to the late Sir Charles Blagden, who likened it to the appearance of a black eye, an odd, but not inapt comparison."

Image credit: NASA and The Hubble Heritage Team (AURA/STScI)

M64 is in the constellation Coma Berenices. This region of the sky is near the north galactic pole, which means we are looking away from the Milky Way. At this area of the night sky there is minimal interference from gas and dust in our galaxy and many galaxies can be seen.

While it is possible to see Messier 64 in binoculars, it will require very dark skies for average binoculars and will only show as a very small, oval contrast change. However, in telescopes as small as 102mm, its distinctive markings can be seen on dark nights with good clarity.

M64 is relatively nearby, at around 17 to 25 million light years away from Earth. Recent studies have revealed that the interstellar gas in the outer regions of the galaxy rotates in the opposite direction from that in the inner regions, leading astronomers to believe that at least one

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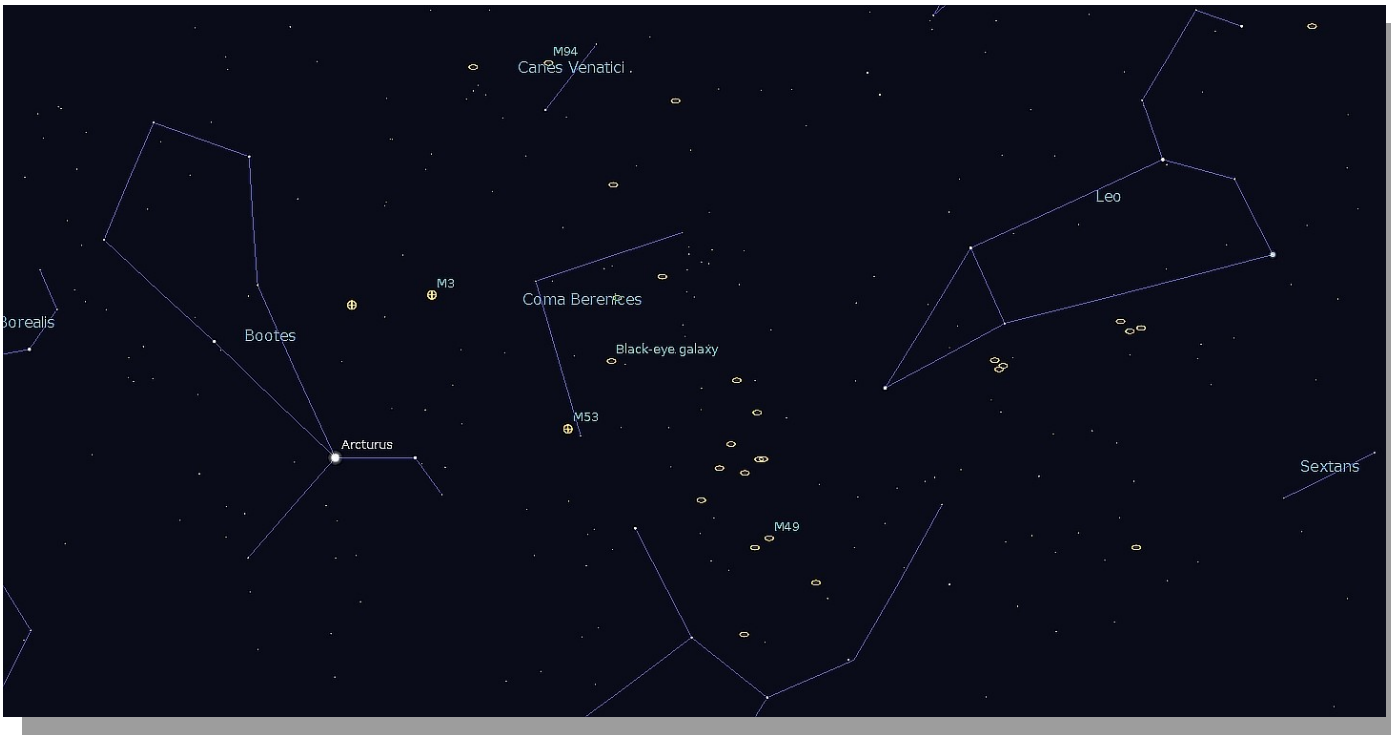
Eyepiece (Cont'd)



Sky map using Stellarium, the free planetarium software: http://stellarium.org/

(Continued from page 6)

satellite galaxy had collided with it less than a billion years ago.

So as the weather warms, add The Black Eye Galaxy to your observing list, as I plan to do.

Information credits:

- Pasachoff, Jay M. 2000. *A Field Guide to the Stars and Planets.* New York, NY. Houghton Mifflin.
- Dickinson, Terence 2006. *Nightwatch: a practical guide to viewing the universe.* Buffalo, NY. Firefly Books
- http://en.wikipedia.org/wiki/Coma_Berenices
- https://www.universetoday.com/37593/messier-64-black-eye-galaxy/

Minutes (Cont'd)

(Continued from page 2)

tist" /Aeronautical Engineer. John spoke about "Rocket Science 101." He gave an overview of the history of rocketry from 13th century China till today. He then outlined the basics of every rocket. He concluded with the private sector developments in space exploration.

- Pete Kellerman shared his experiences with rocket launch at the Wallops Island facility. There is an app called "What's up at Wallops" where you can view their launch schedule.

Camping Trip (Cont'd)

(Continued from page 3)

night, so one can reserve a campsite to be sure to have a place for a tent, or take a chance on finding room on the astronomy field. We plan to reserve a campsite. If we find room on the astronomy field, we just won't use the reserved campsite. I don't know if the cost of a reserved campsite will be refunded if it is not used, but I doubt that is possible.

If you don't want to camp, a quick search shows several hotels between 15 to 25 miles away, with nightly rates from $75 to $135. Let me know at observing@ccas.us if you want to join us at Cherry Springs in May. The trip is weather dependent.

CCAS Original Astrophotography

by Dave Hockenberry

On the cover: M64, The Black Eye Galazy. Image acquired with a QSI583wsg camera through Hyperion 12.5" telescope on an AP 1200 GEM between 4/19/17 and 2/12/18. Autoguiding with SX Lodestar camera and SX AOLF active optics unit. Image capture with MaxIm DL Pro. Observatory control with MaxIm DL and APCC. 3.4 hours Lum (600 second exposures), 1.2 Hours Blue and Green filter exposures, and 2 hours Red filter exposures (all 600 second subexposures) with AstroDon Gen 2 color filters. Image processing with CCDStack and Photoshop CC. M64 is approximately 24-31 light years distance from us in the constellation Coma Berenices. At apparent magnitude 9.3 this is a Spring treat for visual observers since in dark skies and moderate aperture telescopes the dark spot near the nucleus can be seen.

Measuring the Movement of Water on Earth

by Teagan Wall

*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.*

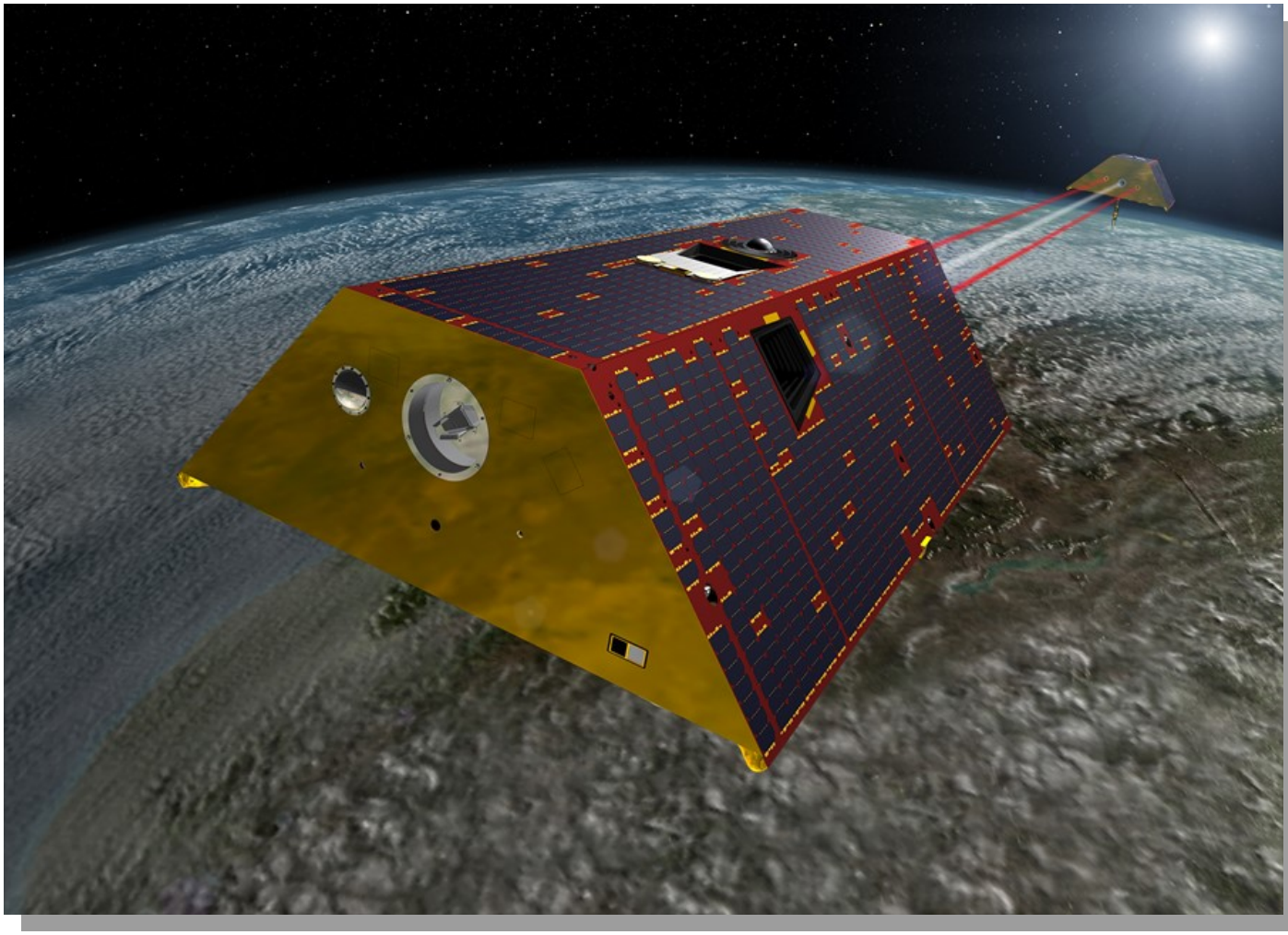
Visit spaceplace.nasa.gov to explore space and Earth science!

As far as we know, water is essential for every form of life. It's a simple molecule, and we know a lot about it. Water has two hydrogen atoms and one oxygen atom. It boils at 212° Fahrenheit (100° Celsius) and freezes at 32° Fahrenheit (0° Celsius). The Earth's surface is more than 70 percent covered in water.

On our planet, we find water at every stage: liquid, solid (ice), and gas (steam and vapor). Our bodies are mostly water. We use it to drink, bathe, clean, grow crops, make energy, and more. With everything it does, measuring where the water on Earth is, and how it moves, is no easy task.

The world's oceans, lakes, rivers and streams are water. However, there's also water frozen in the ice caps, glaciers, and icebergs. There's water held in the tiny spaces between rocks and soils deep underground. With so much water all over the planet—including some of it hidden where we can't see—NASA scientists have to get creative to study it all. One way that NASA

(Continued on page 9)



An artist's rendering of the twin GRACE-FO spacecraft in orbit around Earth. Credit: NASA

Space Place (Cont'd)

(Continued from page 8)
will measure where all that water is and how it moves, is by launching a set of spacecraft this spring called GRACE-FO.

GRACE-FO stands for the "Gravity Recovery and Climate Experiment Follow-on." "Follow-on" means it's the second satellite mission like this—a follow-up to the original GRACE mission. GRACE-FO will use two satellites. One satellite will be about 137 miles (220 km) behind the other as they orbit the Earth. As the satellites move, the gravity of the Earth will pull on them.

Gravity isn't the same everywhere on Earth. Areas with more mass—like big mountains—have a stronger gravitational pull than areas with less mass. When the GRACE-FO satellites fly towards an area with stronger gravitational pull, the first satellite will be pulled a little faster. When the second GRACE-FO satellite reaches the stronger gravity area, it will be pulled faster, and catch up.

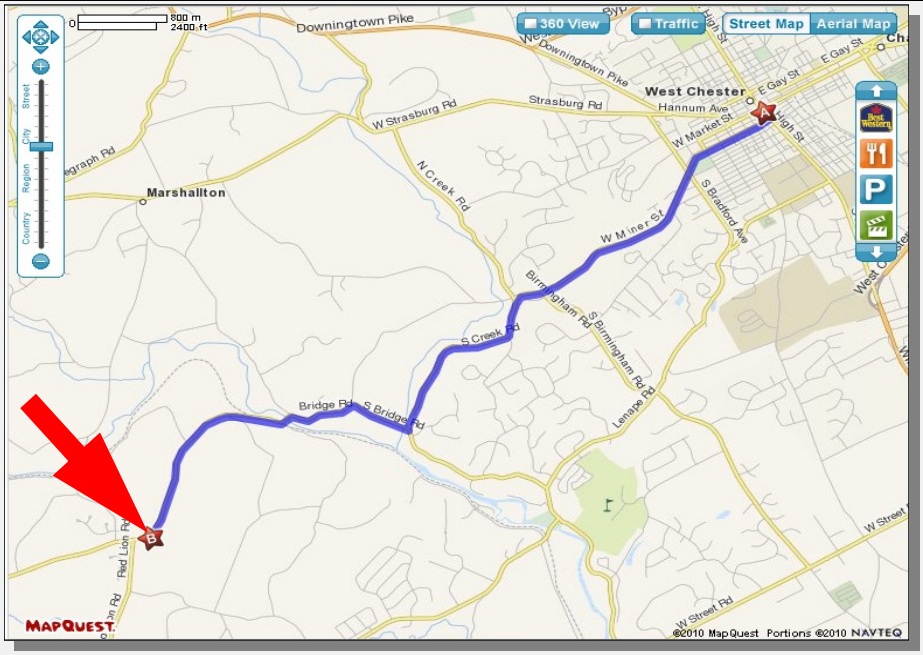
Scientists combine this distance between the two satellites with lots of other information to create a map of Earth's gravity field each month. The changes in that map will tell them how land and water move on our planet. For example, a melting glacier will have less water, and so less mass, as it melts. Less mass means less gravitational pull, so the GRACE-FO satellites will have less distance between them. That data can be used to help scientists figure out if the glacier is melting.

GRACE-FO will also be able to look at how Earth's overall weather changes from year to year. For example, the satellite can monitor certain regions to help us figure out how severe a drought is. These satellites will help us keep track of one of the most important things to all life on this planet: water.

You can learn more about our planet's most important molecule here:

https://spaceplace.nasa.gov/water

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.

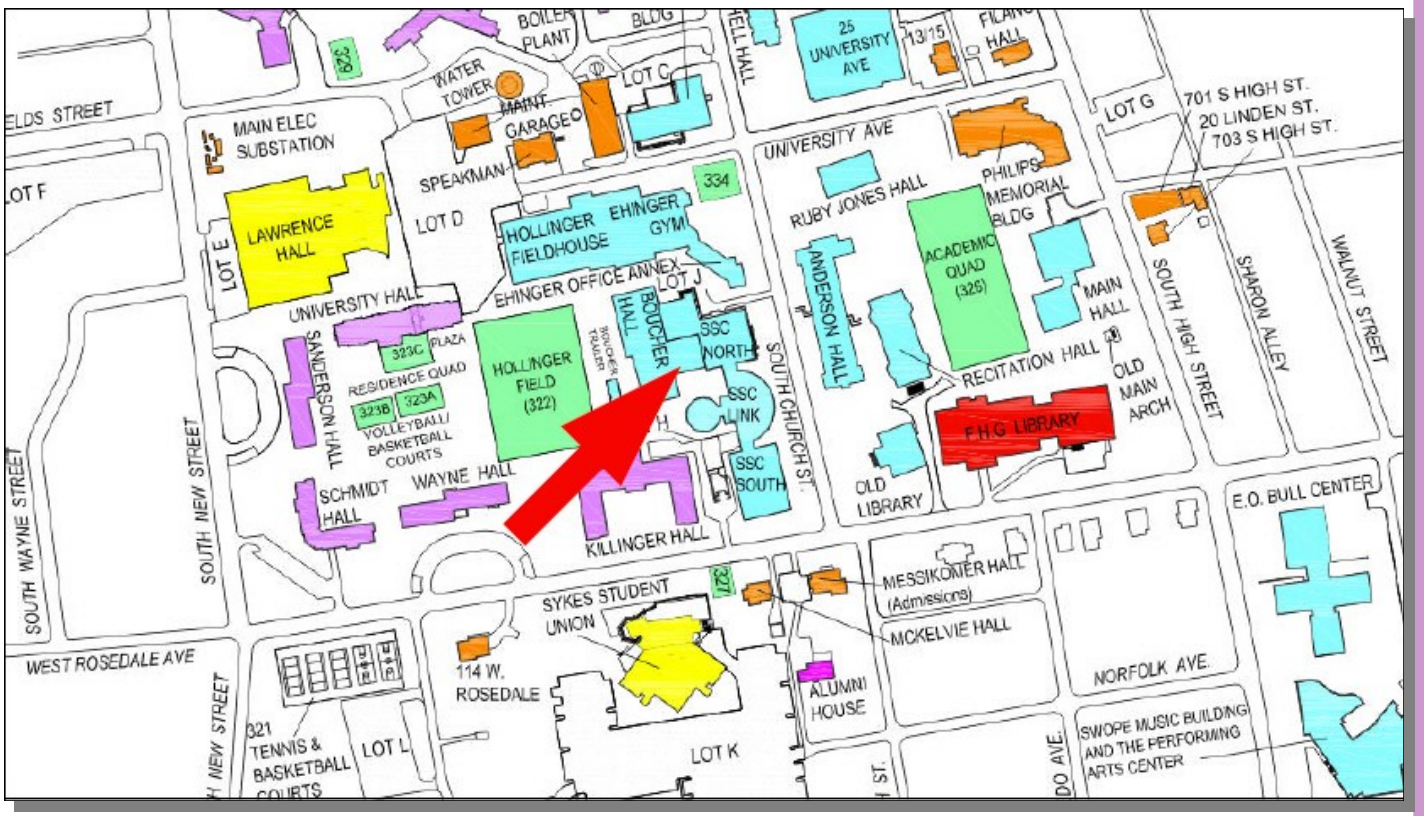
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route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



Observing (Cont'd)

(Continued from page 5)

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 first quarter Moon sets around 2:00 a.m. so it will not interfere with the "shooting stars" at their peak in the hour before dawn.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

March 2018 Financial Summary

Beginning Balance	$1,184
Deposits	$155
Disbursements	-$0
Ending Balance	$1,339

New Member Welcome!

Welcome new CCAS members Gary Zibinski from West Chester, PA, and Christopher Traini and family of Lincoln University, 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.

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

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 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 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 & 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.**