



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 26, No. 3 **Three-Time** Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016 March 2018

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The Lunar X



Image Credit & Copyright: Henrik Adamsson

Membership Renewals Due

03/2018	Angelini Fulton Sterrett
04/2018	Dennis Hepler Imburgia Miller Richter Rossomando
05/2018	Cunningham Fletcher Klapholz LaFrance O'Hara Ostaneck

March 2018 Dates

- 1st** • Full Moon, the Full Worm Moon or the Snow Blinding Moon, 7:51 p.m. EST
- 9th** • Last Quarter Moon, 6:19 p.m. EST
- 11th** • Daylight Saving Time begins, 2:00 a.m.
- 17th** • New Moon, 9:11 a.m. EDT
- 20th** • Spring equinox
- 24th** • First Quarter Moon, 11:35 a.m. EDT
- 31st** • Full Moon, the Full Sap Moon or the Maple Sugar Moon



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.
- ☼ **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.

Winter/Spring 2018 Society Events

March 2018

7th • 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.

13th • CCAS Monthly Meeting starting at 7:30 p.m. in Room 113, Merion Science Center (former Boucher Building), West Chester University. CCAS Member Speaker: John Conrad, NASA/JPL Ambassador.

16th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

19th • Astronomy: A Beginner's Guide classes through the Chester County Night School at Henderson High School. Classes start at 7pm and run for 6 weeks.

20th • Open call for articles and photographs for the April 2018 edition of [Observations](#).

22nd-23rd • The von Kármán Lecture Series: [Cassini Science Results](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

26th • Deadline for newsletter submissions for the April 2018 edition of [Observations](#).

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.

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.

20th • Open call for articles and photographs for the May 2018 edition of [Observations](#).

26th • Deadline for newsletter submissions for the May 2018 edition of [Observations](#).

Minutes from the February 13, 2018, CCAS Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor welcomed all new and returning members to the February 13, 2018, meeting of the Chester County Astronomical Society. 15 people were in attendance.
- Don Knabb, our observing chair, announced our 10 year anniversary of Night Sky Network membership. Liz Smith and TJ Picklo partnered our club with this organization one decade ago. This website sponsored by the Astronomical Society of the Pacific posts our outreach programs including star parties and Night School Classes. Night Sky Network pins for participation in outreach were awarded by Don. Members who were present to personally receive their pins were Dennis O'Leary, Andy and Colin Monaghan, Pete Kellerman, Roger and Linda Taylor, Ann and David Hockenberry, and Don and Barb Knabb.
- Donn Knabb also shared the original document of approval from West Chester University to start our club, CCAS, on 9/21/1993. This fall will be our club's 25th Anniversary.
- Astronomy: A Beginner's Guide classes for the Chester County Night School at Henderson High School will begin March 19, 2018, at 7pm and run for 6 weeks. Each class is taught by our club members.
- Don reminded our members that there is a Yahoo User's Group for our club hosted by Pete Kellerman. If you have not joined already, contact Pete or Don for an invitation.
- Don announced some upcoming observing events. BRC members observing on March 16 and April 13. Public star parties are on April 14 at Bucktoe Creek Nature Preserve in Avondale, PA, April 21 Hoopes Park in West Chester, PA, and May 19 at Anson Nixon Park in Kennett Square, PA.
- Pete Kellerman has been in contact with members of the Delaware Valley Astronomy Club to arrange a joint weekend of observing at Blue Mountain Vista possibly in October 2018. More details to come.
- Don Knabb shared the night sky for the Spring of 2018 using Sky Safari Pro. Spring is galaxy season. Also look for Algieba or Gamma Leonis in Leo which is a double star that Herschel studied to establish that gravity also works on stars.
- David Hockenberry announced that tonight's program is member's night. David shared the book *Sky Glow* by Gavin Heffernan and Harlan Mehmedinovic with accompanying DVD. *Sky Glow* is a book of astrophotography and a time lapse video series that explores the growing threat of light pollution on our North American starscapes. It will be available for anyone who would care to view it.
- David also shared pictures from the Total Solar Eclipse of August 2017 taken in

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March 2018 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on March 13, 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: John Conrad, NASA/JPL Ambassador.

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

Flagship U.S. Space Telescope Facing Further Delays

by Daniel Clery, Science Magazine



The main mirror of NASA's James Webb Space Telescope being tested at Goddard Space Flight Center in Greenbelt, Maryland, in 2017.
NASA/Desiree Stover/Flickr (CC BY-NC-ND 2.0)

NASA's troubled James Webb Space Telescope (JWST) is heading for more choppy water, says a **report from the U.S. Government Accountability Office** (GAO) released yesterday. Problems in testing the orbiting telescope's components and integrating them together means further launch delays are likely, GAO found. And the slips could mean the project will breach the \$8 billion cost ceiling imposed by Congress in 2011.

The JWST is a successor to the Hubble Space Telescope, but with a mirror more than three times as wide and focusing on slightly longer, infrared wavelengths. It is expected to revolutionize our knowledge of the

early universe, planets around other stars, and much else in between.

It is also the most complex and costly science mission NASA (and its European and Canadian partners) have ever built. Its early development was **plagued by cost overruns and schedule slips**, but after a crisis in 2011 that nearly saw it canceled, Congress set its budget in stone. Since then, **building and testing the spacecraft** have mostly stayed on track, but last September NASA did push back the JWST's planned launch from October 2018 to a date between March and June 2019.

Telescope Available for a Member to Own

by Don Knabb



Several months ago the club received a telescope that was donated by a person who no longer uses it. The scope is not up to the quality that we like to have for a club lending scope, so we are giving this scope to someone to keep it for their own use.

The scope is an 8 inch Dobsonian design. It is an "Odyssey 8" and it was made in California in the early 1980s. The mirror is in good shape, although it could use a cleaning. I have tested the scope and it has two main disadvantages. It lacks a finder scope and it is difficult to focus. A good "red dot" finder can easily be installed and they only cost \$40 or so. The focusing is just something that takes a little patience since there is no traditional rack and pinion. Focusing is done by sliding the tube that holds the eyepiece in and out and locking it with a twist lock. The scope comes with two eyepieces. The eyepieces are not great, but they are enough to get started.

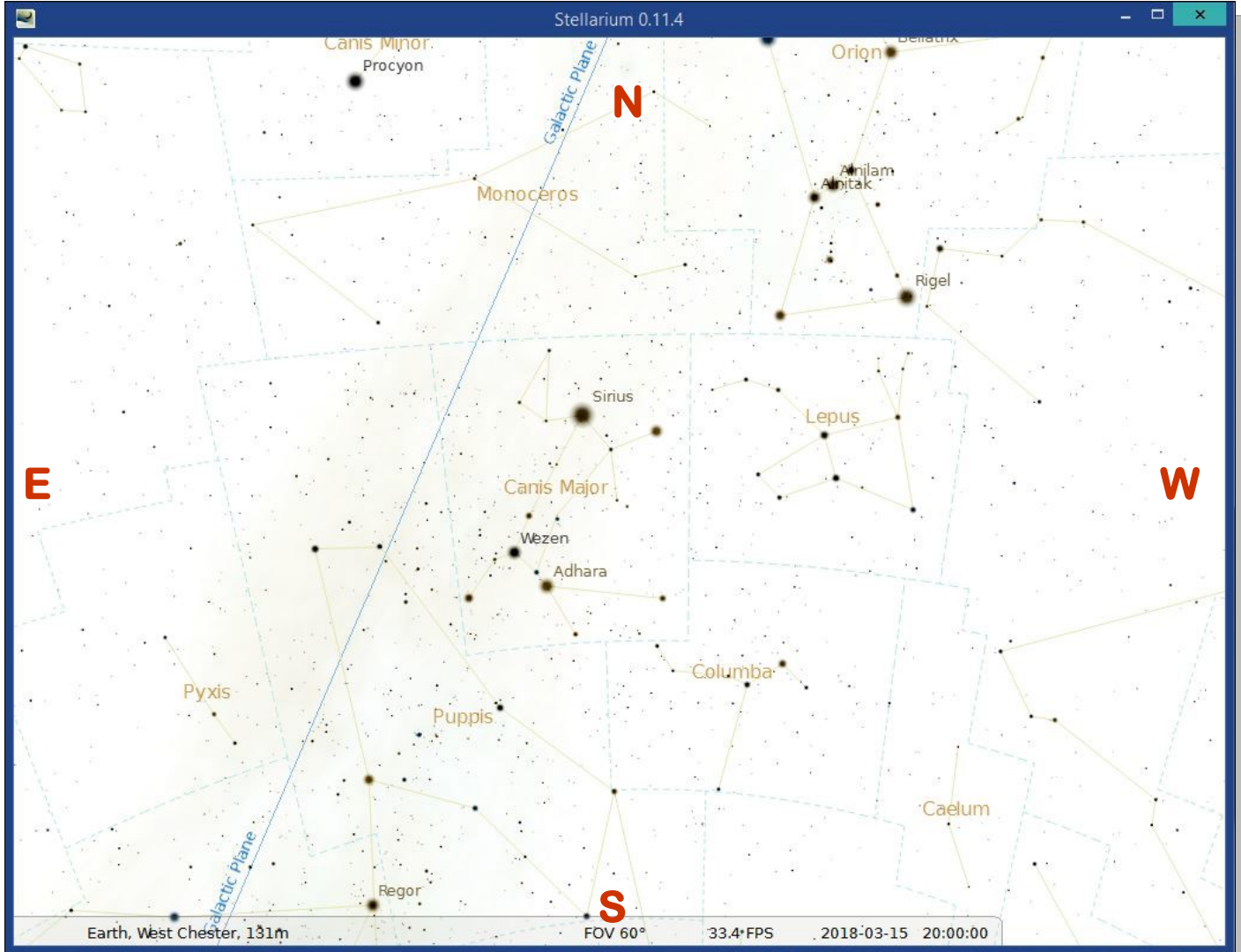
I observed the Moon and the image is quite sharp with the lower power eyepiece and focusing is pretty easy with this eyepiece. I also viewed the Orion Nebula and it looks very nice. Using the higher power eyepiece causes focusing to be a little more difficult but it is not impossible if one has a little patience.

So, this is not a great telescope, but being an 8 inch Dob it gathers a lot of light and is relatively easy to use. It is a whole lot better than no telescope at all! If you are interested in the telescope, send an email to Don Knabb at dknabb01@comcast.net. If we have several members interested in the telescope we'll put the names in a hat and draw one.

The Sky Over Chester County

March 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
03/01/2018	6:08 a.m. EST	6:35 a.m. EST	5:54 p.m. EST	6:21 p.m. EST	11h 18m 38s
03/15/2018	6:46 a.m. EDT	7:13 a.m. EDT	7:09 p.m. EDT	7:36 p.m. EDT	11h 55m 23s
03/31/2018	6:20 a.m. EDT	6:48 a.m. EDT	7:25 p.m. EDT	7:52 p.m. EDT	12h 37m 37s

Moon Phases

Last Quarter	03/09/2018	6:19 a.m. EST	New Moon	03/17/2018	9:11 a.m. EDT
First Quarter	03/24/2018	11:35 a.m. EDT	Full Moon	03/31/2018	8:36 a.m. EDT

March 2018 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	Full Moon, the Full Worm Moon or the Snow Blinding Moon, 7:51 p.m. EST
5 – 19	The Zodiacal light is visible in the west after evening twilight
9	Last Quarter Moon, 6:19 p.m. EST
10	The Moon, Saturn and Mars form a triangle in the morning sky
11	Daylight Saving Time begins, 2:00 a.m.
17	New Moon, 9:11 a.m. EDT
18	The Moon, Venus and Mercury are low in the west after sunset
20	Spring equinox
22	The Moon is close to Aldebaran
24	First Quarter Moon, 11:35 a.m. EDT
24	The Lunar Straight Wall is visible
31	Full Moon, the Full Sap Moon or the Maple Sugar Moon

The best sights this month: We happily welcome Venus back into the evening sky where it shines brightly as the “evening star”. March is the best month of 2018 to see Mercury, the best days being at mid-month. We also enjoy two full Moons during March, the second one being a “Blue Moon”.

Mercury: March is the best month of 2018 to see the planet closest to the Sun. March 15th is the day when Mercury is highest in the sky as the glow of the Sun fades. Mercury and Venus stay close through most of the month and both will be within the same field of view for most binoculars until late in the month when Mercury falls into the glow of the setting Sun.

Venus: Welcome back “evening star”! Venus will rise a bit higher each evening through March and will be our companion in the evening sky until autumn. Our sister planet will shine at magnitude -3.9 all month.

Mars: The red planet is rising around 2:00 a.m. at the start of the month, with its best buddy Saturn following about an hour behind. By the end of the month they will be rising at nearly the same time.

Jupiter: Jupiter rises around midnight and shines brightly in the constellation Libra.

Saturn: Saturn follows Mars across the sky and by month’s end the two planets are less than 2 degrees apart. At month’s end Mars and Saturn are close to M22, a beautiful globular cluster in Sagittarius.

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

The Moon: We have two full moons during March. On March 1st, according to Native Americas, we have the Full Worm Moon. In March, the ground softens, and the earthworm casts reappear, inviting the return of the robins. The Northern tribes knew this as the Full Crow Moon, when the cawing of crows signals the end of winter, or the Full Crust Moon because the snow cover becomes crusted from thawing by day and freezing at night. Fullness occurs at 7:51 p.m.

Then we have a second full moon on March 31st. This is a Blue Moon. According to Native Americans this is the Full Sap Moon, marking the time of tapping maple trees. In 2018, this is also the Paschal Full Moon, or the first full moon of the spring season. The first Sunday following the Paschal Moon is Easter Sunday, which indeed will be observed the very next day, on Sunday, April 1st. This is also the second Blue Moon of 2018 — once again, depending on your location, because the moon reaches peak fullness on April 1 for some locations.

Constellations: Early in the evening the “big guy” Orion dominates the sky in the southwest, with bright Capella in Auriga nearly overhead. Leo the Lion is in the southeast and as the night progresses you can see some spring constellations rising such as Boötes, Corona Borealis and Hercules.

Messier/deep sky: Take a few more gazes at the Orion Nebula before it settles into the west as spring marches on. The Big Dipper is high in the sky so

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Through The Eyepiece: NGC 2169, the “37” Cluster

by Don Knabb, CCAS Treasurer & Observing Chair

The constellation Orion the Hunter is a joy to behold during winter and early spring nights. With just a set of binoculars we can see the fuzzy spot that is the Orion Nebula, M42. With a telescope the nebula comes alive with structure and the Trapezium, the 4 stars at the heart of the nebula, are visible. I also enjoy using binoculars to see the “S” curve of stars that are on the right side of Orion’s belt.

But that’s not all that Orion has to offer stargazers. There are numerous less flashy but interesting deep sky objects scattered about the constellation.

One of my favorites is NGC 2169, an open cluster that was perhaps discovered by Giovanni Batista Hodierna before 1654 (but his description is not sufficient for a confirmed identification) and was independently discovered by William Herschel on October 15, 1784.



NGC 2169, The “37” Cluster

Photo credit Noel Carboni, used with permission.
<http://noel.prodigitalsoftware.com/Astrophotography.html>

NGC 2169 is also called the “37 Cluster” and the reason for this name can be seen in the photo by Noel Carboni, which was featured as NASA’s Astronomy

Photo of the Day (APOD) on November 18, 2005. The brighter stars of open cluster NGC 2169 seem to form a cosmic 37.

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Chart credit: Stellarium planetarium software (Stellarium.org)

Eyepiece (Cont'd)

(Continued from page 6)

Of course, the improbable numerical asterism appears solely by chance and depending on the optics of your telescope it might be an upside down 37 or a backward 73. As far as galactic or open star clusters go, NGC 2169 is a small one, spanning about 7 light-years.

It is not difficult to find NGC 2169. The 37 Cluster is near the elbow of the arm Orion is using to hold his club overhead and forms a triangle with Nu and Xi Orionis as seen in the star map I created using Stellarium planetarium software.

At its distance of about 3600 light-years, open cluster NGC 2169 shines at a total brightness of 5.9 magnitudes. The cluster

is made up of approximately 30 stars.

Formed at the same time from the same cloud of dust and gas, the stars of NGC 2169 are only about 8 million years old. Such clusters are expected to disperse over time as they encounter other stars, interstellar clouds, and experience gravitational tides while traveling through the galaxy. Over four billion years ago, our own Sun was likely formed in a similar open cluster of stars.

Information credits:

<http://www.seds.org/messier/xtra/ngc/n2169.html>

http://en.wikipedia.org/wiki/NGC_2169

<http://antwarp.gsfc.nasa.gov/apod/ap051118.html>

<http://noel.prodigitalsoftware.com/Astrophotography.html>

Observing (Cont'd)

(Continued from page 5)

take this opportunity to look for galaxies M81 and M82. With a low power eyepiece in your telescope they might be in the same field of view depending on your equipment. For more of a challenge, look for the 10th magnitude galaxies M65 and M66 in Leo.

Comets: There are no bright comets visible during March.

Meteor showers: There are no major meteor showers during March.

CCAS Original Astrophotography

by Dave Hockenberry, CCAS Program Chair



Van den Bergh 17 (NGC 1333)

Image acquired with a QSI 583wsg camera through a Hyperion 12.5" astrograph telescope, on an AP 1200 equatorial mount. Image capture with MaxIm DL Pro. Observatory control with MaxIm DL Pro and APCC. 17 hours Lum, 4 hours Blue, 4 hours Red, and 3.25 hours Green data through Astro-Don Gen 2 filters. Van den Bergh 17 lies at approximately 1,000 light years distance in the constellation Perseus, and is the blue reflection nebula seen here. The red objects toward the right are Herbig-Haro objects, jets and excited gas from newborn stars (mostly red dwarf stars) probably less than a million years old.

What Is the Ionosphere?

by Linda Hermans-Killiam

High above Earth is a very active part of our upper atmosphere called the ionosphere. The ionosphere gets its name from ions—tiny charged particles that blow around in this layer of the atmosphere.

How did all those ions get there? They were made by energy from the Sun!

Everything in the universe that takes up space is made up of matter, and matter is made of tiny particles called atoms. At the ionosphere, atoms from the Earth's atmosphere meet up with energy from the Sun. This energy, called radiation, strips away parts of the atom. What's left is a positively or negatively charged atom, called an ion.

The ionosphere is filled with ions. These particles move about in a giant wind. However, conditions in the ionosphere change all the time. Earth's seasons and weather can cause changes in the ionosphere, as well as radiation and particles from the Sun—called space weather.

These changes in the ionosphere can cause problems for humans. For example, they can interfere with radio signals between Earth and satellites. This could make it difficult to use many of the tools we take for granted here on Earth, such as GPS. Radio signals also allow us to communicate with astronauts on board the International Space Station, which orbits Earth within the ionosphere. Learning more about this region of our atmosphere may help us improve forecasts about when these radio signals could be dis-



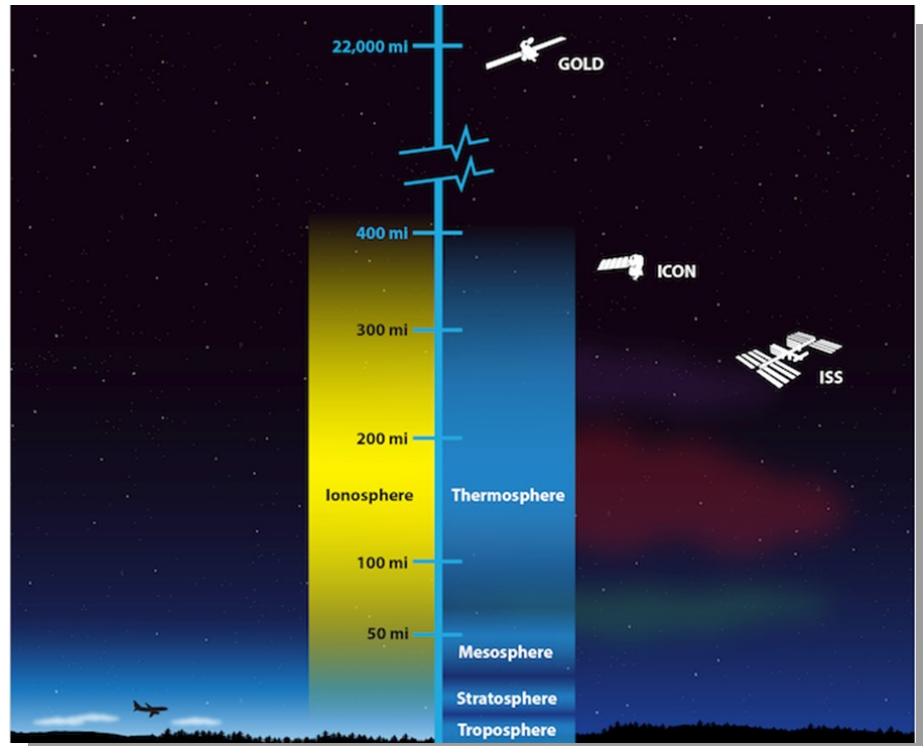
torted and help keep humans safe.

In 2018, NASA has plans to launch two missions that will work together to study the ionosphere. NASA's GOLD (Global-scale Observations of the Limb and Disk) mission launched in January 2018. GOLD will orbit

22,000 miles above Earth. From way up there, it will be able to create a map of the ionosphere over the Americas every half hour. It will measure the temperature and makeup of gases in the ionosphere. GOLD will also study bubbles of charged gas that are known to cause communication problems.

A second NASA mission, called ICON, short for Ionospheric Connection Explorer, will launch later in 2018. It will be placed in an orbit just 350 miles above Earth—through the ionosphere. This means it will have a close-up view of the upper atmosphere to pair with GOLD's wider view. ICON will study the forces that shape this part of the

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This illustration shows the layers of Earth's atmosphere. NASA's GOLD and ICON missions will work together to study the ionosphere, a region of charged particles in Earth's upper atmosphere. Changes in the ionosphere can interfere with the radio waves used to communicate with satellites and astronauts in the International Space Station (ISS). Credit: NASA's Goddard Space Flight Center/Duberstein (modified)

Space Place (Cont'd)

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upper atmosphere.

Both missions will study how the ionosphere is affected by Earth and space weather. Together, they will give us better observations of this part of our atmosphere than we have ever had before.

To learn more about the ionosphere, check out NASA Space Place: <https://spaceplace.nasa.gov/ionosphere>

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!

Minutes (Cont'd)

(Continued from page 2)

Casper, WY with his Samsung cell phone held in place by a Televue Fone Mate attached to a eyepiece on his Questar telescope. These pictures were taken with a solar filter till totality and totality was captured with the solar filter removed. He offers that this set up is an easy way to get started in astrophotography and to encourage engagement at star parties.

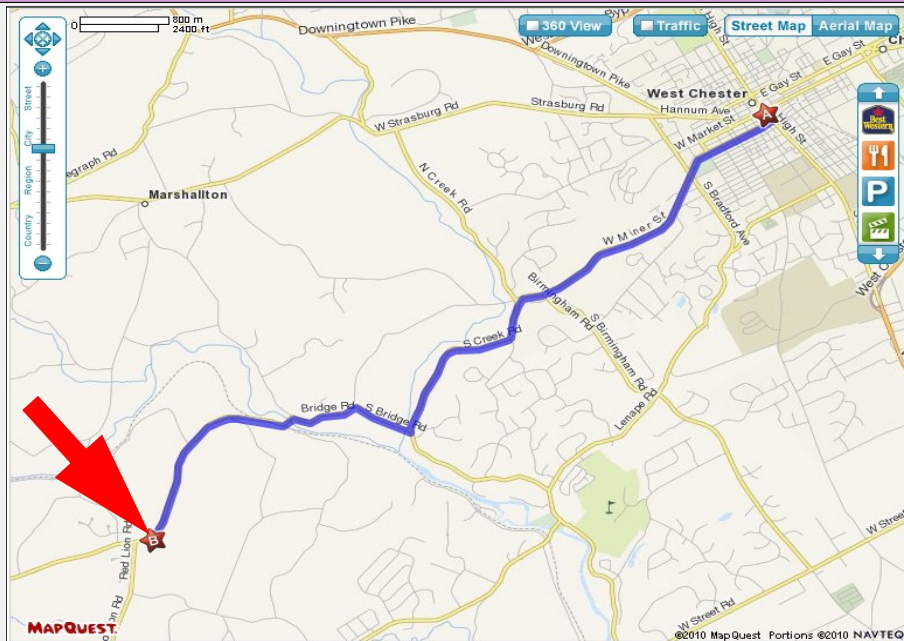
- Pete Kellerman used an 80 mm telescope on an Iopton Mount for eclipse viewing at the Chester County Library. Visitors wanted to both visually observe and to take photographs with their phones.
- Don Knabb shared that the Night-Cap Camera App assists phones and tablets in taking low light and night photos with Astronomy modes to capture the night sky features.
- Don Knabb shared pictures of the Solar Eclipse adventure that he, Barb, Roger, and Linda Taylor took to the Great Smoky Mountain National Park. Don shared pictures of

the eclipse and the moon taken with a cell phone through a telescope.

- Dennis O'Leary and his wife enjoyed the eclipse from Crossville, Tennessee. He incidentally met people from West Chester, PA at this site. Although challenged by clouds, the sky cleared just before totality and he had a great view through his solar telescope and binoculars with a filter. He was most impressed that one could see sunset all around them instead of just facing west.
- Ed Damereau shared that he used a homemade device using a mini colander and foam core to project the eclipse at a site in PA. Many people constructed homemade devices for viewing.
- Roger Taylor discussed the recent Space X Falcon Heavy launch. A lively discussion about space exploration as a business model vs government sponsored space exploration ensued. Dennis O'Leary, one of our NASA Solar System Ambassadors shared that NASA's DAWN

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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).



Minutes (Cont'd)

(Continued from page 9)

mission had instrumentation donated by European companies to defray the cost and keep it under budget. The rockets to launch the mission take up a large portion of the budget.

- David Hockenberry shared a recent astrophotograph of the Black Eye galaxy and gave an overview of his astroimage processing.
- Roger Taylor concluded the meeting by announcing that next month's program would be a presentation by NASA solar ambassador and club member, John Conrad.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

Feb. 2018 Financial Summary

Beginning Balance	\$1,448
Deposits	\$80
Disbursements	-\$345
Ending Balance	\$1,184

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.

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](http://www.ida.org). 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**.