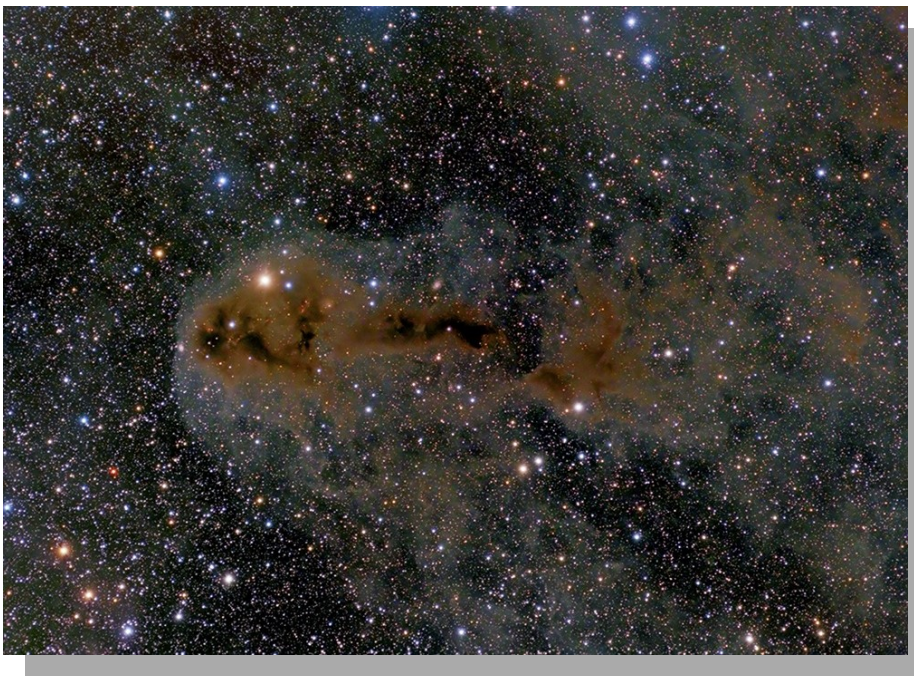
Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 24, No. 1 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *January 2016*

In This Issue

Spectacular Dark Nebula LDN 1251



Located in the constellation Cepheus the King, this object is a molecular cloud, a region of incredibly cold dust and gas that eventually will turn into a star-forming region. (4-inch Takahashi FSQ-106N refractor at f/5, FLI ML-6303E CCD camera, LRGB image with exposures of 3, 1, 1, and 1 hour, respectively) Image: Behyar Bakhshandeh from San Diego, California.

Membership Renewals Due

01/2016	Golub Kellerman Kovacs Linskens Loeliger McElwee
02/2016	La Para Macaleer
03/2016	Angelini Sterrett

Important January 2016 Dates

2nd • Last Quarter Moon, 12:30 a.m.

4th • Quadrantid Meteor Shower peaks.

9th • New Moon, 8:30 p.m.

16th • The Lunar X is visible around 4:00 p.m.

16th • First Quarter Moon, 6:26 p.m.

23rd • Full Moon, 8:45 p.m.

CCAS Upcoming Nights Out

CCAS has several "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, March 25th, 2016** - CCAS Monthly Observing Session, Myrick Conservancy Center, Brandywine Red Clay Alliance. The observing session starts at sunset.

☼ **Friday, April 8th, 2016** - CCAS Monthly Observing Session, Myrick Conservancy Center, Brandywine Red Clay Alliance. The observing session starts at sunset.

Winter 2016 Society Events

January 2016

4th • Quadrantid meteor shower peaks.

6th • 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.

12th • CCAS Monthly Meeting, Merion Science Center, Rm 112, West Chester University. The meeting starts at 7:30 p.m. Meeting Agenda: Members' Night.

14th-15th • The von Kármán Lecture Series: Deep Space Atomic Clock, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the February 2016 edition of Observations.

22nd • West Chester University Planetarium Show: "Once in a Blue Moon." The show starts at 7 p.m. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

26th • Deadline for newsletter submissions for the February 2016 edition of Observations.

February 2016

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.

9th • CCAS Monthly Meeting, Merion Science Center, Rm 112, West Chester University. The meeting starts at 7:30 p.m. Meeting Agenda: TBA.

11th-12th • The von Kármán Lecture Series: The Europa Mission, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

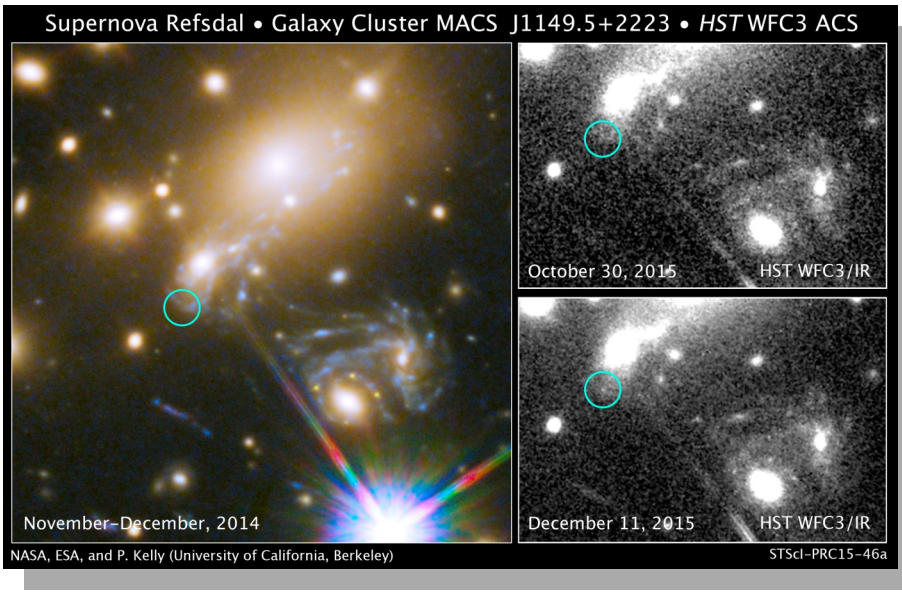
19th • West Chester University Planetarium Show: "Killer Rocks from Outer Space." The show starts at 7 p.m. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

20th • Open call for articles and photographs for the March 2016 edition of Observations.

26th • Deadline for newsletter submissions for the March 2016 edition of Observations.

Caught in the Act: Hubble Captures the First-Ever Predicted Exploding Star

Courtesy Hubblesite



Hubble has captured an image of the first-ever predicted supernova explosion. The reappearance of the supernova dubbed "Refsdal" was calculated by different mass models of a galaxy cluster whose immense gravity is warping the supernova's light as the light travels toward Earth. The supernova was previously seen in November 2014 behind the galaxy cluster MACS J1149.5+2223, part of Hubble's Frontier Fields program. Astronomers spotted four separate images of the supernova in a rare arrangement known as an Einstein Cross. This pattern was seen around a galaxy within MACS J1149.5+2223. While the light from the cluster has taken about five billion years to reach us, the supernova itself exploded much earlier, nearly 10 billion light years ago. The detection of Refsdal's reappearance served as a unique

(Continued on page 7)

January 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on January 12, 2016, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. The agenda for this evening is "Members' Night." Bring your latest gadgets, astronomy Xmas gifts, or anything you'd like to share with the group for an informal get together.

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.

We are looking for presenters for future meetings in our spring and fall 2016 seasons. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Music for Observing

by CCAS Member Frank J. Angelini, Sr.

Observing the night sky has been one of my passions for over 40 years. As a hobby, it is becoming more popular every day. The new "GoTo" telescopes are becoming more affordable with each solid-state innovation. Folks who buy these scopes but are otherwise new to astronomy soon learn that observing is much more than pushing buttons, looking in an eyepiece, and saying, "Wow!"

To become an accomplished astronomer requires time, sacrifice, and exposure to extremes in temperature. Hours can pass waiting for that perfect moment when an object is in view and those nasty clouds have past. Without some kind of diversion, these periods of otherwise inactivity can cause boredom followed by ambivalence, followed by a complete lack of interest. How many scopes find their way to the back of a closet, attic, or garage?

In order to deal with the tedious set up time, waiting for darkness, waiting for optics to cool down, I usually include a musical theme as an integral part of my observing sessions. Over the years, I have compiled hundreds of musical pieces. All of these have some relationship to space, the sky, the night, etc. The media ranges from 45 rpm, LP vinyl, reel to reel, CD's, SCD's, iTunes downloads etc. I have converted most of these to WAV files using a PC and audio recording software. Prior to a session I usually prepare a play list and then use my pc and sound system to play the list. The music ranges from pop/rock, heavy metal, country, classical, synthetic, and actual recorded space sounds from NASA. I have included some of my favorites here, plus links to other sources. I hope you enjoy them.

1. "The History of Everything," Bare-naked Ladies, from *Hits from Yesterday and the Day Before* (Theme song of the CBS series, The Big Bang Theory)
2. *The Planets*, Gustav Holst ("Mars, The Bringer of War" is my favorite)
3. *Also Sprach Zarathustra*, Richard Strauss, Op. 30
4. *The Jupiter Symphony*, W.A. Mozart, K551
5. "Titan," HammerFall, from *Threshold* (Swedish heavy metal)
6. "Cygnus X-1, Book 1: The Voyage," Rush, from *Farewell to Kings* (Cygnus X-1's, Lyra, Pegasus, and Deneb and more)
7. "Saved by a Bell," Mike Oldfield, from *Discovery* ("Would you like to look through my telescope?" "I hope the sky stays clear for us.")
8. "Galaxy Song," Monty Python, from *Monty Python Sings* (Everyone knows this!)
9. The Musical Sounds of Space – NPR (https://en.wikipedia.org/wiki/Space-themed_music)
10. "Music of the Spheres (432 Hz)" ("Music of the Spheres (432 Hz)" is made in accordance with the Pythagorean tuning and universal harmonies.)
11. Anything composed by Isao Tomita, for example, "Snowflakes are Dancing"
12. "Across the Universe," The Beatles
13. "2000 Light-Years from Home," The Rolling Stones,

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CCAS Original Astrophotography: Moon Occulting Venus

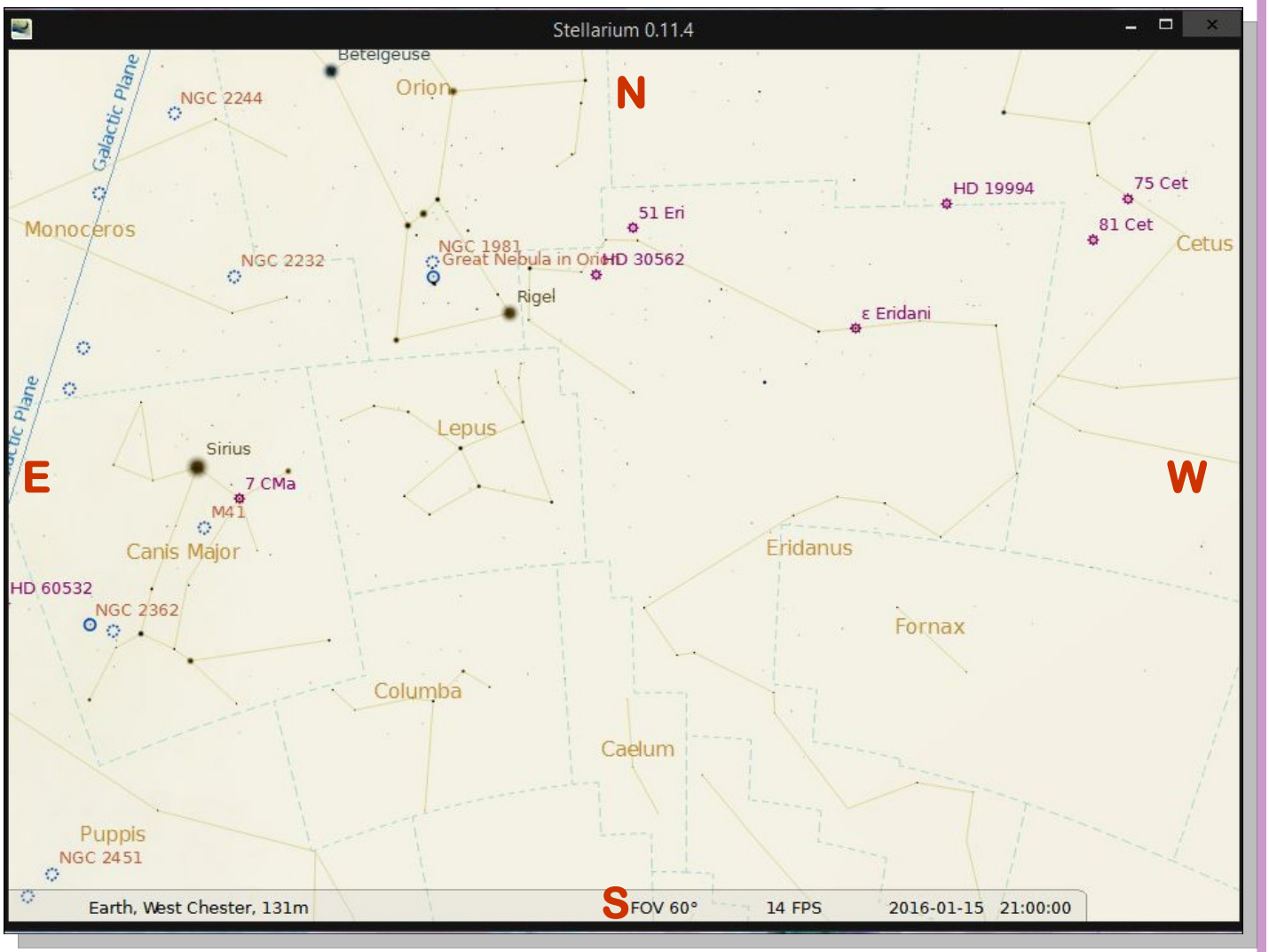
by Don Knabb, CCAS Treasurer & Observing Chair

Image taken on December 4, 2015. This year, the moon will occult Venus twice (on April 6th and again on September 3rd), but the occultations won't be visible in North America.

The Sky Over Chester County

January 15, 2016 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
1/01/2016	6:52 a.m. EST	7:22 a.m. EST	4:46 p.m. EST	5:16 p.m. EST	9h 23m 34s
1/15/2016	6:51 a.m. EST	7:21 a.m. EST	5:00 p.m. EST	5:29 p.m. EST	9h 38m 48s
1/31/2016	6:42 a.m. EST	7:10 a.m. EST	5:18 p.m. EST	5:47 p.m. EST	10h 07m 43s

Moon Phases					
Last Quarter	1/02/2016	12:30 a.m. EST	New Moon	1/09/2016	8:30 p.m. EST
First Quarter	1/16/2016	6:26 p.m. EST	Full Moon	1/23/2016	8:45 p.m. EST

January 2016 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	Last Quarter Moon
3	Venus approaches Saturn at dawn this week
4	The Quadrantid meteor shower peaks
9	New Moon
16	First Quarter Moon
16	The Lunar X is visible around 4 p.m.
19	The Moon occults Aldebaran
23	Full Moon, the Wolf Moon
31	Last Quarter Moon

The best sights this month: The evening highlight will be on January 19th when the Moon occults Aldebaran around 9:30 p.m. If you care to set your alarm to about an hour before dawn you can see Venus and Saturn very close on the morning of January 9th. And for a real thrill seek out 5th magnitude Comet Catalina in the hours before dawn.

Mercury: Mercury is the only naked eye planet visible in the evening sky during January. During the first week of the month look low into the fading glow of the sunset.

Venus: On January 9th Venus and Saturn are less than ½ degree apart in the pre-dawn sky.

Mars: Dim Mars rises about an hour after midnight and is not far from the bright star Spica early in the month. Take a look on January 3rd when Mars and Spica are joined by the waning crescent Moon.

Jupiter: We are catching up to Jupiter in our race around the Sun so the king of the planets will rise around 8:30 p.m. by month's end.

Saturn: Watch as the gap between Saturn and Venus closes during the first week of January. You'll need to get up before dawn to see this close encounter.

Uranus and Neptune: The outer gas giants continue to be in good viewing position just after the sky darkens. Finder charts for both planets are available at skypub.com/urnep, provided by Sky and Telescope magazine.

The Moon: The Moon passes through the Hyades and occults Aldebaran on January 19th. This should happen around 9:30 p.m., then Aldebaran reappears around 10:10 p.m.

Full Moon occurs on January 23rd. According to Native Americans, this is the Full Wolf Moon. Amid the cold and deep snows of midwinter, the wolf packs howled hungrily outside Indian villages, so it was named the Full Wolf Moon. Sometimes it was also referred to as the Old Moon, or the Moon after Yule. Some called it the Full Snow Moon, but most tribes applied that name to the next full Moon.

Constellations: Put on warm clothing, set a lounge chair facing south, step into a sleeping bag and pull it up around you as you sit down. Stare into the beautiful winter night sky and watch Orion and his hunting dog Canis Major chase Taurus the Bull across the sky. Hopefully Orion won't step on Lepus the Hare who is running around under his feet! Gemini the Twins follow Orion, then the very faint Cancer the Crab crawls behind the Twins. But grab your binoculars and find the beautiful Beehive Cluster at the center of the Crab. Stay up late and fierce Leo the Lion leaps out of the eastern horizon.

Messier/deep sky: During the winter months we are looking away from the center of the Milky Way, so the sky is not as full of deep sky wonders as during the summer. But, the sky is clear and there are still many beautiful objects for us to enjoy. Don't miss the trio of clusters in Auriga, and not far away is another nice cluster, M35, at the feet of the twins of Gemini. And below and behind Orion is Canis Major with the cluster M41, the Little Beehive, not far from the brightest star in the night sky, Sirius.

Comets: Comet Catalina should be visible in the pre-dawn sky during the first two weeks of January when the Moon is not washing out our view of this dim visitor from deep space. A finder chart is available in Astronomy magazine.

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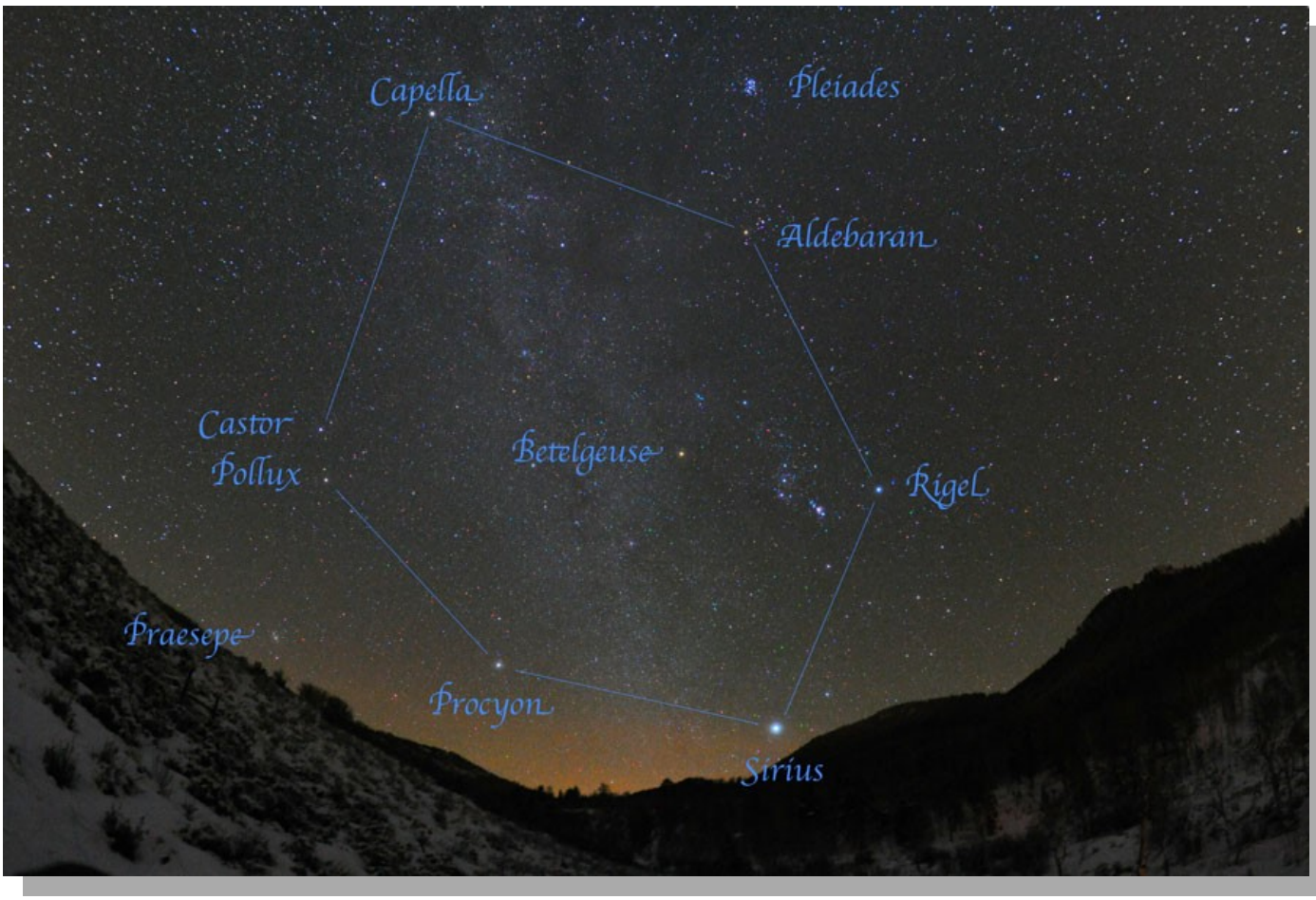
Looking Up: The Winter Hexagon

by Don Knabb, CCAS Treasurer & Observing Chair



Winter Hexagon over Stagecoach Colorado
Credit & Copyright: Jimmy Westlake (Colorado Mountain College), used with permission.

Telescopic observing during the winter months is not easy in our climate. Setting up, taking down, and operating a telescope means you need to have your gloves off to turn knobs and set equipment into place. Eyepieces can easily be fogged by your breath and they can slip out of your hands due to the cold temperatures and your frozen fingers. Even worse is taking your equipment apart after everything is down to very cold temperatures. Holding a tripod leg for even a few seconds chills your hands to the bone!

So during the winter I tend to do more naked eye and binocular observing. Naked eye observing requires nothing more than holding a star map in your gloved hand with a red flashlight in the other hand. Binoculars, once you have them focused correctly, are also easy to handle with gloved hands. And with a lounge chair, warm, layered clothing and a sleeping bag you can be quite comfortable for an hour or so even in below freezing temperatures.

The winter night sky holds many "shapes in the sky". Most of these are constellations, but there are also asterisms, that is, patterns of stars in the sky. An asterism may form part of an official constellation, or be composed of stars from more than one. Like constellations, asterisms are in most cases composed of stars which, while they are visible in the same general direction, are not physically related, often being at significantly different distances from Earth. The mostly simple shapes and few stars make these patterns easy to identify, and thus particularly useful to those learning to familiarize themselves with the night sky.

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Hubble (Cont'd)

(Continued from page 2)

opportunity for astronomers to test their models of how mass — especially that of mysterious dark matter — is distributed within this galaxy cluster.

For more images and information, visit

http://www.spacetelescope.org/news/heic1525

Credit: NASA, ESA, and P. Kelly (University of California, Berkeley)

Looking Up (cont'd)

(Continued from page 6)

My favorite winter asterism is the Winter Hexagon. This asterism covers a huge area of the sky. If you can find Sirius, the brightest star in the sky, you can find the Winter Hexagon. If you aren't sure which star is Sirius, you can certainly find the constellation Orion. Then look to the lower left of Orion and the really bright star that you see is Sirius. From Sirius you can proceed clockwise up to Procyon, then to Pollux (and Castor), on to Capella, down to Aldebaran and on around to Rigel. The band of our Milky Way Galaxy runs through the center of the Winter Hexagon, while the Pleiades open star cluster is visible just above it.

On the left is a photo by astrophotographer Jimmy Westlake. It was featured on the NASA Astronomy Picture of the Day website in January of 2011. Jimmy is Professor of Astronomy and Physics at Colorado Mountain College in Steamboat Springs, Colorado. You can find his pictures at http://www.jwestlake.com/JRWjr_Astrophotography/Welcome.html. He was gracious to allow me to use this copyrighted picture for this article.

This asterism is an unrivalled collection of stars: Sirius is the brightest star in the night sky, Capella is the 6th brightest, Rigel is the 7th, Procyon the 8th and Aldebaran, Pollux and Castor are among the night's 25 brightest stars.

This asterism is also called the Winter Circle. The earliest reference to the designation Winter Hexagon that I can find is from the March 1988 issue of Astronomy magazine, although I am sure this shape was seen centuries into the past.

So bundle up on even the coldest night and step outside, if only for a few minutes. That is all it takes to find the Winter Hexagon!

Information credits:

http://en.wikipedia.org/wiki/Winter_Hexagon
http://homepage.mac.com/kvmagruder/bcp/aster/constellations/win6.htm
http://www.daviddarling.info/encyclopedia/W/Winter_Hexagon.html
http://newton.dep.anl.gov/newton/askasci/1993/astron/AST015.HTM
http://antwrp.gsfc.nasa.gov/apod/ap110103.html

Music (Cont'd)

(Continued from page 3)

from *Their Satanic Majesties Request* (See you on Aldebaran!)
14. *Zeit*, Tangerine Dream (Cool!)
15. "Why Does the Sun Shine," They Might Be Giants
16. "Why Does the Sun Really Shine," They Might Be Giants, from *Here Comes Science* (The original appeared in 1959 on the album *Space Songs* by Tom Glazer and Dottie Evans.)
17. "Eclipse," Pink Floyd, from *Dark Side of the Moon* (Universal!)
18. "Talent is an Asset," Sparks, from *Kimono My House* ("Look at Albert, isn't he a sight; growing, growing at the speed of light.")
19. "The Farthest Lights," Freedy Johnston, from *Blue Days, Black Nights*
20. "New Constellation," Toad the Wet Sprocket, from *New Constellation*
21. "Satellite," The Replacements, from *All Shook Down (2008 Reissue)*
22. "Secret Star," Guided by Voices, from *Earthquake Glue*
23. "Andromeda Heights," Prefab Sprout, from *Andromeda Heights*
24. "The Space Ritual," Hawkwind, from *Doremi Fasol Latido*
25. "Ballet Suite," Gayne
26. "After Midnight," Eric Clapton, from *Eric Clapton*
27. "All Night Long," Aretha Franklin, from *Aretha: With the Ray Bryant Combo*
28. "Darkness," Tab Benoit, from *Night Train to Nashville*
29. "East of the Sun and West of the Moon," Diane Schuur
30. "Europa (Earth's Cry, Heaven's Smile)," Santana, from *Amigos*
31. "Fly me to the Moon (In Other Words)," Frank Sinatra, from *It Might As Well Be Swing*
32. "Half Moon," Janis Joplin, from *Pearl*

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How Will We Finally Image the Event Horizon of a Black Hole?

by Dr. Ethan Siegel

One hundred years ago, Albert Einstein first put forth his theory of General Relativity, which laid out the relationship between space-time and the matter and energy present within it. While it successfully recovered Newtonian gravity and predicted the additional precession of Mercury's orbit, the only exact solution that Einstein himself discovered was the trivial one: that for completely empty space. Less than two months after releasing his theory, however, the German scientist Karl Schwarzschild provided a true exact solution, that of a massive, infinitely dense object, a black hole.

One of the curious things that popped out of Schwarzschild's solution was the existence of an event horizon, or a region of space that was so severely curved that nothing, not even light, could escape from it. The size of this event horizon would be directly proportional to the mass of the black hole. A black hole the mass of Earth would have an event horizon less than a centimeter in radius; a black hole the mass of the sun would have an event horizon just a few kilometers in radius; and a supermassive black hole would have an event horizon the size of a planetary orbit.

Our galaxy has since been discovered to house a black hole about four million solar masses in size, with an event horizon about 23.6 million kilometers across, or about 40 percent the size of Mercury's orbit around the sun. At a distance of 26,000 light years, it's the largest event horizon in angular size visible from Earth, but at just 19 micro-arc-seconds, it would take a telescope the size of Earth to resolve it – a practical impossibility.

But all hope isn't lost! If instead of a single telescope, we built an array of telescopes located all over Earth, we could simultaneously image the galactic center, and use the technique of VLBI (very long-baseline interferometry) to resolve the black hole's event horizon. The array would only have the light-gathering power of the individual telescopes, meaning the black hole (in the radio) will appear very faint, but they can obtain the resolution of a telescope that's the distance between the farthest telescopes in the array! The planned Event Horizon Telescope, spanning four different continents (including Antarcti-

(Continued on page 9)

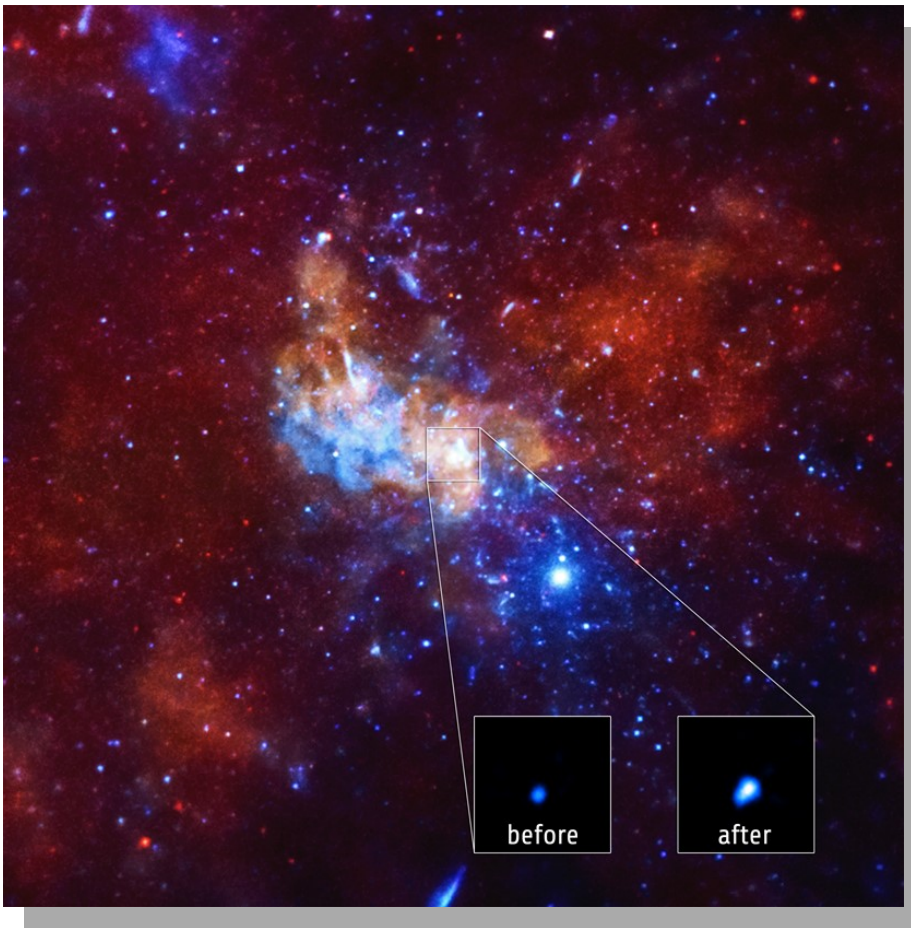


Image credit: NASA/CXC/Amherst College/D.Haggard et al., of the galactic center in X-rays. Sagittarius A is the supermassive black hole at our Milky Way's center, which normally emits X-ray light of a particular brightness. However, 2013 saw a flare increase its luminosity by a factor of many hundreds, as the black hole devoured matter. The event horizon has yet to be revealed.*

Space Place (Cont'd)

(Continued from page 8)

ca), should be able to resolve under 10 micro-arc-seconds, imaging a black hole directly for the first time and answering the question of whether or not they truly contain an event horizon. What began as a mere mathematical solution is now just a few years away from being observed and known for certain!

Note: This month's article describes a project that is not related to NASA and does not suggest any relationship or endorsement. Its coverage is for general interest and educational purposes.

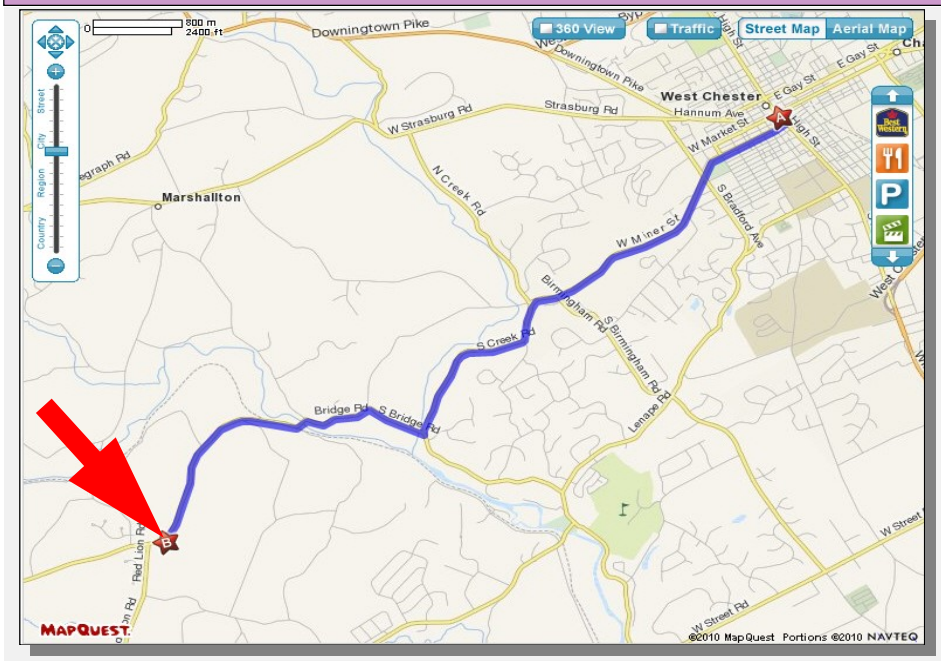
Music (Cont'd)

(Continued from page 7)

33. "Heaven Is 10 Zillion Light Years Away," Stevie Wonder
34. "How High the Moon," Diane Schuur
35. "I'm Beginning to See the Light," versions by Diane Schuur, Ella Fitzgerald, and Louis Armstrong & Duke Ellington
36. "It Was Written in the Stars," Ella Fitzgerald, from *Ella Fitzgerald Sings the Harold Arlen Songbook*
37. "Midnight Sun," versions by Diane Schuur and Ella Fitzgerald
38. "Night Life," Willie Nelson & Wynton Marsalis
39. "Planet of Women," ZZ Top, from *Afterburner*
40. "Quiet Night of Quiet Stars (Corcovado)," Queen Latifah, from *Trav'lin' Light*
41. "Rocket Man," Elton John, from *Honky Château*
42. "Round Midnight," versions by Diane Schuur, Miles Davis, and Thelonious Monk
43. "Star Eyes," Charlie Parker, from *Swedish Schnapps*
44. "Star Love," The Playmates
45. "Stardust," Willie Nelson & Wynton Marsalis
46. "Stars Fell on Alabama," versions by Ella Fitzgerald & Louis Armstrong and Frank Sinatra
47. "That Lucky Old Sun," versions by Louis Armstrong and Ray Charles
48. "Walking on the Moon," The Police, from *Reggatta de Blanc*

Other Links:
http://www.seattleastronomy.com/blog1/2011/05/a-little-night-music/
http://www.hobbyspace.com/Music/index.html
https://myspace.com/alonzoreason
http://marsartists.blogspot.com/p/space-themed-music.html
http://adsabs.harvard.edu/full/2008ASPC..400..514F

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.

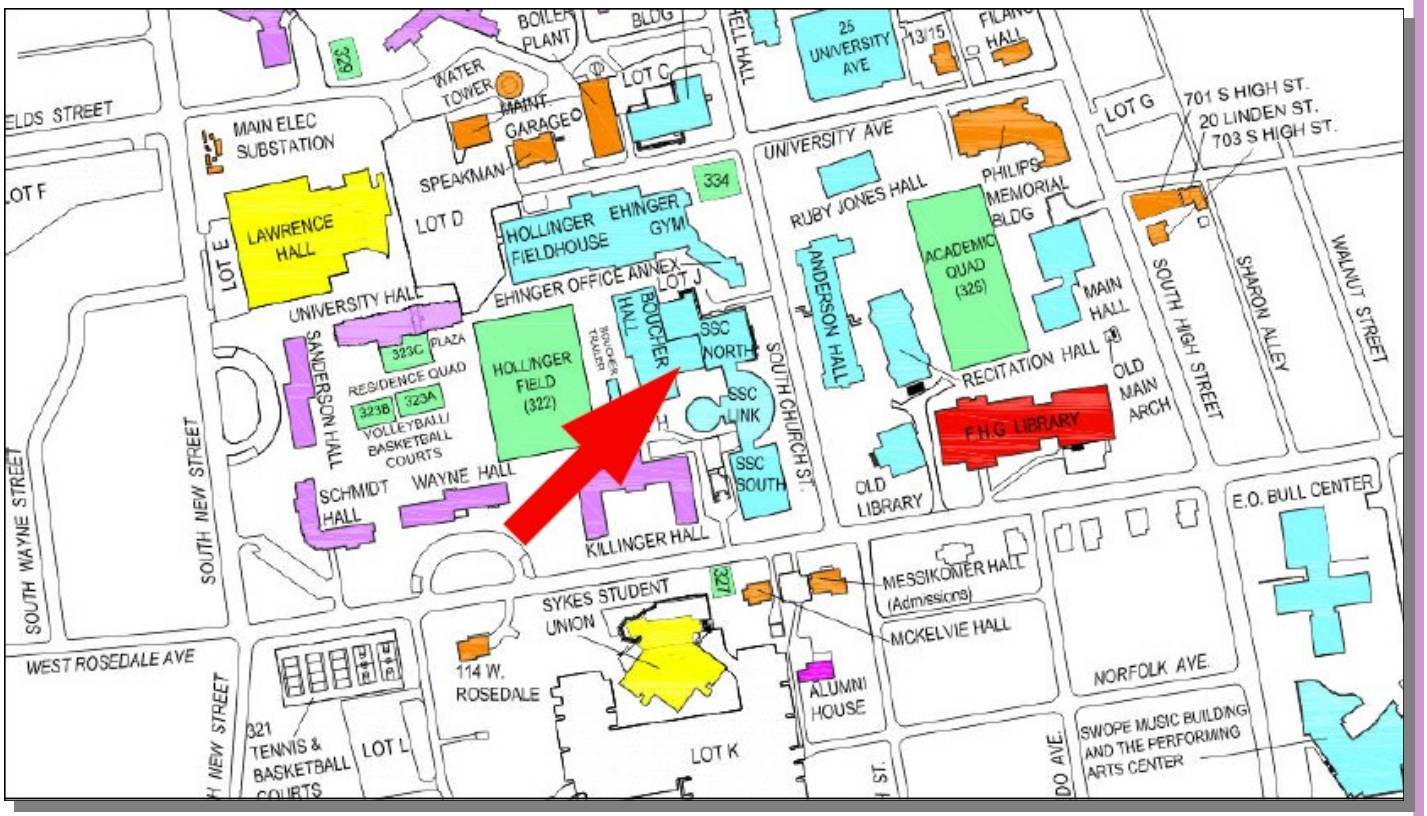
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 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 Quadrantid meteor shower peaks in the early morning hours of January 4th. This is the briefest meteor shower of the year, so if you want to see these shooting stars you need to go out after midnight and watch the skies. The waning crescent Moon won't cause much interference so this could be an excellent meteor shower.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

Dec. 2015 Financial Summary

Beginning Balance	$2,294
Deposits	$365
Disbursements	$60
Ending Balance	$2,599

New Member Welcome!

Welcome new CCAS member Andy Moynihan from West Chester. 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

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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.**