Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 24, No. 4 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *April 2016*

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Membership Renewals Due

04/2016	Hepler Imburgia Miller Richter Ruch
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M45, the Pleiades

Taken by Don Knabb in November with a Televue 127is and a Canon 7D DSLR. Image capture was with Maxim DL. This image is a stack of 5 exposures. The processing is only up through the black and white stage, not color. CCD Stack was used to process the image. There is a little nebulosity visible around some stars.

April 2016 Dates

7th • New Moon, 7:23 a.m.

10th • The Moon occults Aldebaran, beginning at 6:46 p.m. with the Sun still shining

13th • First Quarter Moon, 11:59 p.m.

22nd • Lyrid Meteor Shower Peaks.

22nd • Full Moon, 1:23 a.m.

29th • Last Quarter Moon, 11:28 p.m.

CCAS Upcoming Nights Out

CCAS has several special "nights out" scheduled over the next few months. Members are encouraged to help out during these events any way they can. See below for more information.

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

☼ **Saturday, April 9th, 2016** - Hoopes Park, West Chester. The observing session starts at sunset.

Winter/Spring 2016 Society Events

April 2016

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. Guest Speaker: Dr. Desik Narayana presents "How to Build the Brightest Galaxies."

15th • West Chester University Planetarium Show: "Jupiter, King of the Planets." 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 May 2016 edition of Observations.

21st-22nd • The von Kármán Lecture Series: CubSats: Big Goal, Tiny Package, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

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

May 2016

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. CCAS Member Speaker & NASA/JPL Solar Ambassador John Conrad presents " "Looking Really Deep (97% back to Big Bang) and Deeper (JWST and WFIRST)".

15th • West Chester University Planetarium Show: "Jupiter-King of the Planets." 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 June 2016 edition of Observations.

24th-25th • The von Kármán Lecture Series: Fire and Ice . . . and Methane – Exploring Mars and Titan using laboratory and field analogues on Earth, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

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

Minutes from the March 8, 2016, Society Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor, CCAS president, welcomed 34 members and guests to the March 8, 2016 meeting of CCAS.
- Roger presented the Astronomical League Arp 100 astrophotography pin to David Hockenberry. He is the 33rd person to earn this award for photographing 100 Arp objects.
- Don Knabb, observing chair, reminded group members to sign up for the CCAS Yahoo user group that is being hosted by Pete Kellerman.
- Don presented the night sky in March with Sky Safari Pro.
- Chester County Night School Astronomy Classes given by CCAS members have resumed on March 7, 2016 for the Spring session. Members are invited to assist in teaching the classes.
- The next star party will be held at Bucktoe Preserve about 5 miles south of Kennett Square on Saturday, March 12, 2012.
- Don also showed the group examples of Astronomical League pins and explained some of the pins that many clubs members may be qualified to earn already by participation in club activities.
- David Hockenberry, program chair, introduced Dennis O'Leary, one of our NASA Solar System Ambassadors who presented "New Horizon" the Pluto Flyby. The time line of the New Horizon's history, the instrumentation of the New Horizon vehicle, and the photos and findings reported to date were presented. Additional information can be found at. http://pluto.jhuapl.edu or http://www.nasa.gov/newhorizons.

April 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on April 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. Our guest speaker is Dr. Desik Narayana presents "How to Build the Brightest Galaxies."

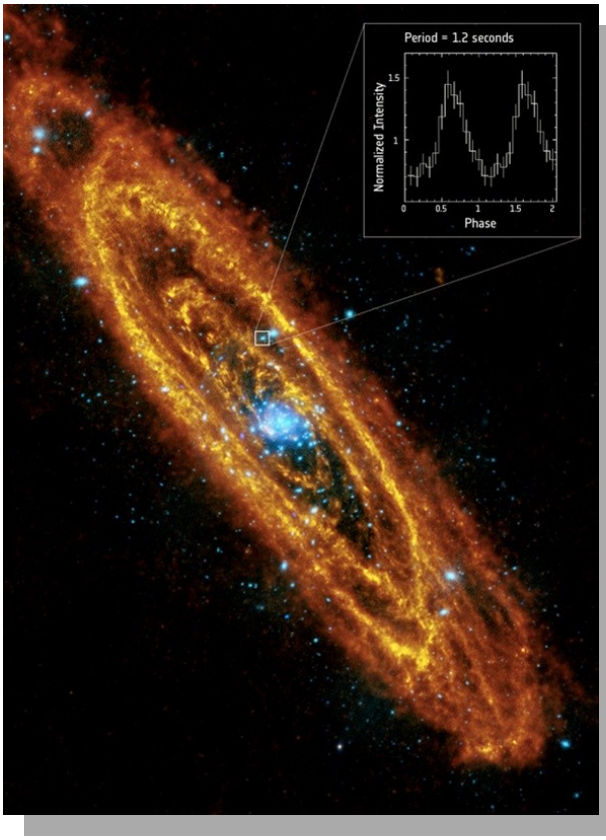
Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

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

Andromeda's First Spinning Neutron Star Has Been Found

by ESA, Noordwijk, Netherlands, Courtesy of Astronomy Magazine

Andromeda (M31) is a popular target among astronomers. Under clear dark skies, it is even visible to the naked eye. Its proximity and similarity in structure to our spiral galaxy, the Milky Way, make it an important natural laboratory for astronomers. It has been extensively studied for decades by telescopes covering the whole electromagnetic spectrum. Despite the galaxy being extremely well studied, one particular class of object had never been detected — spinning neutron stars.



Andromeda: ESA/Herschel/PACS/SPIRE/J. Fritz, U. Gent/XMM-Newton/EPIC/W. Pietsch, MPE; data: P. Esposito et al. (2016)

Neutron stars are the small and extraordinarily dense remains of a once-massive star that exploded as a powerful supernova at the end of its natural life. They often spin rapidly and can sweep regular pulses of radiation towards Earth, like a lighthouse beacon appearing to flash on and off as it rotates.

These "pulsars" can be found in stellar couples, with the neutron star cannibalizing its neighbor. This can lead to the neutron star spinning faster and to pulses of high-energy X-rays from hot gas being funneled down magnetic fields onto the neutron star.

Binary systems hosting a neutron star like this are quite common in our galaxy, but regular signals from such a pairing had never before been seen in Andromeda.

Now, astronomers systematically searching through the archives of data from XMM-Newton X-ray telescope have uncovered the signal of an unusual source fitting the bill of a fast-spinning neutron star. It spins every 1.2 seconds, and appears to be feeding on a neighboring star that orbits it every 1.3 days.

We were expecting to detect periodic signals among the brightest X-ray objects in Andromeda, in line with what we already found during the 1960s and 1970s in our galaxy," said Gian Luca Israel from INAF-Osservatorio Astronomica di Roma, Italy. "But persistent bright X-ray pulsars like this are still somewhat peculiar, so it was not completely a sure thing we would find one in Andromeda.

"We looked through archival data of Andromeda spanning 2000–2013, but it wasn't until 2015 that we were finally able to identify this object in the galaxy's outer spiral in just two of the 35 measurements."

While the precise nature of the system remains unclear, the data imply that it is unusual and exotic. "It could be what we call a 'peculiar low-mass X-ray binary pulsar' — in which the companion star is less massive than our Sun — or alternatively an intermediate-mass binary system with a companion of about two solar masses," said Paolo Esposito of INAF-Istituto di Astrofisica Spaziale e Fisica Cosmica, Milan, Italy. "We need to acquire more observations of the pulsar and its companion to help determine which scenario is more likely."

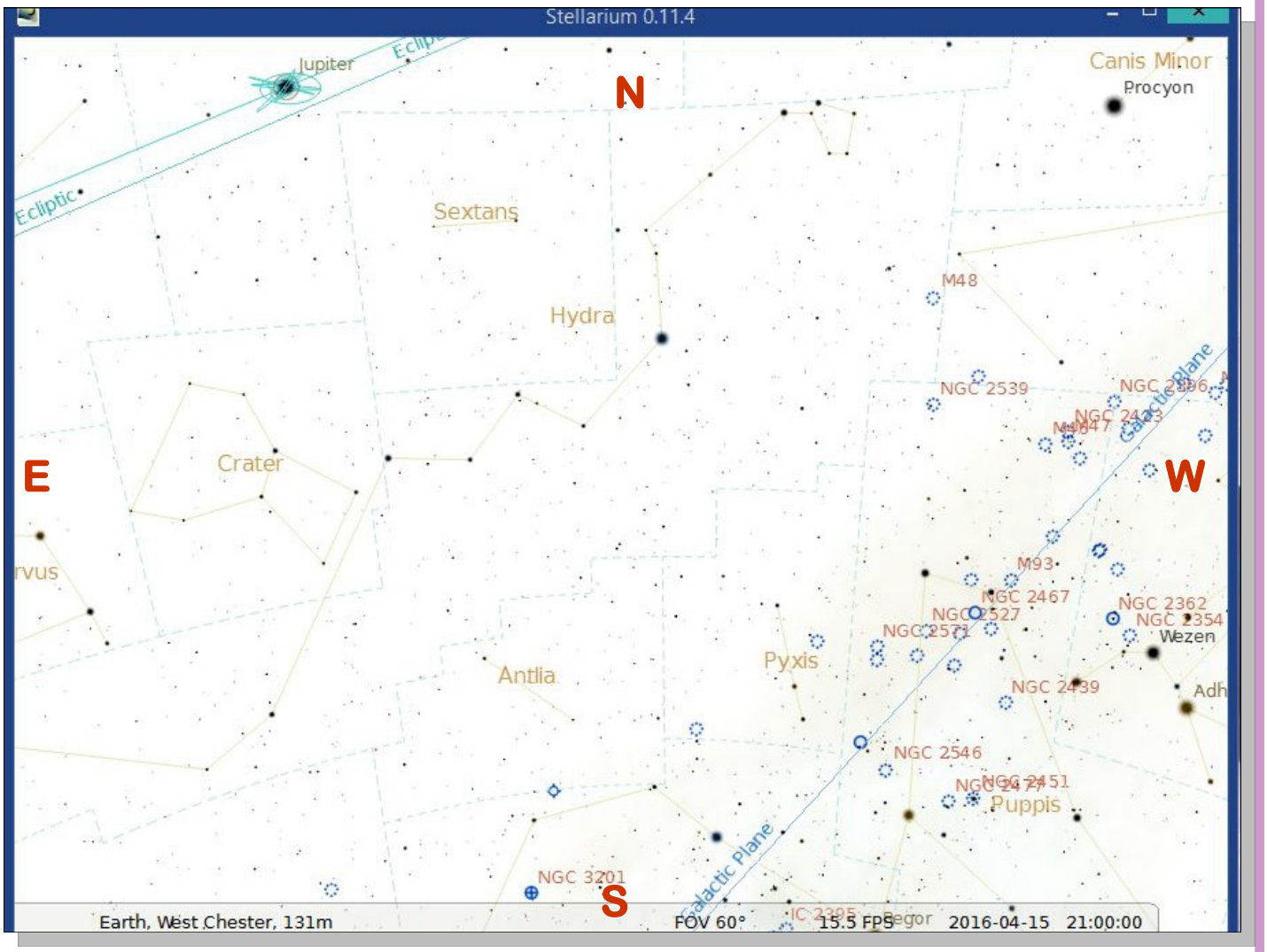
"The well-known Andromeda galaxy has long been a source of exciting discoveries, and now an intriguing periodic signal has been detected by our flagship X-ray mission," added Norbert Schartel from the European Space Agency (ESA).

"We're in a better position now to uncover more objects like this in Andromeda, both with XMM-Newton and with future missions such as ESA's next-generation high-energy observatory, ATHENA."

The Sky Over Chester County

April 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
4/01/2016	6:17 a.m. EST	6:44 a.m. EDT	7:25 p.m. EDT	7:53 p.m. EDT	12h 41m 30s
4/15/2016	5:54 a.m. EDT	6:22 a.m. EDT	7:40 p.m. EDT	8:08 p.m. EDT	13h 17m 24s
4/30/2016	5:32 a.m. EDT	6:01 a.m. EDT	7:55 p.m. EDT	8:24 p.m. EDT	13h 53m 19s

Moon Phases					
New Moon	4/07/2016	7:23 a.m. EDT	First Quarter	4/13/2016	11:59 p.m. EDT
Full Moon	4/22/2016	1:23 a.m. EDT	Last Quarter	4/29/2016	11:28 p.m. EDT

April 2016 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

7	**New Moon**
10	**The Moon occults Aldebaran, beginning at 6:46 p.m. with the Sun still shining**
13	**First Quarter Moon**
17	**The Moon is near Jupiter**
18	**Mercury is at greatest elongation**
22	**Full Moon, the Full Pink Moon**
22	**The Lyrid meteors peak**
24	**The Moon, Saturn, Mars and Antares form a nice group in the late night sky**
29	**Last Quarter Moon**

The best sights this month: Mercury is at its best of 2016 during April, so don't miss this chance to add Mercury to your "life list". Then for an observing challenge try to see the crescent Moon occult Aldebaran in Taurus the Bull while the Sun still shines low in the west on April 10th.

Mercury: April is a great month to see Mercury! On the 18th Mercury reaches greatest elongation, so about 45 minutes after the Sun disappears from the sky look into the fading glow of the sunset. Binoculars will help you find this small planet.

Venus: Venus is nearly behind the Sun, so wait a few weeks until it emerges to see the "evening star".

Mars: Mars rises around 11 p.m. during April and can be seen to the east of the claws of Scorpius.

Jupiter: The king of the planets shines brightly nearly all night during April. On the 8th a star of the constellation Leo the Lion, Chi Leonis, approaches Jupiter and looks like a 5th Moon.

Saturn: Saturn follows Mars into the sky around 11:30 p.m. and is east of Scorpius.

Uranus and Neptune: The outer gas giants will not be in favorable viewing position for several months.

The Moon: Full moon is on April 22nd. 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.

The Moon has several events occurring during April. Most fun is an occultation of Aldebaran on April 10th. The Sun is still shining at 6:46 p.m. when the Moon occults Aldebaran, so you will need a telescope to see the Moon coming in front of Aldebaran. But we will be in the glow of twilight when Aldebaran emerges around 7:55 p.m.

Then on April 17th the Moon has a close encounter with Jupiter. Finally, late at night on April 24th the Moon, Saturn, Mars and Antares form a nice group in the late night sky.

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

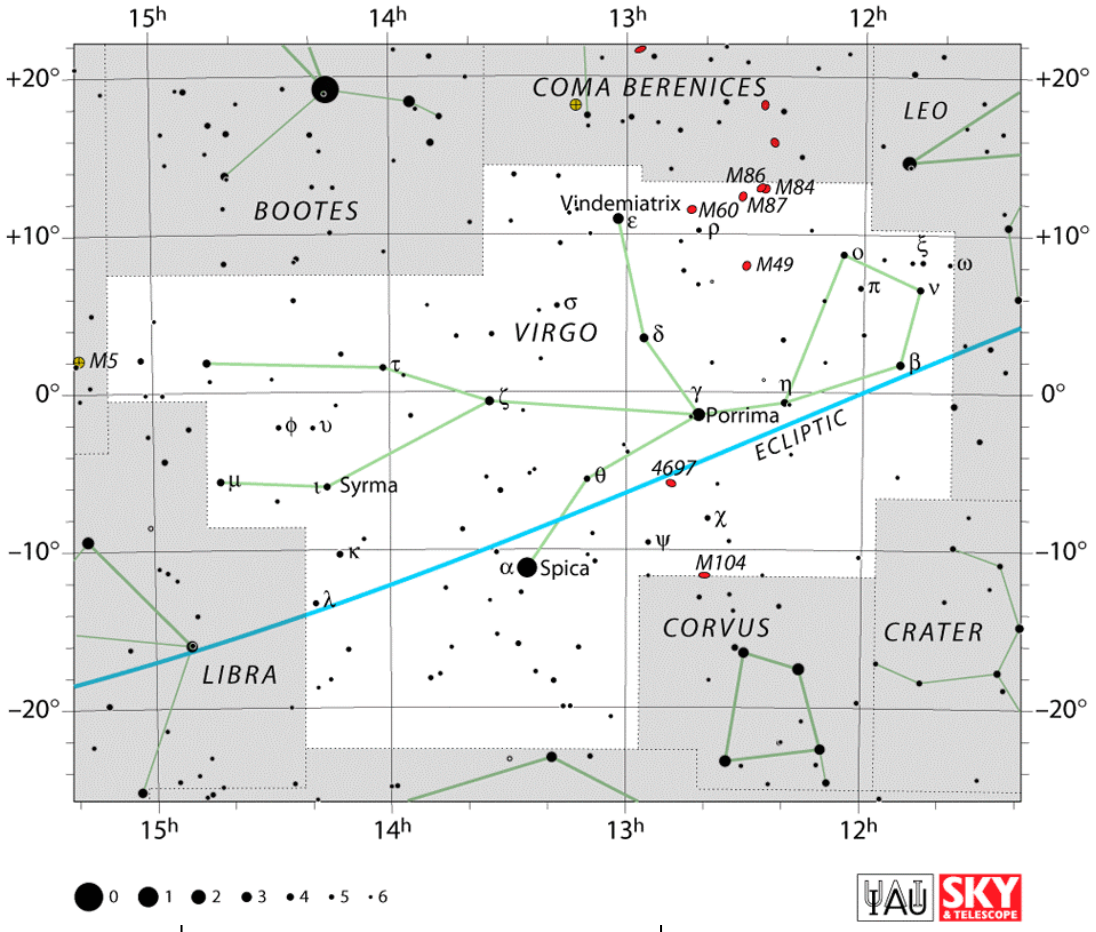
Comets: There are no bright comets in the sky during April.

Meteor showers: The Lyrid meteor shower occurs on the night of April 22/23. Expect up to 20 meteors per hour at the peak of the shower. This is not a good year to observe the Lyrid shower because the Full Moon occurs on the same night as the peak of the shower.

Through the Eyepiece: Markarian's Chain in the constellation Virgo

by Don Knabb, CCAS Treasurer & Observing Chair

The spring night sky brings a parade of galaxies into center stage not long after the sky becomes completely dark. The skies are not full of the humidity of summer so they are quite dark when the Moon is absent. And you'll need a dark sky to enjoy these faint fuzzies, but they are worth seeking out. So grab the largest telescope you can carry and aim your light bucket toward the constellation Virgo.



Virgo Constellation Map, by IAU and Sky &Telescope magazine, Creative Commons image

As you find these denizens of the deep sky, remember that they are much more distant than the stars of our home galaxy the Milky Way and the photons that hit your retina and travel to your brain have had a long journey indeed. So keep that in mind if they are faint and fuzzy and are best seen with averted vision.

We start our search for galaxies by looking between Arcturus in Boötes and the tail of Leo the Lion, the star Denebola. Here is a sky map you can use to guide your search:

For an observer with a moderate to large telescope, targets abound. You'll need to have some good quality star charts or a star chart app for your electronic device to make a definitive conclusion about what objects you are looking at because there are just so many galaxies in this area of the sky.

One of the most interesting things to see in this part of the sky is a group called Markarian's Chain. Markarian's Chain is a stretch of galaxies that forms part of the Virgo Cluster. It's called a "chain" because, when viewed from Earth, the galaxies lie along a smoothly curved line. It was named after the Armenian astrophysicist, B. E. Markarian, who discovered it in the mid-1970s. At least seven galaxies in the chain appear to move coherently, although others appear to be superposed by chance.

Here is an image of Markarian's Chain taken by CCAS member Dave Hockenberry. You can see how this group of galaxies got its name.

In the lower left corner of Dave's photo is M87. The two bright objects on the right, below center are M86 and M84, with M84 the one to the right. All these Messier objects are galaxies, as are most of the objects in the photograph that are not obviously stars. Very near center of the photo is a pair of

(Continued on page 7)

Eyepiece (cont'd)

Image credit: Dave Hockenberry, astrophotographer

(Continued from page 6)

galaxies called "The Eyes". These are the galaxies NGC 4435 and NGC 4438.

Markarian's Chain is part of the Virgo Cluster of galaxies. Our own Local Group of galaxies, the Milky Way, the large and small Magellanic Clouds, M31, M32, M100, M33, is currently receding from the Virgo Cluster at a rate of about 1000 km/second. However, it is anticipated that our Local Group will eventually stop receding from the Virgo Cluster and will ultimately accelerate towards this region because the gravity from the Virgo Cluster influences us even at distances of 70 million light years.

If we are lucky enough to have clear weather for our next BRC observing night, we should convince whoever brings the largest telescope to seek out Markarian's Chain!

Information sources:

http://en.wikipedia.org/wiki/Markarian%27s_Chain
http://seds.org/messier/more/virgo.html
http://www.starrywonders.com/markarian.html
http://www.cloudynights.com/item.php?item_id=1779
http://www.allaboutastro.com/markarianchain.html

Gravitational Wave Astronomy Will Be The Next Great Scientific Frontier

by Dr. Ethan Siegel

Imagine a world very different from our own: permanently shrouded in clouds, where the sky was never seen. Never had anyone see the Sun, the Moon, the stars or planets, until one night, a single bright object shone through. Imagine that you saw not only a bright point of light against a dark backdrop of sky, but that you could see a banded structure, a ringed system around it and perhaps even a bright satellite: a moon. That's the magnitude of what LIGO (the Laser Interferometer Gravitational-wave Observatory) saw, when it directly detected gravitational waves for the first time.

An unavoidable prediction of Einstein's General Relativity, gravitational waves emerge whenever a mass gets accelerated. For most systems -- like Earth orbiting the Sun -- the waves are so weak that it would take many times the age of the Universe to notice. But when very massive objects orbit at very short distances, the orbits decay noticeably and rapidly, producing potentially observable gravitational waves. Systems such as the binary pulsar PSR B1913+16 [the subtlety here is that binary pulsars may contain a single neutron star, so it's best to be specific], where two neutron stars orbit one another at very short distances, had previously shown this phenomenon of orbital decay, but gravitational waves had never been directly detected until now.

When a gravitational wave passes through an objects, it simultaneously stretches and compresses space along mutually perpendicular directions: first horizontally, then vertically, in an oscillating fashion. The LIGO detectors work by splitting a laser beam into perpendicular "arms," letting the beams reflect back and forth in each arm hundreds of times (for an effective path lengths of hundreds of km), and then recombining them at a photodetector. The interference pattern seen there will shift, predictably, if gravitational waves pass through and change the effective path lengths of the arms. Over a span of 20 milliseconds on September 14, 2015, both LIGO detectors (in Louisiana and Washington) saw identical stretching-and-compressing patterns. From that tiny amount of data, scientists were able to conclude that two black holes, of 36 and 29 solar masses apiece, merged together, emitting 5% of their total mass into gravitational wave energy, via Einstein's $E = mc^2$.

During that event, more energy was emitted in gravitational waves than by all the stars in the observable Universe combined. The entire Earth was compressed by less than the width of a proton during this event, yet

(Continued on page 10)

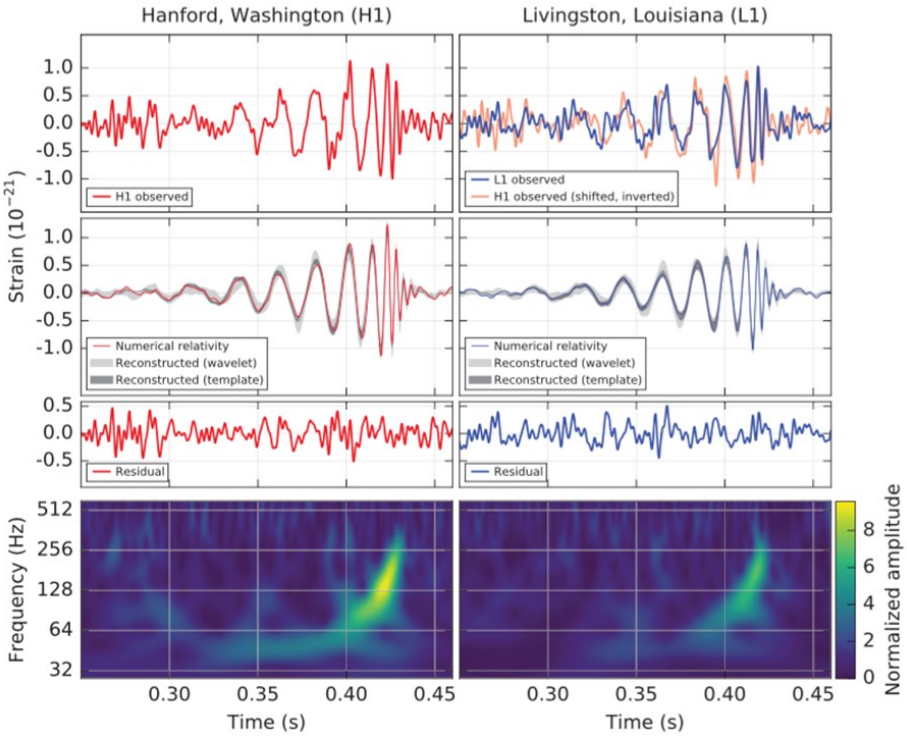


Image credit: Observation of Gravitational Waves from a Binary Black Hole Merger B. P. Abbott et al., (LIGO Scientific Collaboration and Virgo Collaboration), Physical Review Letters 116, 061102 (2016). This figure shows the data (top panels) at the Washington and Louisiana LIGO stations, the predicted signal from Einstein's theory (middle panels), and the inferred signals (bottom panels). The signals matched perfectly in both detectors.

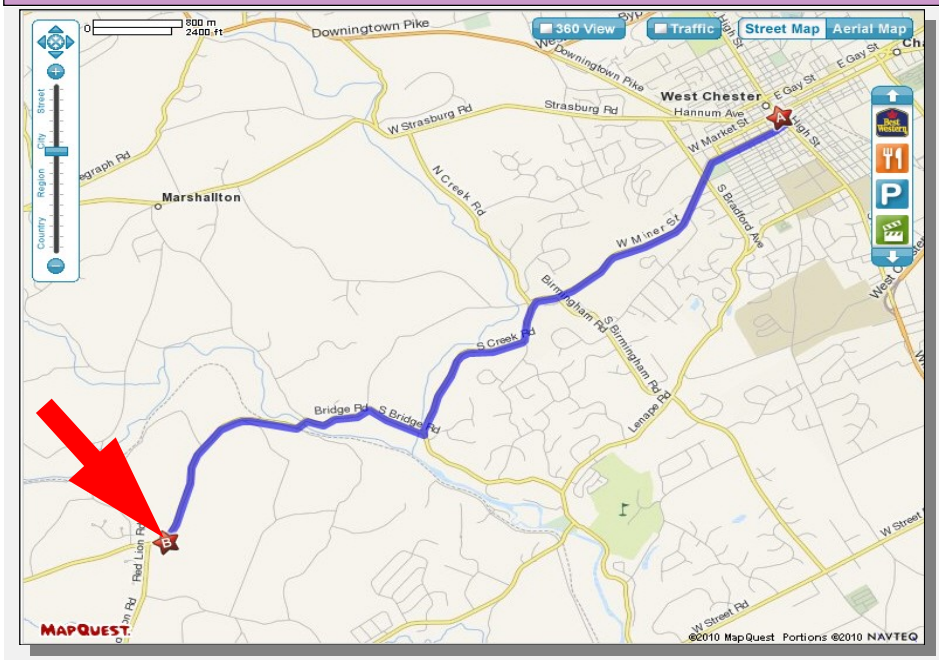
CCAS Program Chair Earns Astronomical League Award

by Roger Taylor, CCAS President

Roger Taylor & Dave Hockenberry

CCAS Program Chair Dave Hockenberry was presented the Arp Peculiar Galaxy (Northern) Observing Award at the March 8th meeting. The Arp award is based on the 338 objects found in the Arp Catalog of Peculiar Galaxies. A challenging for amateur astronomers, one hundred of the 338 Arp galaxies must be observed or imaged to qualify for the Program's certificate and pin. Dave is only the 33rd amateur astronomer in the Astronomical League to earn the award. It was named in honor of Halton C. Arp, one of the leaders in the contemporary debate on the origin and evolution of galaxies in the universe. To learn more about the award, visit https://www.astroleague.org/al/obsclubs/arppec/arppec.html

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.

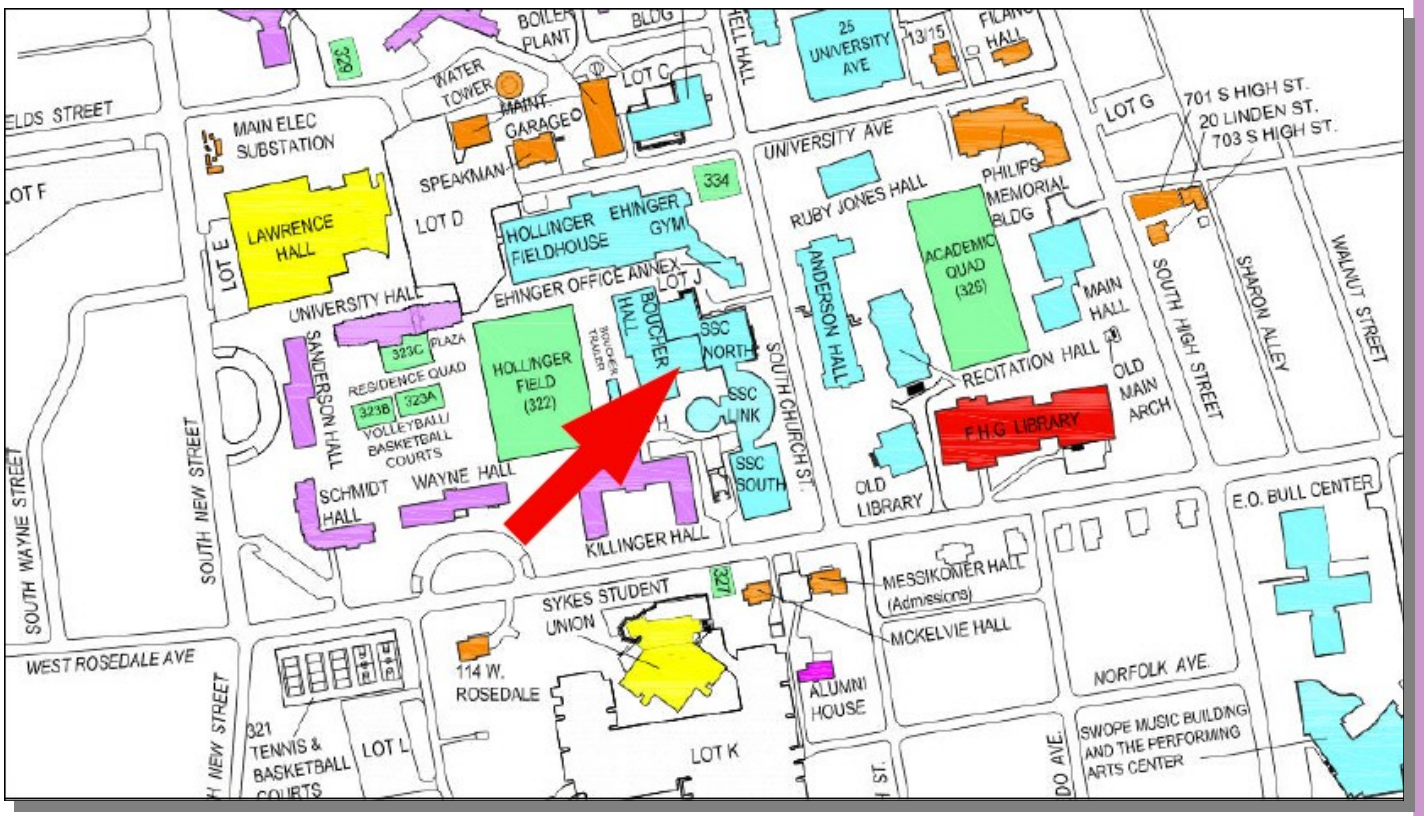
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route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



Space Place (Cont'd)

(Continued from page 8)

thanks to LIGO's incredible precision, we were able to detect it. At least a handful of these events are expected every year. In the future, different observatories, such as NANOGrav (which uses radiotelescopes to the delay caused by gravitational waves on pulsar radiation) and the space mission LISA will detect gravitational waves from supermassive black holes and many other sources. We've just seen our first event using a new type of astronomy, and can now test black holes and gravity like never before.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

March 2016 Financial Summary

Beginning Balance	$2,852
Deposits	$195
Disbursements	$168
Ending Balance	$2,879

New Member Welcome!

Welcome new CCAS member Jim Fulton from Exton, 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

PENNSYLVANIA OUTDOOR LIGHTING COUNCIL

The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

http://www.POLCouncil.org

Find out about Lyme Disease!

Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

http://www.LymePA.org

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

Good Outdoor Lighting Websites

One of the biggest problems we face in trying to reduce light pollution from poorly designed light fixtures is easy access to good ones. When you convince someone, a neighbor or even yourself, to replace bad fixtures, where do you go for good lighting fixtures? Check out these sites and pass this information on to others. Help reclaim the stars! And save energy at the same time!

Starry Night Lights

Light pollution from poor quality outdoor lighting wastes billions of dollars and vast quantities of valuable natural resources annually. It also robs us of our heritage of star-filled skies. Starry Night Lights is committed to fighting light pollution. The company offers the widest selection of ordinance compliant, night sky friendly and neighbor friendly outdoor lighting for your home or business. Starry Night Lights is located in Park City, Utah.

Phone: **877-604-7377**
Fax: **877-313-2889**

http://www.starrynightlights.com

★ ★ ★ ★ ★

LIGHTHOUSE OUTDOOR LIGHTING

Lighthouse Outdoor Lighting is a dedicated lifetime corporate member of the International Dark-Sky Association. Lighthouse's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Phone: **484-291-1084**

https://www.lighthouse-lights.com/landscape-lighting-design/pa-west-chester/

Local Astronomy-Related Stores

Listing retail sites in this newsletter does not imply endorsement of any kind by our organization. This information is provided only as a service to our members and the general public.

Skies UNLIMITED

Skies Unlimited is a retailer of telescopes, binoculars, eyepieces and telescope accessories from Meade, Celestron, Televue, Orion, Stellarvue, Takahashi, Vixen, Losmandy and more.

Skies Unlimited
Suburbia Shopping Center
52 Glocker Way
Pottstown, PA 19465

Phone: **610-327-3500** or **888-947-2673**
Fax: **610-327-3553**

http://www.skiesunlimited.net

★ ★ ★ ★ ★

Spectrum Scientifics
Quality Science Products for All Ages

Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

4403 Main Street
Philadelphia, PA 19127

Phone: **215-667-8309**
Fax: **215-965-1524**

Hours:
Tuesday thru Saturday: 10AM to 6PM
Sunday and Monday: 11AM to 5PM

http://www.spectrum-scientifics.com

CCAS Information Directory

CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: **newsletter@ccas.us**

Or mail the contribution, typed or handwritten, to:

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.**