Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 24, No. 5 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *May 2016*

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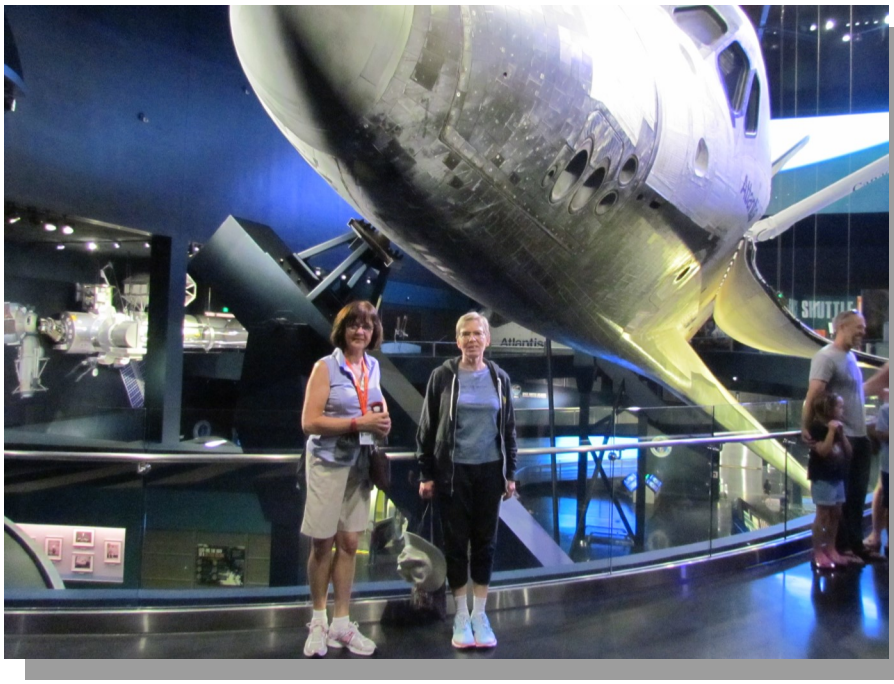
Membership Renewals Due

05/2016	Cunningham Fletcher LaFrance Lapp
06/2016	Hanspal Hebding Panger
07/2016	Johnston Piehl

Kennedy Space Center Visit



Kathy Buczynski & Barb Knabb at the Space Shuttle Atlantis at the Kennedy Space Center. Image: Don Knabb

May 2016 Dates

5th • Eta Aquariid Meteor Shower Peaks.

6th • New Moon, 3:29 p.m.

9th • Transit of Mercury, 7:12 a.m. to 2:42 p.m.

13th • First Quarter Moon, 1:02 p.m.

21st • Full Moon, 5:14 p.m.

29th • Last Quarter Moon, 8:11 a.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, May 6th, 2016** - CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

☼ **Saturday, May 14th, 2016** - CCAS Special Observing Session celebrating Astronomy Day, Anson Nixon Park, Kennett Square, PA. For more information, contact our Observing Chair, Don Knabb.

Spring/Summer 2016 Society Events

May 2016

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.

6th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

9th • Transit of Mercury. See this rare event in its entirety from 7:12 a.m. until 2:42 p.m. Never observe the Sun directly, use a solar filter on a telescope or special eclipse glasses for unmagnified observation.

10th • 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)".

14th • CCAS Special Observing Session celebrating Astronomy Day, Anson Nixon Park, Kennett Square, PA. For more information, contact our Observing Chair, Don Knabb.

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.

June 2016

1st • 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.

3rd • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

16th-17th • The von Kármán Lecture Series: 2015-2016 El Niño Winter and California Water: What did we see from space?, 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 July 2016 edition of Observations.

21st • Summer Equinox, 12:24 a.m. First day of summer.

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

Minutes from the April 12, 2016, Society Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor welcomed 23 members and guests to the April12, 2016 meeting of CCAS.
- Pete Kellerman proposed to club members that we organize a club observing star party at an observing field in New Ringold, PA, for this summer.
    - No date has been set but if there is sufficient interest he would pursue setting a date, securing the site, and exploring lodging options.
- Don Knabb reminded members that the next club observing at BVA/BRC is Friday, May 5, 2016.
- Spring Astronomy Day is on Saturday, May 14. CCAS will be celebrated with a community star party at Anson Nixon Park in Kennett Square, PA.
- Don then shared the highlights of the night sky for the month of April with the Sky Safari App. The transit of Mercury will occur on Monday, May 9, 2016 around 9 a.m. Reminder: never observe the Sun directly; use a solar filter on a telescope or special eclipse glasses for unmagnified observation.
- David Hockenberry introduced our guest speaker for the evening, Dr Desika Narayanan, Assistant Professor of Astronomy at Haverford College.
    - Dr. Narayanan spoke to our membership on "How to Make the Brightest Galaxies in the Universe" using computational astrophysics to model star and galaxy formation.

May 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

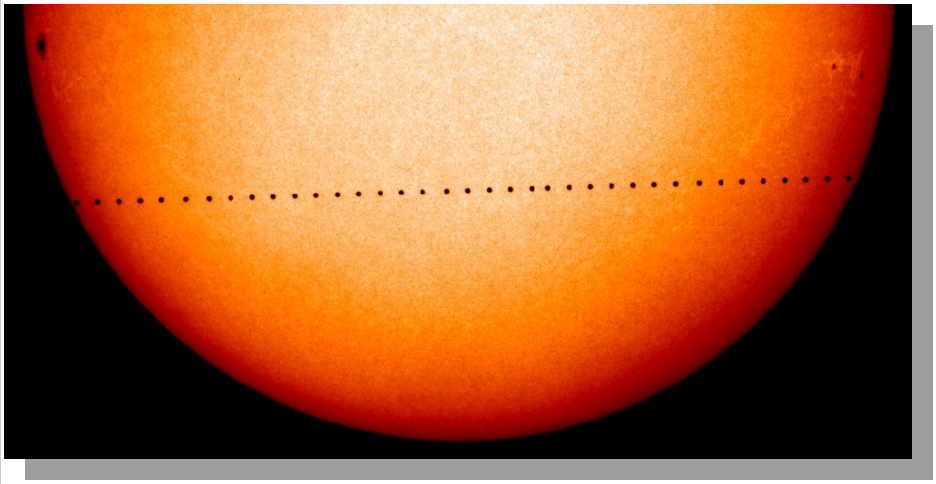
Our next meeting will be held on May 10, 2016, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. Our speaker is CCAS member and NASA/JPL Solar System Ambassador, John Conrad, who will present "Looking Really Deep (97% back to Big Bang) and Deeper (JWST and WFIRST)."

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.

Watch Mercury's Transit Online via Slooh.com

by John Wenz, Courtesy of Astronomy Magazine



A 2006 NASA photo of a Mercury transit as seen from Earth.

[Editor's Note: I wrote an article about Slooh several years ago after my brother gave me a membership as a Christmas present.]

On Monday, May 9, 2016, a rare event will take place: Mercury will transit across the face of the sun. Similar to the way we see exoplanets, Earth observers will be able to see dips in light as the tiny planet makes its way across the face of the sun, blotting out just a fraction of starlight.

Slooh Observatory, a group of remote operated telescopes, will be livestreaming the event online. The event starts at 7 a.m. EDT Monday and will run for an astounding seven hours. Observing a Mercury transit from Earth only happens a few times per century, and requires specialized equipment to capture in order not to damage either your eyes or the telescope. Slooh will also feature expert guests in its coverage of the event.

The observatory is encouraging viewers to submit their own pictures of the event, though we caution that staring directly at the sun, especially through a telescope, can damage your eyes or even lead to blindness. Check out the 2006 article from Phil Harrington on observing the bright stuff. Erika Rix also gave a rundown on observing the transit in the March 2016 issue of Astronomy magazine.

The Mercury transit is rare, because Mercury's orbit is tilted 7° to the ecliptic. The last one was in 2006, and the next one won't be until 2019. NASA has a schedule up of other dates, past and present.

You can go to Slooh.com to join and watch this live broadcast, snap and share your own photos during the event, chat with audience members and interact with the hosts, and personally control Slooh's telescopes.

The Slooh broadcast will also be accessible at Astronomy.com.

Safe Solar Observing Options

abridged from an article on Sky & Telescope.

It's easy to learn how to look at the sun as there are several right ways; however, there are also many wrong ways to view it. The danger is obvious: its disk is so bright that prolonged, direct exposure can cause permanent damage to the retina, leading to loss of vision or blindness. To observe the Sun safely, you need to filter out more than 99% of the Sun's light before it reaches your eyes.

Given these caveats, this article offers some practical advice on how to look at the sun to safely observe sunspots and solar eclipses alike.

There are numerous ways you can observe the beauty of the Sun with complete confidence that nothing bad will happen to your eyes. If you're observing the Sun without any optical aid, all you really need are low-cost solar observing glasses from companies such as Rainbow Symphony.

Alternatively, you can go to a welding-supply store and buy a piece of #14 arcwelder's glass, which reduces sunlight enough for safe direct naked-eye viewing.

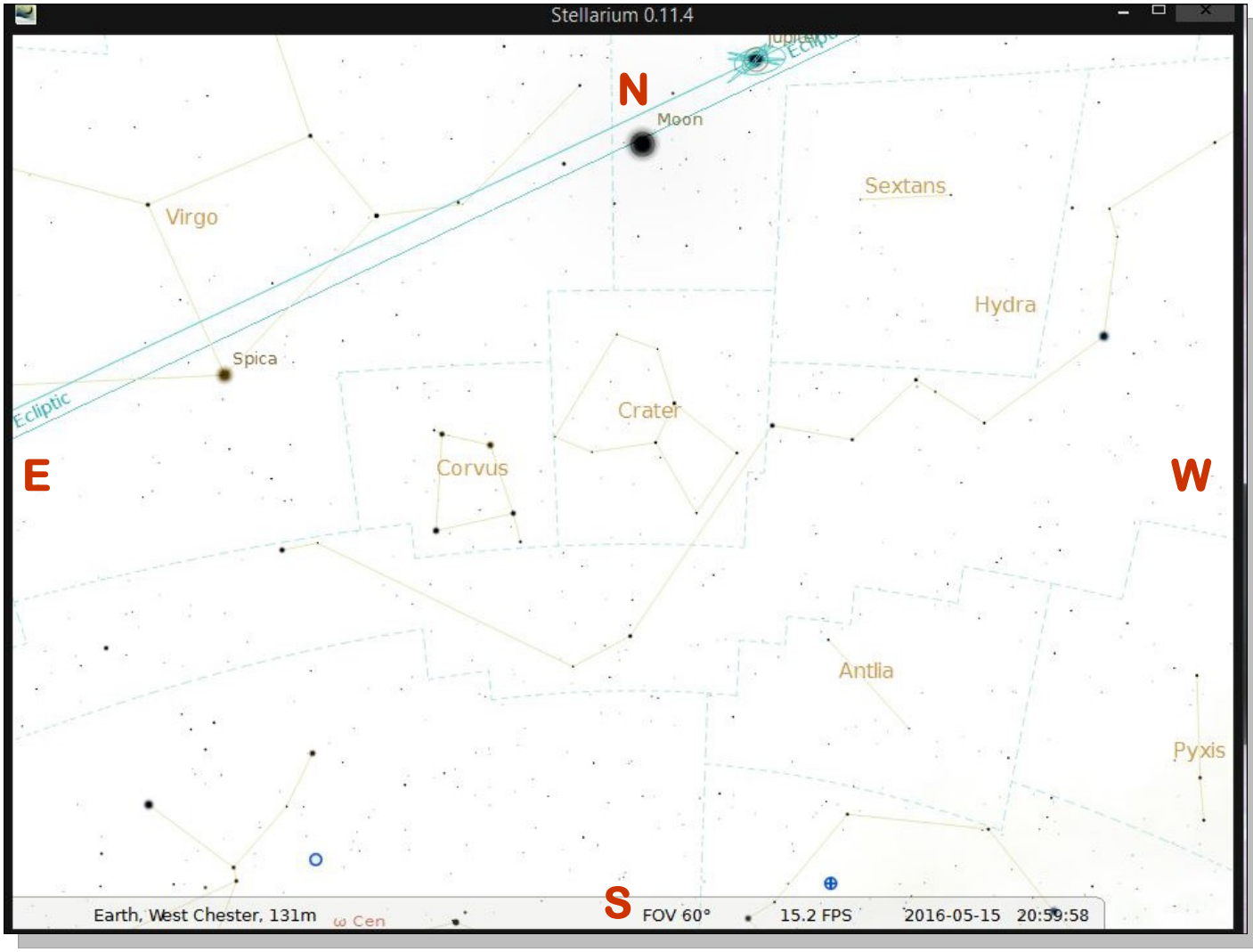
But no matter what, do not use "filters" such as smoked glass, stacked sunglasses, polarized filters, camera filters, candy wrappers, or compact discs. They might reduce the Sun's glare, but enough harmful radiation can sneak through to dam-

(Continued on page 7)

The Sky Over Chester County

May 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
5/01/2016	5:31 a.m. EDT	6:00 a.m. EDT	7:56 p.m. EDT	8:25 p.m. EDT	13h 55m 34s
5/15/2016	5:14 a.m. EDT	5:45 a.m. EDT	8:09 p.m. EDT	8:40 p.m. EDT	14h 24m 22s
5/31/2016	5:02 a.m. EDT	5:34 a.m. EDT	8:23 p.m. EDT	8:55 p.m. EDT	14h 48m 39s

Moon Phases					
New Moon	5/06/2016	3:29 p.m. EDT	First Quarter	5/13/2016	1:02 p.m. EDT
Full Moon	5/21/2016	5:14 p.m. EDT	Last Quarter	5/29/2016	8:11 a.m. EDT

May 2016 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

5	**The Eta Aquariid meteor shower peaks**
6	**New Moon**
7	**Two moon shadows are visible on Jupiter**
9	**Transit of Mercury across the Sun**
13	**First Quarter Moon and the Lunar X is visible**
14	**International Astronomy Day**
21	**Full Moon, the Full Flower Moon, with Mars, Saturn and Antares nearby**
22	**Mars is at opposition**
29	**Last Quarter Moon**
30	**Mars is the closest to Earth and largest in a telescope**

The best sights this month: The transit of Mercury is the highlight of May! We can see this rare event in its entirety from 7:12 a.m. until 2:42 p.m. As always, never observe the Sun directly, use a solar filter on a telescope or special eclipse glasses for unmagnified observation. Beyond the transit of Mercury, we are treated to three bright planets at reasonable viewing hours; Jupiter is high in the sky just after sunset while Mars and Saturn rise well before midnight.

Mercury: Other than during the transit, Mercury is not observable during May.

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

Mars: During May the red planet shines brighter than it has for 10 years and is more than 18" across in a telescope. Mars reaches opposition on May 22nd and will be visible most of the night as it rises about an hour after sunset. It is highest in the sky in the hours after midnight, so take a good look on May 30th when it is at closest approach to Earth. At its brightest, Mars will shine as bright as mighty Jupiter!

Jupiter: Although it is getting smaller and less bright, Jupiter still puts on an excellent show during May. I enjoyed watching the Great Red Spot move across the planet in mid-April.

Saturn: The ringed planet rises about an hour after Mars and forms a triangle with Mars and Antares all month. Saturn is about the same size as Mars in a telescope, but is not nearly as bright due to its 7 times greater distance from the Sun.

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

The Moon: Full Moon is on May 21st, when it will form nearly a rectangle with Mars, Saturn and Antares. Native Americans called this the Full Flower Moon. In most areas, flowers are abundant everywhere during this time, thus, the name of this Moon. Other names include the Full Corn Planting Moon, or the Milk Moon.

Lunar X Alert – The famous Lunar X will be visible on the evening of May 13th!

Constellations: This is a great time of year to look high overhead at the Big Dipper and find all of Ursa Major, the Big Bear. Leo the Lion is still high in the sky as darkness falls, but he seems to be running away from Hercules as he is rising in the east. And bright Arcturus in Boötes shines like a beacon in the southeast. Boötes and Hercules are well placed for viewing by the time it is really dark and an hour or two later the summer triangle is rising in the east. And if we have a good dark sky the Milky Way can be seen in Cygnus. Aim your telescope there and gaze into an eyepiece full of stars!

Messier/deep sky: Oh joy, its globular cluster time again! M3 is high overhead during May. Take a look at the glow of 500,000 stars in your eyepiece! And stay up a bit later as M13, the Great Globular Cluster in Hercules rises in the east. M13 contains several hundred thousand stars, perhaps a million!

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

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Through the Eyepiece: M13, the Great Globular Cluster in Hercules

by Don Knabb, CCAS Treasurer & Observing Chair

As we go from spring toward summer, we see the constellation Hercules rising in the east as late spring evenings darken. Hercules contains one of the most looked at and beautiful objects visible from the Northern Hemisphere, M13, the Great Globular Cluster. To find M13, first find "the Keystone", an asterism in Hercules. M13 is along one side of the keystone of Hercules.

Even modest telescopes show M13 as a blazing ball of stars. With a medium sized telescope, the outer edges can be resolved into its member stars. On the top of page 7 there is an image of M13 recently taken with an 80mm refractor and a digital single lens reflex camera.
On the bottom of page 7 there is an image taken by the Hubble Space Telescope of the center portion of M13.

The Great Globular Cluster was discovered by Edmond Halley in 1714. Messier, when he cataloged this object as M13 in 1764, described it as a "nebula containing no stars". It is difficult to determine the exact number of stars, especially in the central core where they are most numerous, but 30,000 stars have actually been counted and estimates are that the cluster contains approximately one million stars. The total luminosity of M13 is over 300,000 times that of the Sun and the total mass is equal to perhaps half a million Suns. The brightest members of the cluster are red giants, each as bright as 2,000 Suns.

A globular cluster is a spherical collection of stars that orbits a galaxy as a satellite. They can contain anywhere from ten thousand to a million stars. These stars orbit the collective center of mass of the cluster in a veritable bee hive of motion, and the cluster itself orbits the Milky Way as a distinct object, occasionally plunging right through the main disk and out the other side. Although the cluster appears extremely dense, the distance between individual stars is actually quite large. As a result, stars within them rarely collide, and globular clusters survive relatively unscathed by their passage through the galaxy's disk.

Star map generated with Stellarium, the free planetarium software

Globular cluster M13 was selected in 1974 as target for one of the first radio messages addressed to possible extra-terrestrial intelligent races. The message was sent by the big radio telescope of the Arecibo Observatory.

For the best view of M13, wait until Hercules is high in the sky on a night when the Moon is absent from the sky. You will be amazed by the depth and complexity of this globular cluster.

Information credits:
Dickinson, Terence 2006. Nightwatch: a practical guide to viewing the universe. Buffalo, NY. Firefly Books
http://messier.seds.org/m/m013.html
https://en.wikipedia.org/wiki/Messier_13
http://astropixels.com/globularclusters/M13-01.html

Eyepiece (cont'd)

Image credit: By Joshborup - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=47509295

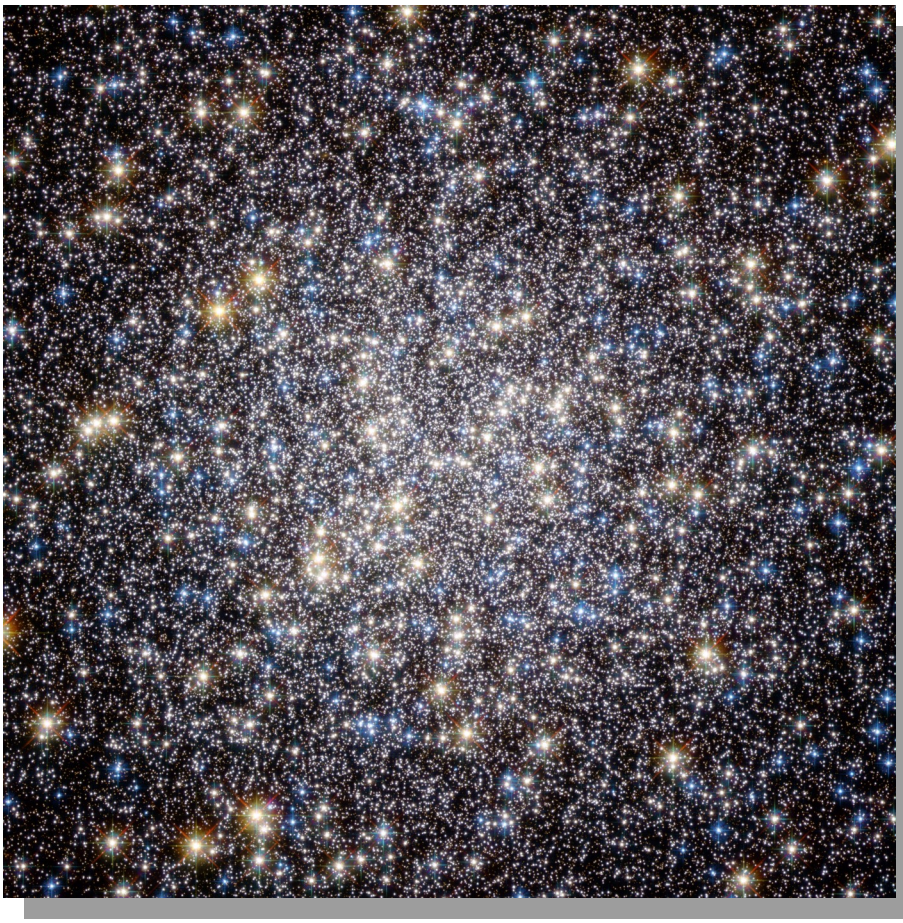


Image credit: By IAU and Sky & Telescope magazine (Roger Sinnott & Rick Fienberg) - [1], CC BY 3.0, https://commons.wikimedia.org/w/index.php?curid=15407421

Solar Viewing (Cont'd)

(Continued from page 3)

age your eyes. Only use materials specifically manufactured for safe solar viewing or #14 arcwelder's glass. The simplest safe method of looking at the sun is to watch the Sun's image projected onto a piece of paper.

Poke a small hole in an index card with a pencil point, face it toward the Sun, and hold a second card three or four feet behind it in its shadow. The hole will project a small image of the Sun's disk onto the lower card. This technique is especially useful during solar eclipses: the projected image will show all the phases of the eclipse, just as the real Sun does. Experiment with different size holes. A large hole makes the image bright but fuzzy; a small hole makes it dim but sharp.

For a better view, you can reduce the amount of daylight shining on the viewing card by enclosing it in a long box. This lets you use a small pinhole giving a sharp image.

If you want to show the Sun to many people at the same time, you can use binoculars or a small telescope to project an image of the Sun onto a screen or white sheet of paper (almost any flat surface will suffice).

If you have binoculars, attach them securely to a camera tripod and cover one side. Point the other, uncovered side toward the Sun — but don't look into the eye end! Instead, let the sunlight fall onto a card behind the eye-end lens. A close-in card gives a brighter but small-

(Continued on page 9)

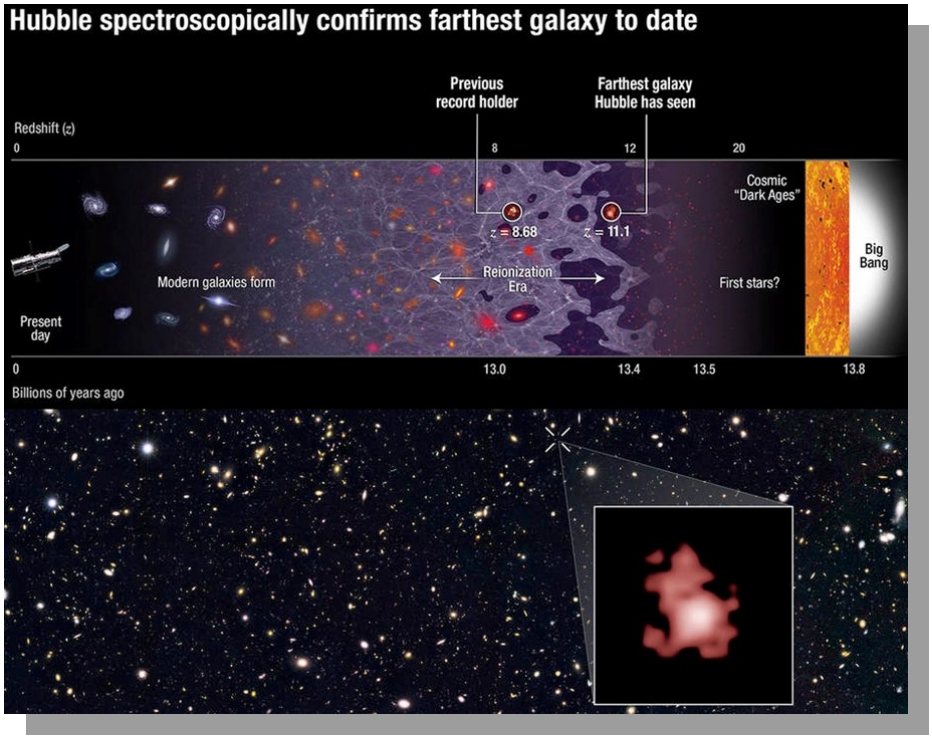
Hubble Shatters The Cosmic Record For Most Distant Galaxy

by Dr. Ethan Siegel

The farther away you look in the distant universe, the harder it is to see what's out there. This isn't simply because more distant objects appear fainter, although that's true. It isn't because the universe is expanding, and so the light has farther to go before it reaches you, although that's true, too. The reality is that if you built the largest optical telescope you could imagine -- even one that was the size of an entire planet -- you still wouldn't see the new cosmic record-holder that Hubble just discovered: galaxy GN-z11, whose light traveled for 13.4 billion years, or 97% the age of the universe, before finally reaching our eyes.

There were two special coincidences that had to line up for Hubble to find this: one was a remarkable technical achievement, while the other was pure luck. By extending Hubble's vision away from the ultraviolet and optical and into the infrared, past 800 nanometers all the way out to 1.6 microns, Hubble became sensitive to light that was severely stretched and redshifted by the expansion of the universe. The most energetic light that hot, young, newly forming stars produce is the Lyman-α line, which is produced at an ultraviolet wavelength of just 121.567 nanometers. But at high redshifts, that line passed not just into the visible but all the way through to the infrared, and for the newly discovered galaxy, GN-z11, its whopping redshift of **11.1** pushed that line all the way out to 1471 nanometers, more than double the limit of visible light!

Hubble itself did the follow-up spectroscopic observations to confirm the existence of this galaxy, but it also got lucky: the only reason this light was visible is because the region of space between this galaxy and our eyes is mostly ionized, which *isn't true* of most locations in the universe at this early time! A redshift of 11.1 corresponds to just 400 million years after the Big Bang, and the hot radiation from young stars doesn't ionize the majority of the universe until 550 million years have passed. In most directions, this galaxy would be invisible, as the neutral gas would block this light, the same way the light from the center of our galaxy is blocked by the dust lanes in the galactic plane. To see farther back, to the universe's first true galaxies, it will take the James Webb Space Telescope. Webb's infrared eyes are much less sensitive to the light-extinction caused by neutral gas than instruments like Hubble. Webb may reach back to a redshift of 15 or even 20 or more, and discover the true answer to one of the universe's greatest mysteries: when the first galaxies came into existence!



Images credit: (top); NASA, ESA, P. Oesch (Yale University), G. Brammer (STScI), P. van Dokkum (Yale University), and G. Illingworth (University of California, Santa Cruz) (bottom), of the galaxy GN-z11, the most distant and highest-redshifted galaxy ever discovered and spectroscopically confirmed thus far.

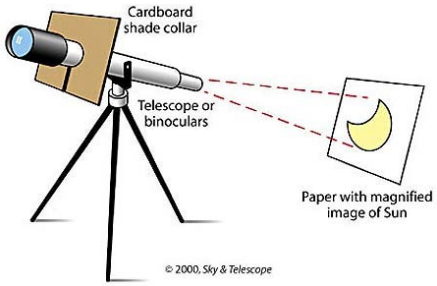
Solar Viewing (Cont'd)

(Continued from page 7)

er image, while moving it farther away makes the view bigger but dimmer.

A big telescope lets in a lot of sunlight, which poses the risk of overheating internal components. So either use a telescope with an aperture no larger than 4 inches or, for larger apertures, use an opaque mask over the Sunward-pointing end with a 3- to 4-inch-wide hole in it.

Remove the finderscope and place an eyepiece at the telescope's focuser. Aim the telescope in the general direction of the Sun (without looking at the Sun through the telescope!) and move it around until sunlight streams out of the eyepiece. You'll know when you hit the sweet spot!



Small telescopes are especially suited to the solar-projection method. Seen here is a simple projection setup made from a cardboard shield and a piece of white paper as a projection surface. A surprising amount of detail can be seen this way. Image © 2003 Sky & Telescope

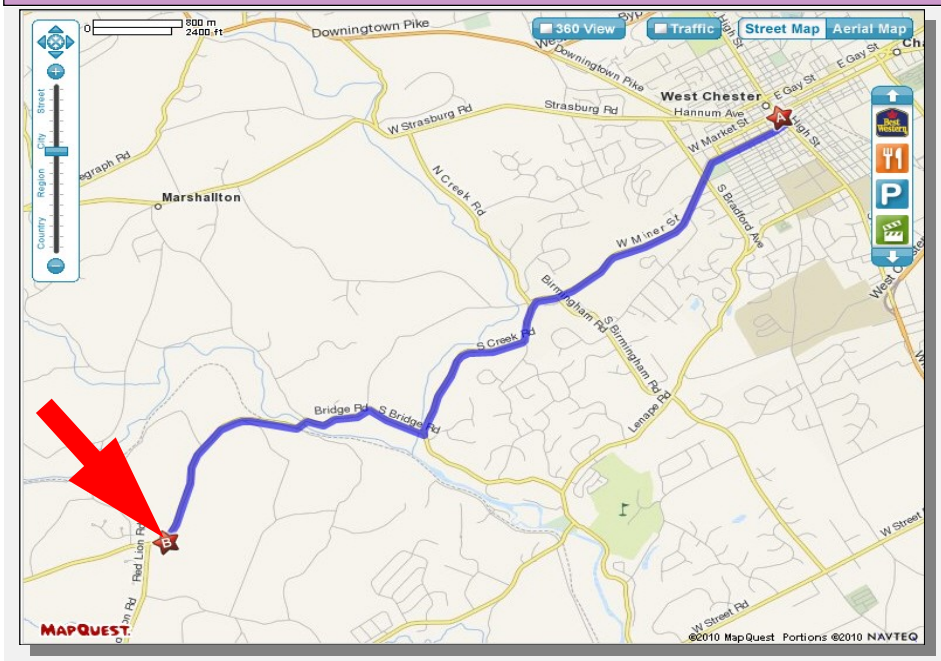
Whether you're projecting with binoculars or a telescope, using a sunshade to block ambient light from falling on the projection surface will improve the view.

If you want to observe the Sun through a telescope, there are many options. The easiest and least expensive option is to use a sheet of solar-filter material specially made for telescope use. Make sure to place the filter material at the front end of your telescope, and to cover the entire opening. If you plan to use a large telescope, no problem — simply create a mask with a 3- or 4-inch-wide hole and cover the hole with your filter material.

Last but certainly not least, many amateurs are currently using specialized solar equipment that allows them to observe the Sun at very narrow wavelengths, particularly the hydrogen-alpha line at 656.3 nanometers or the calcium-K line at 393.3 nanometers.

See the complete article at http://www.skyandtelescope.com/astronomy-news/observing-news/how-to-look-at-the-sun/

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.

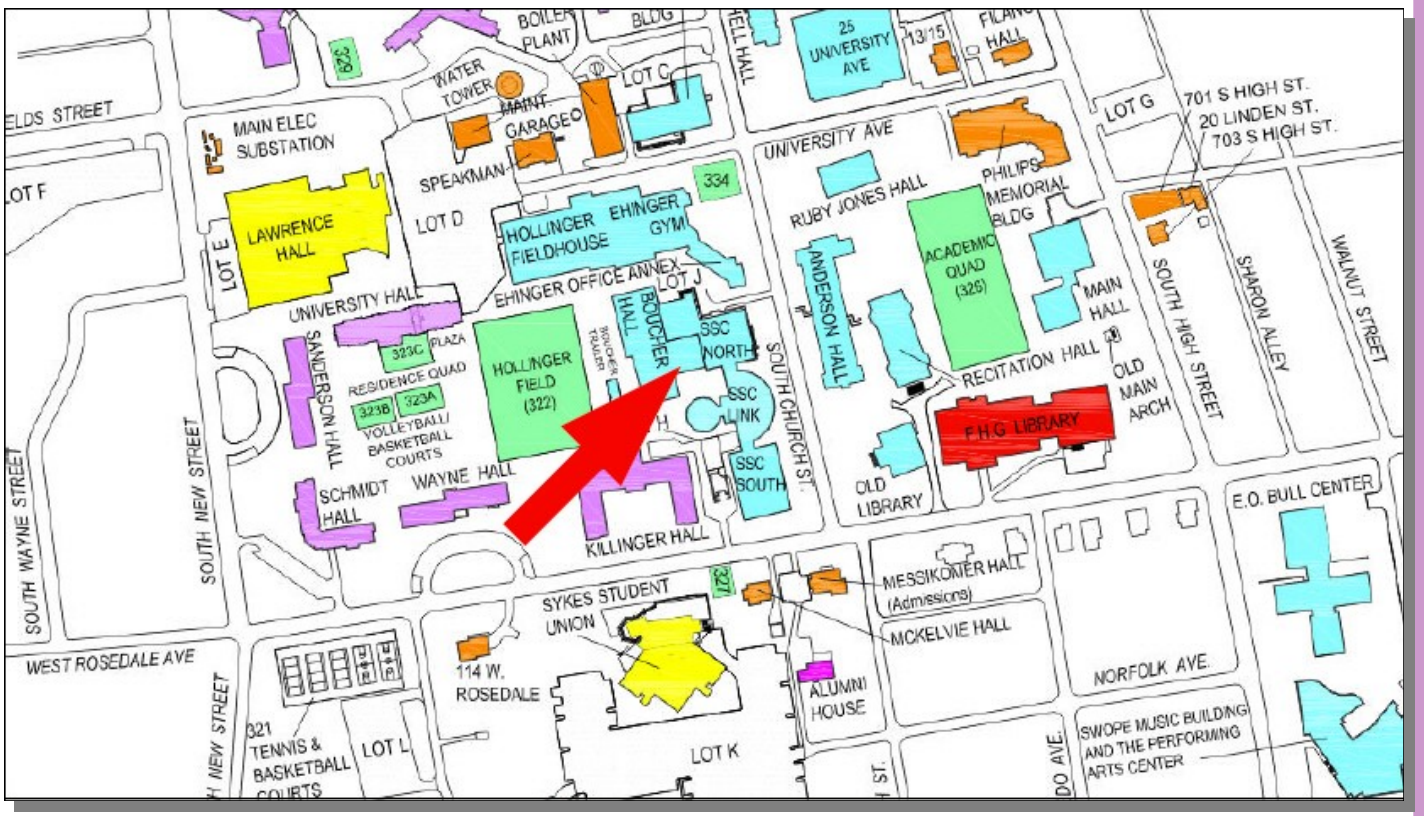
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 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 5)

Meteor showers: Comet Halley leaves a trail of debris as it passes through the solar system, and the Eta Aquariid meteors are that debris, as are the Orionids of October. Conditions are excellent this year with the peak of the shower occurring near the time of New Moon. The peak is predicted to be on the afternoon of May 5th, so either the 4th, 5th or 6th could provide a nice collection of "shooting stars".

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

April 2016 Financial Summary

Beginning Balance	$2,879
Deposits	$60
Disbursements	$0
Ending Balance	$2,939

New Member Welcome!

Welcome new CCAS members Renee Deis and Matt Deis from West Chester, and David Klapholz from Glen Mills. 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

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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.**