Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 26, No. 10 ***Three-Time*** *Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016* *October 2018*

In This Issue

M33, The Triangulum Galaxy

Image Credit & Copyright: Christoph Kaltseis, CEDIC

Membership Renewals Due

10/2018	Johanson
	Kresch
	Lane
	Lester
	Rosenblatt
	Skelton
11/2018	Baker
	Buczynski
	Holenstein
	Kerkel
	Leiden
	McNeal & Talunas
12/2018	Damerau
	Kozik
	Marshall
	Moynihan
	O'Leary

October 2018 Dates

2nd • Last Quarter Moon, 5:45 a.m. EDT

8th • New Moon, 11:46 p.m. EDT

8th-9th • The Draconid meteor shower peaks

16th • First Quarter Moon, 2:01 p.m. EDT

17th –18th • The Moon is near Mars

21st • The Orionid meteor shower peaks

24th • Full Moon, the Hunter's Moon or the Animal Fattening Moon, 12:45 p.m. EDT

31st • Last Quarter Moon, 12:40 p.m. EDT

CCAS Upcoming Nights Out

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

☼ **Saturday, October 13, 2018** - CCAS Special Observing Session at Anson Nixon Park, Kennett Square, PA. The session is scheduled from 6:00 to 9:00 p.m. EDT.

☼ **Sunday, October 14, 2018** - CCAS Special Observing Session, Daylesford Crossing Moon Observing, starting at 7:00 p.m. EDT. Could be postponed to Monday, October 15, 2018.

☼ **Saturday, October 20, 2018** - CCAS Special Joint Observing Session at Willistown Run-a-Muck, with Willistown Conservation Trust, 6:30 to 8:00 p.m. EDT, Newtown Square, PA. The event is open only to registered participants.

Autumn 2018 Society Events

October 2018

4th-5th • The von Kármán Lecture Series: Mapping Disasters from Space, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

5th-6th • CCAS & DVAA joint camping trip.

9th • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. The meeting starts immediately after at 7:30 p.m. Presentation: "100 Years of the Telescope" narrated by Neil deGrasse Tyson.

12th • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

13th • CCAS Special Observing Session at Anson Nixon Park, Kennett Square, PA. The session is scheduled from 6:00 to 9:00 p.m. EDT.

14th • CCAS Special Observing Session, Daylesford Crossing Moon Observing, starting at 7:00 p.m. EDT. Could be postponed to Monday, October 15, 2018.

19th • Live public presentation, *Spectacular Saturn*, at the West Chester University Mather Planetarium. Doors open at 6:30 p.m. with presentation starting at 7:00 p.m. Cost is $6.00.

20th • CCAS Special Observing Session, Willistown Conservation Trust Run-a-Muck. The observing session is scheduled from 6:30 pm to 8:00 pm. The event is open only to registered participants.

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

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

November 2018

2nd • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

8th-9th • The von Kármán Lecture Series: Deep Space Network, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

9th • Live public presentation, *The Red Planet*, at the West Chester University Mather Planetarium. Doors open at 6:30 p.m. with presentation starting at 7:00 p.m. Cost is $6.00.

13th • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. The meeting starts immediately after at 7:30 p.m. CCAS Member Speaker: John Conrad.

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

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

Minutes from the September 11, 2018, CCAS Meeting

by Ann Miller, CCAS Secretary

- President Roger Taylor welcomed everyone to the 2018-2019 season of the Chester County Astronomical Society.
  - This is the 25th Anniversary of CCAS, which was started in the living room of Ed Lurcott with 12 members and has expanded to 100 members meeting at West Chester University.
  - A cake was shared by everyone present to acknowledge the anniversary.
- Roger announced that he is calling for elections of officers and committee chair persons. He will be stepping down as president as of January 1, 2019.
  - The President, Vice President, Secretary, and Treasurer are elected positions.
  - The Education Chair, Public Relations Chair, and Program Chairs are appointed/volunteer positions.
  - Any volunteers or nominations are welcomed. A letter will be sent by the secretary to start the process.
- Roger also reported on the Cherry Springs Dark Sky outing for club members described as a dusk-to-dawn spectacular. He encouraged members to attend similar outings in the future.
- David Hockenberry, program chair, welcomed the evening's speaker, Drew Anderson to speak on space weather.
  - Anderson is a meteorologist who lectures at a Penn State campus and at West Chester University as well as being a TV weather reporter.
  - The public can follow space weather on line with www.swpc.noaa.gov.
  - Anderson also discussed planetary weather with the upcoming Hurricane Florence.

October 2018 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

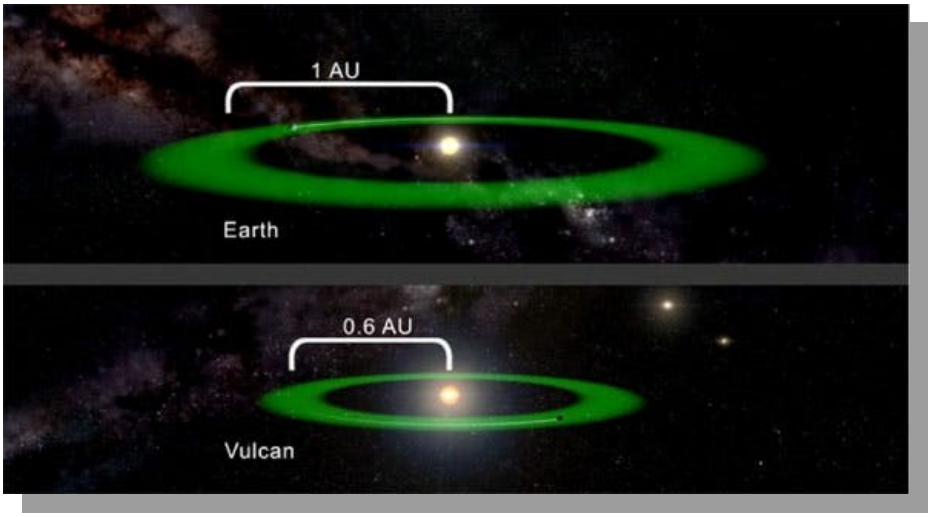
Our next meeting will be held on October 9, 2018, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. Presentation: "100 Years of the Telescope" narrated by Neil deGrasse Tyson.

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

As for future meetings, we are looking for presenters for our 2018-2019 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Super-Earth Discovered in (Fictional) Vulcan System

by Monica Young, Sky & Telescope Magazine



The green area surrounding 40 Eridani A depicts the habitable zone of the star, the area where temperatures would be right for liquid water, an essential ingredient for life (Vulcan or otherwise). The habitable zone of Vulcan is closer to its dwarf star than the Earth's is to the sun because 40 Eridani A is cooler and dimmer than our sun.

Almost three decades ago, Gene Roddenberry (producer of the Star Trek universe) wrote a letter to Sky & Telescope, along with Harvard-Smithsonian Center for Astrophysics astronomers Sallie Baliunas, Robert Donahue, and George Nassiopoulos. In their Letter to the Editor, they argued that 40 Eridani A — an orangeish star 16 light-years away — would make the ideal home for Vulcan, the home planet of Science Officer Mr. Spock. Now, a new discovery puts a little more science into that science fiction assertion.

In the July 1991 issue, the three astronomers and one moviemaker made the case for what star should be considered Vulcan's home:

> *The star around which Vulcan orbits was never identified in the original series or in any of the feature films based on it and so has never been officially established. But two candidates have been suggested in related literature.*

Two Star Trek books named the star 40 Eridani A as Vulcan's sun, while another publication named Epsilon Eridani instead. However, Roddenberry and the astronomers made an argument for 40 Eridani A:

> *We prefer the identification of 40 Eridani as Vulcan's Sun because of what we have learned about both stars at Mount Wilson. . . . The HK [Project] observations suggest that 40 Eridani is 4 billion years old, about the same age as the Sun. In contrast, Epsilon Eridani is barely 1 billion years old.*
>
> *Based on the history of life on Earth, life on any planet around Epsilon Eridani would not have had time to evolve beyond the level of bacteria. On the other hand, an intelligent civilization could have evolved over the eons on a planet circling 40 Eridani. So the latter is the more likely Vulcan sun. . . . Presumably Vulcan orbits the primary star, an orange main-sequence dwarf of spectral type K1. . . . Two companion stars — a 9th magnitude white dwarf and an 11th magnitude red dwarf — orbit each other about 400 astronomical units from the primary. They would gleam brilliantly in the Vulcan sky.*

It turns out the letter authors' prediction was right — a world really does orbit the primary star of the three-star 40 Eridani system. (Whether it's home to a logic-based alien society, though, is anyone's guess!)

The world is a super-Earth, the most common type of planet in the galaxy (though a type that's missing from our solar system). At twice Earth's radius and eight to nine times its mass, 40 Eridani b sits on the line that divides rocky super-Earths from gaseous ones. The planet orbits its star every 42 days, putting just inside the system's habitable zone — in other words, where it's nice and hot. At 16 light-years away, it's the closest super-Earth known and therefore a good potential target for follow-up observations.

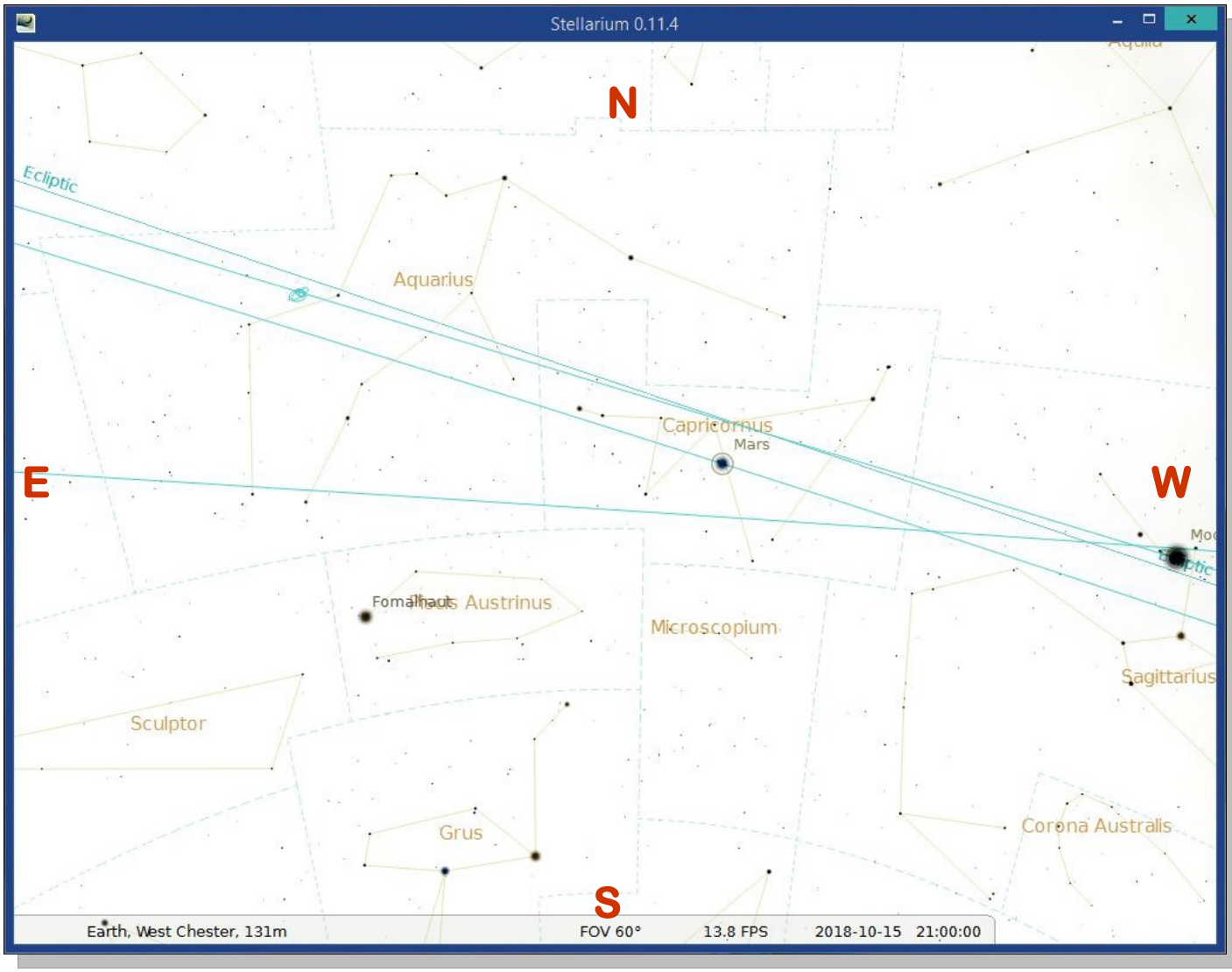
The discovery comes courtesy of the Dharma Planet Survey, designed to detect and characterize low-mass planets around bright, nearby stars. Started in 2016 and continuing until 2020, this survey uses a robotic 50-inch telescope on Mount Lemmon to look for planet-induced wobbles in 150 bright stars within 160 light-years of Earth. The spectrograph attached to the scope can measure radial veloci-

(Continued on page 9)

The Sky Over Chester County

October 15, 2018 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
10/01/2018	6:29 a.m. EDT	6:56 a.m. EDT	6:42 p.m. EDT	7:09 p.m. EDT	11h 46m 01s
10/15/2018	6:43 a.m. EDT	7:11 a.m. EDT	6:21 p.m. EDT	6:48 p.m. EDT	11h 10m 00s
10/31/2018	7:00 a.m. EDT	7:28 a.m. EDT	5:59 p.m. EDT	6:27 p.m. EDT	10h 30m 56s

Moon Phases					
Last Quarter	10/02/2018	5:45 p.m. EDT	New Moon	10/08/2018	11:46 p.m. EDT
First Quarter	10/16/2018	2:01 p.m. EDT	Full Moon	10/24/2018	12:45 p.m. EDT
Last Quarter	10/31/2018	12:40 p.m. EDT			

October 2018 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	**Last Quarter Moon, 5:45 p.m. EDT**
8	**New Moon, 11:46 p.m. EDT**
8/9	**The Draconid meteor shower peaks**
11	**The Moon is near Jupiter**
14	**The Moon is near Saturn**
16	**First Quarter Moon, 2:01 p.m. EDT**
17	**The Lunar Straight Wall is visible**
17/18	**The Moon is near Mars**
21	**The Orionid meteor shower peaks**
23	**Uranus is at opposition**
24	**Full Moon, the Hunter's Moon or the Animal Fattening Moon, 12:45 p.m. EDT**
31	**Last Quarter Moon, 12:40 p.m. EDT**

The best sights this month: The parade of planets we have been watching this summer is coming to an end. We still have Saturn and Mars all month, but Venus leaves us and Jupiter falls low into the glow of the sunset. But October is a great time for seeking out dim fuzzy objects in the sky, with the Andromeda Galaxy, M31, the grandest fuzzy spot of all.

Mercury: If you have a low western horizon you might glimpse Mercury low in the glow of the fading sunset near month's end.

Venus: Sadly, we say goodbye to the brilliant "evening star" that we have been watching for several months. Venus will disappear from the evening sky around October 7th and passes us in the race around the Sun on October 26th. Our sister planet will reappear as the "morning star" a few days later.

Mars: Mars is losing brightness as the month progresses but is still a bright red beacon in the sky throughout October. The best view through a telescope is around 8 or 9 p.m.

Jupiter: The king of the planets continues to fall toward the western horizon, setting only an hour after sunset by month's end.

Saturn: Saturn sets around 10 p.m. during October, so for the best telescopic view take a look as soon as the sky is fully dark. The rings of Saturn continue to be tilted close to the maximum for the year, making it easier to see the Cassini Division, the space between the main inner and outer rings.

Uranus and Neptune: Uranus reaches opposition on October 23rd, so it will be visible all night and is highest in the sky around midnight. If you haven't seen this distant gas giant in a telescope you will have a great opportunity during October. It is a beautiful blue-green color. Neptune is much dimmer and is already on the meridian by the middle of the evening. A sky map for both planets is in the September issue of Sky and Telescope magazine.

The Moon: Full Moon is on October 24th. This full Moon is the Hunter's Moon. Many moons ago, Native Americans named this bright moon for obvious reasons. The leaves are falling from trees, the deer are fattened, and it is time to begin storing up meat for the long winter ahead. Because the fields were traditionally reaped in late September or early October, hunters could easily see fox and other animals that come out to glean from the fallen grains. Probably because of the threat of winter looming close, the Hunter's Moon is generally accorded with special honor, historically serving as an important feast day in both Western Europe and among many Native American tribes. Native Canadians called this the Animal Fattening Moon.

Constellations: High up in the sky we see the Summer Triangle overhead. Look to the left of the large triangle and you'll find another geometric shape in the sky, the Great Square of Pegasus. And a bit toward the east and nearly overhead is the constellation Cassiopeia in the shape of a large "W". According to Greek myths, Cassiopeia was the Queen of Ethiopia. Her husband, Cepheus the King is honored by the constellation just to the west of Cassiopeia that is in the shape of a house.

Messier/deep sky: October is a great month to study the Andromeda galaxy, M31. This is the most distant object you can ever see without binoculars or

(Continued on page 7)

Through The Eyepiece: Globular Cluster M15

by Don Knabb, CCAS Treasurer & Observing Chair

With Pegasus flying upside down across the October sky this is a great time to view globular cluster M15. Yes, I said upside down since the "great square" represents Pegasus' body, the stars off the top of the square are his legs and the string of stars to the right (west) are his neck and head.

Just off Pegasus' nose is globular cluster M15, also known as NGC 7078. It was discovered by Jean-Dominique Maraldi in 1746. He described it as "A nebulous star, fairly bright and composed of many stars". Charles Messier, who cataloged it on June 3, 1764 couldn't make this out and described it as "nebula without stars," so that it remained to William Herschel in 1783 to resolve this fine star cluster. It is estimated to be 13.2 billion years old, one of the oldest globular clusters. In the upper right is a picture of M15 taken by CCAS member Pete LaFrance.

M15 can be found extremely easily: Find the 2nd magnitude star Epsilon Pegasi, named Enif, and Theta Pegasi southeast (lower left) of it. Follow the line from Theta over Epsilon and extend it perhaps ½ the distance that was between those stars and you will find the fuzzy object that is M15. Use this sky map to aid your star hopping.

At its apparent visual brightness of magnitude 6.2, M15 is about at the limit of visibility for the naked eye under very good conditions. In Chester County skies we need binoculars or a telescope to see this mass of stars. It appears as a round mottled nebula in 4-inch telescopes, with at best the very brightest stars visible, but otherwise unresolved in a fine star field. In larger telescopes more and more stars be-

(Continued on page 7)

Picture credit: Pete LaFrance, Chester County Astronomical Society

Image made using Stellarium planetarium software

Eyepiece (Cont'd)

(Continued from page 6)

come visible; the outer parts are resolved, with a more irregular, non-circular outline. The compact core, however, stays unresolved even in large amateur telescopes, but the brightest stars can be glimpsed even there.

M15 is at a distance of about 33,600 light-years from Earth. The core of this cluster has undergone a contraction known as core collapse and it has an area at its center with an enormous number of stars surrounding what may be a central black hole.

M15 is perhaps the densest of all globular star clusters in our Milky Way galaxy. The Hubble Space Telescope has photographically resolved its super-dense core, as shown in the image below.

So before Pegasus flies upside down into the west, grab your binoculars or telescope and enjoy this beautiful collection of stars while it is well placed in the sky for extended viewing and contemplation.

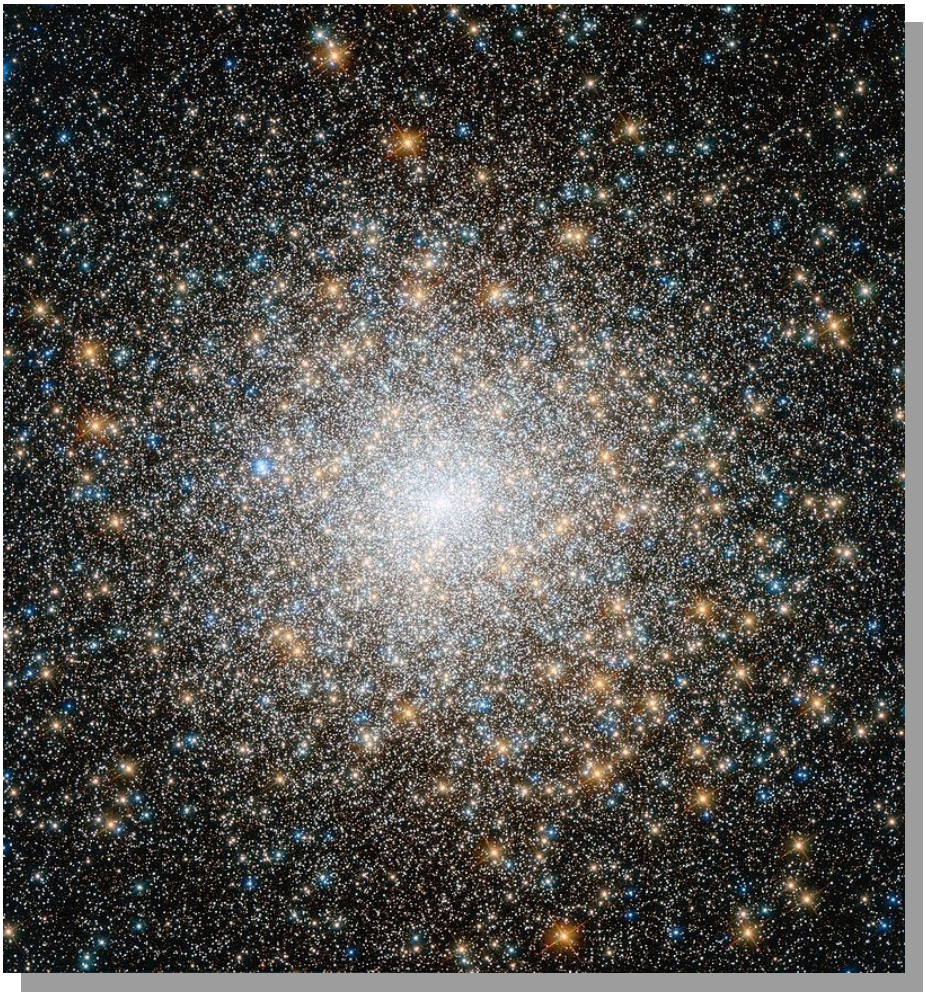


Image credit: Credit: NASA, ESA - http://www.spacetelescope.org/images/heic1321a/ http://www.spacetelescope.org/static/archives/images/large/heic1321a.jpg

Information credits:

- Dickinson, Terence 2006. Nightwatch: a practical guide to viewing the universe. Buffalo, NY. Firefly Books
- http://en.wikipedia.org/wiki/Messier_15
- http://www.astr.ua.edu/gifimages/m15r.html
- http://www.seds.org/messier/m/m015.html

Observing (Cont'd)

(Continued from page 5)

a telescope to help, although you'll need to go to a dark sky site to pick out its soft glow. It is many times further away than any star in the sky. It is so far away that the light you see as that fuzzy spot in the sky left Andromeda 2.5 million years ago! In Chester County skies we need to use binoculars or a telescope, but the view is still wonderful. In addition to M31, you don't need to be up late to catch the wonderful Double Cluster in Perseus and the compact star cluster M34 is just a bit to the south, also in Perseus. Stay up until 10:00 and you can see the star clusters in Auriga rising: M36, M37 and M38.

Comets: Comet 21P/Giacobini-Zinner should be around magnitude 8 in early October. A sky map for finding Comet 21P is in the October issue of Astronomy magazine.

Meteor showers: The Orionid meteor shower is best viewed during the early morning hours

(Continued on page 10)

Observe the Moon

by Jane Houston Jones and Jessica Stoller-Conrad

This article is distributed by NASA Space Place.

With articles, activities and games NASA Space Place encourages everyone to get excited about science and technology.

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

This year's International Observe the Moon Night is on Oct. 20. Look for astronomy clubs and science centers in your area inviting you to view the Moon at their star parties that evening!

On Oct. 20, the 11-day-old waxing gibbous Moon will rise in the late afternoon and set before dawn. Sunlight will reveal most of the lunar surface and the Moon will be visible all night long. You can observe the Moon's features whether you're observing with the unaided eye, through binoculars or through a telescope.

Here are a few of the Moon's features you might spot on the evening of October 20:

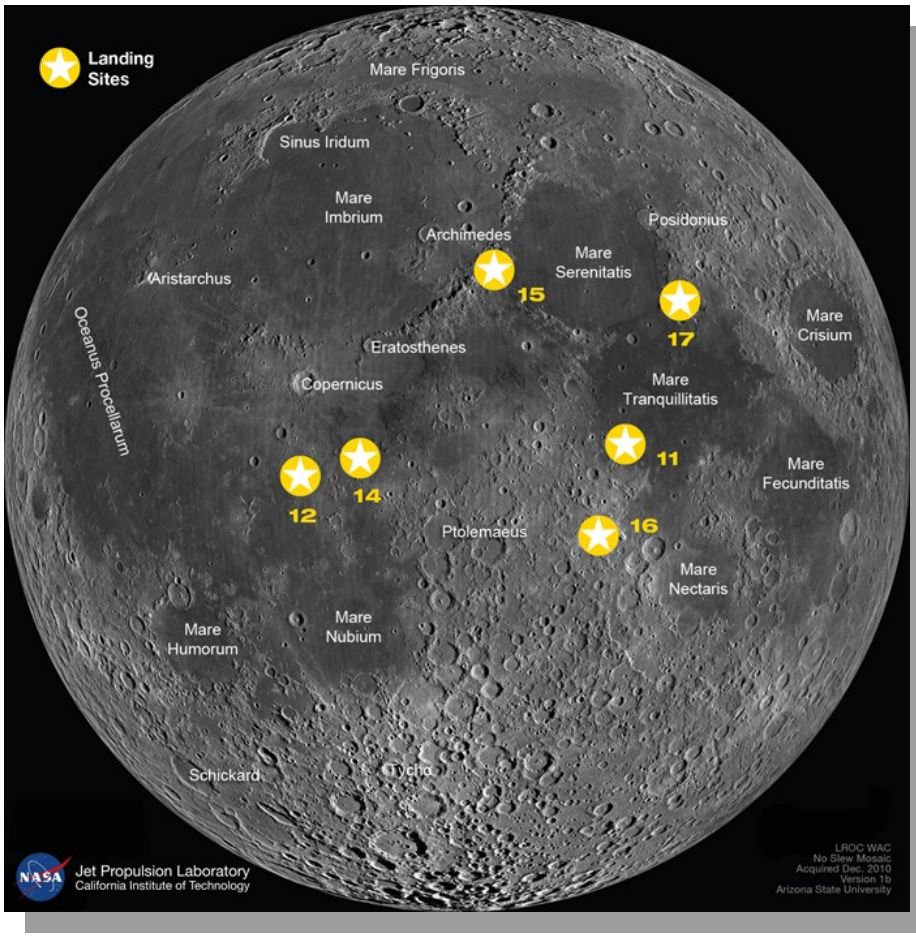
Sinus Iridum—Latin for "Bay of Rainbows"—is the little half circle visible on the western side of the Moon near the lunar terminator—the line between light and dark. Another feature, the Jura Mountains, ring the Moon's western edge. You can see them catch the morning Sun.

Just south of the Sinus Iridum you can see a large, flat plain called the Mare Imbrium. This feature is called a mare—Latin for "sea"—because early astronomers mistook it for a sea on Moon's surface. Because the Moon will be approaching full, the large craters Copernicus and Tycho will also take center stage.

Copernicus is 58 miles (93 kilometers) across. Although its impact crater rays—seen as lines leading out from the crater—will be much more visible at Full Moon, you will still be able to see them on October 20. Tycho, on the other hand, lies in a field of craters near the southern edge of the visible surface of the Moon. At 53 miles (85 kilometers) across, it's a little smaller than Copernicus. However, its massive ray system spans more than 932 miles (1500 kilometers)!

And if you're very observant on the 20th, you'll be able to check off all six of the Apollo lunar landing site locations, too!

(Continued on page 9)



Caption: This image shows some of the features you might see if you closely observe the Moon. The stars represent the six Apollo landing sites on the Moon. Credit: NASA/GSFC/ Arizona State University (modified by NASA/JPL-Caltech)

Space Place (Cont'd)

(Continued from page 8)

In addition to the Moon, we'll be able to observe two meteor showers this month: the Orionids and the Southern Taurids. Although both will have low rates of meteors, they'll be visible in the same part of the sky.

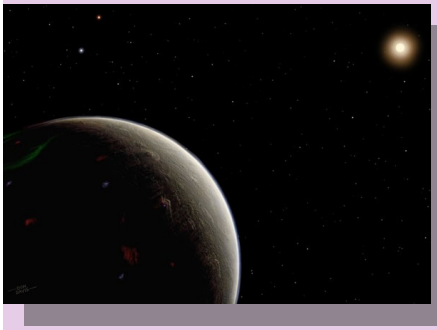
The Orionids peak on Oct. 21, but they are active from Oct. 16 to Oct. 30. Start looking at about 10 p.m. and you can continue to look until 5 a.m. With the bright moonlight you may see only five to 10 swift and faint Orionids per hour.

If you see a slow, bright meteor, that's from the Taurid meteor shower. The Taurids radiate from the nearby constellation Taurus, the Bull. Taurids are active from Sept. 10 through Nov. 20, so you may see both a slow Taurid and a fast Orionid piercing your sky this month. You'll be lucky to see five Taurids per hour on the peak night of Oct. 10.

You can also still catch the great lineup of bright planets in October, with Jupiter, Saturn and Mars lining up with the Moon again this month. And early birds can even catch Venus just before dawn!

You can find out more about International Observe the Moon Night at https://moon.nasa.gov/observe.

Vulcan (Cont'd)



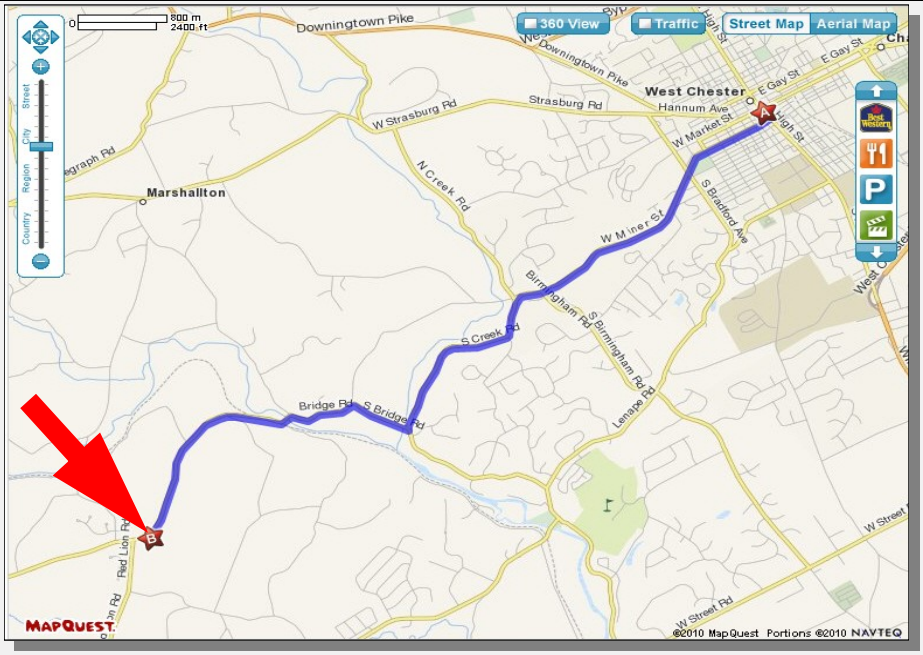
An artist's illustration of the super-Earth orbiting 40 Eridani A, the host star of the fictional Vulcan. Don Davis

(Continued from page 3)

ties down to 1 meter per second, which enables it to find low-mass planets around these nearby stars.

The discovery will appear in the *Monthly Notices of the Royal Astronomical Society*. Read the preprint here.

CCAS Directions



Brandywine Red Clay Alliance
1760 Unionville Wawaset Rd
West Chester, PA 19382
(610) 793-1090
http://brandywinewatershed.org/

BRC was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

Brandywine Red Clay Alliance

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

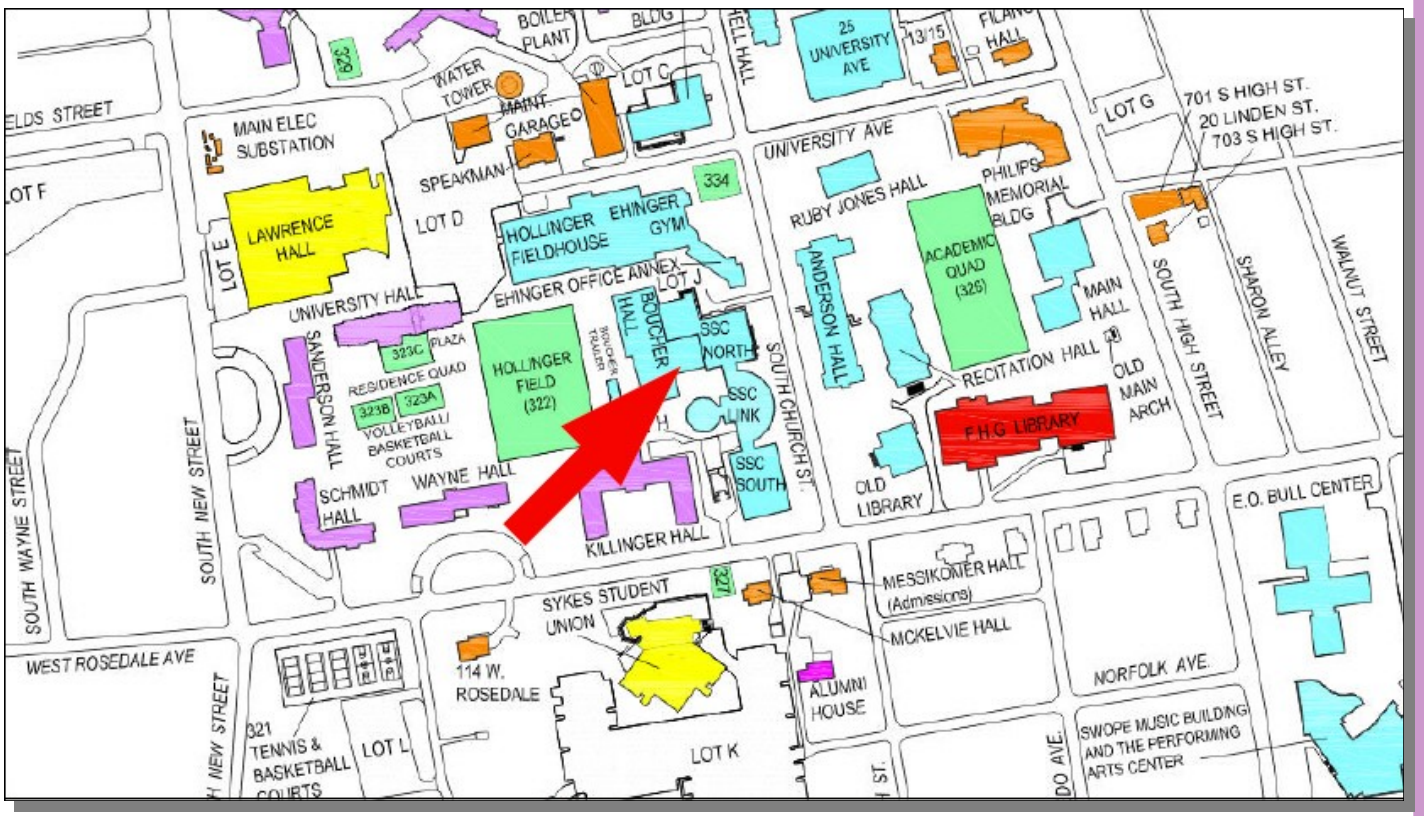
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go left through the gate and drive up the farm lane about 800 feet to the top of the hill. The observing area is on the right.

If you arrive after dark, *please turn off your headlights and just use parking lights* as you come up the hill (so you don't ruin other observers' night vision).

CCAS Directions

West Chester University Campus

The monthly meetings (September through May) are held in Room 112 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



Observing (Cont'd)

(Continued from page 7)

of October 21st. You could see up to 15 "shooting stars" per hour. For the best view, wait until the Moon sets around 4 a.m. to see some meteors, which are made up of dust particles from Comet Halley. The peak of this shower is broad, so look for shooting stars a few days before and after the peak.

Also during October is the Draconid meteor shower. This is usually a minor shower, but its parent comet, 21P/Giacobini-Zinner, passed closest to Earth during September so we might have an outburst of meteors. Look for these meteors during the hours before midnight.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

Sept. 2018 Financial Summary

Beginning Balance	$841
Deposits	$186
Disbursements	-$34
Ending Balance	$1,061

New Member Welcome!

Welcome new CCAS members Stella Bentley, West Chester, PA, Rajesh Nair, Exton, PA, and Chris Wirth from Downingtown, PA. We're glad you decided to join us under the stars! Clear skies to you!

Membership Renewals

You can renew your CCAS membership by writing a check payable to "Chester County Astronomical Society" and sending it to our Treasurer:

Don Knabb
988 Meadowview Lane
West Chester PA 19382

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

CCAS Information Directory

Join the Fight for Dark Skies!

You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at $30.00 for one year. Send to:

International Dark-Sky Association
3225 North First Avenue
Tucson, AZ 85719

Phone: **520-293-3198**
Fax: **520-293-3192**
E-mail: **ida@darksky.org**

For more information, including links to helpful information sheets, visit the IDA web site at:

http://www.darksky.org

Dark-Sky Website for PA

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

http://www.POLCouncil.org

Find out about Lyme Disease!

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

http://www.LymePA.org

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

Good Outdoor Lighting Websites

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

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

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

http://www.starrynightlights.com

★ ★ ★ ★ ★

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

Phone: **484-291-1084**

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

Local Astronomy-Related Stores

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

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

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

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

http://www.skiesunlimited.net

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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:

Dr. 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 Dr. John Hepler, the newsletter editor, at: **newsletter@ccas.us**.

CCAS Website

Dr. John Hepler is the Society's Webmaster. You can check out our Website at:

http://www.ccas.us

Dr. Hepler 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 Dr. 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:	TBA
Webmaster and Newsletter:	John Hepler 410-639-4329
Public Relations:	TBA

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.**