Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 26, No. 11 ***Three-Time*** *Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016* *November 2018*

In This Issue

IC 59 and IC 63 in Cassiopeia

Image Credit & Copyright: Ken Crawford (Rancho Del Sol Obs.)

Membership Renewals Due

11/2018	Baker Buczynski Holenstein Kerkel Leiden McNeal & Talunas
12/2018	Damerau Kozik Marshall Moynihan O'Leary
01/2019	Kellerman Kovacs Linskens McElwee

November 2018 Dates

4th • Daylight Saving Time ends, 2:00 a.m.

7th • New Moon, 11:01 p.m. EST

11th • The Moon is near Saturn

15th • First Quarter Moon, 9:54 a.m. EST

17th • Leonid meteors peak

23rd • Full Moon, the Full Beaver Moon, or the Rivers Freezing Moon, 12:39 a.m. EST

29th • Last Quarter Moon, 7:18 p.m. EST

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, November 2, 2018** - CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset. Last regularly scheduled monthly session of the year.

☼ **Friday, November 16, 2018** - Special CCAS Night Out event with local Girl Scouts at East Goshen Park, West Chester, PA.

Autumn/Winter 2018 Society Events

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, NASA/JPL Ambassador.

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.

December 2018

15th • CCAS Holiday Party, hosted by Dave Hockenberry & Ann Miller at their home in Glen Mills, PA. The party starts at 6:00 p.m. EST. They will provide sandwiches and drinks. They invite others to bring party foods and drinks to share. More details and directions will appear in the December 2018 edition of *Observations*.

14th • Live public presentation, *Walking on the Moon*, 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 • Open call for articles and photographs for the January 2019 edition of Observations.

21st • Winter Solstice, 5:23 p.m. First astronomical day of winter in northern hemisphere.

26th • Deadline for newsletter submissions for the January 2019 edition of Observations.

Minutes from the October 19, 2018, CCAS Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor, president, called the October meeting of CCAS to order on Tuesday, October 9, 2018.
- Roger reminded the group of the upcoming elections for officers of the club and will be seeking volunteers or nominations for President, Vice President, Secretary, and Treasurer.
    - There are also several committees that now have vacancies that need to be filled.
    - We have an Education, Program, Observing, and Publicity committees. More information will be sent to the club members.
- Roger announced that Dr. Karen Schwarz invited CCAS to attend two lectures coming up this month at West Chester University.
    - On Thursday, October 11, 2018, Dr. Jamie Holder, associate Professor of Physics and Astronomy at the University of Delaware will present "Exploring the Extreme Universe with Veritas."
    - On October 24 from 7 to 8:30pm, Dr. Brent Ruswick, Associate Professor of the Department of History at West Chester University will present "Flat Earth Beliefs from around the Globe."
- Upcoming CCAS observing and star Party dates are as follows:
    - October 12 - BRC club observing session at 7pm
    - October 13 - Anson Nixon Park Star Party in Kennett Square, PA at 7pm
    - October 15 - Daylesford Crossing Moon Observing at 7pm
    - October 20 - Willistown Run-A-Muck Star Party during their annual fund raiser.
    - October 26 - Nottingham Park Star Party at 7pm
    - November 2 - BRC Club Observing
- Don Knabb, Observing Chair, shared an interesting fun fact. If our solar system were the size of a quarter, our galaxy would be the size of North America. Don then shared the Sky at Night for the month of October.
- Our program for the evening was movie night. We viewed "400 Years of the Telescope—A Journey of Science, Technology, and Thought," narrated by Neil DeGrasse Tyson.

November 2018 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

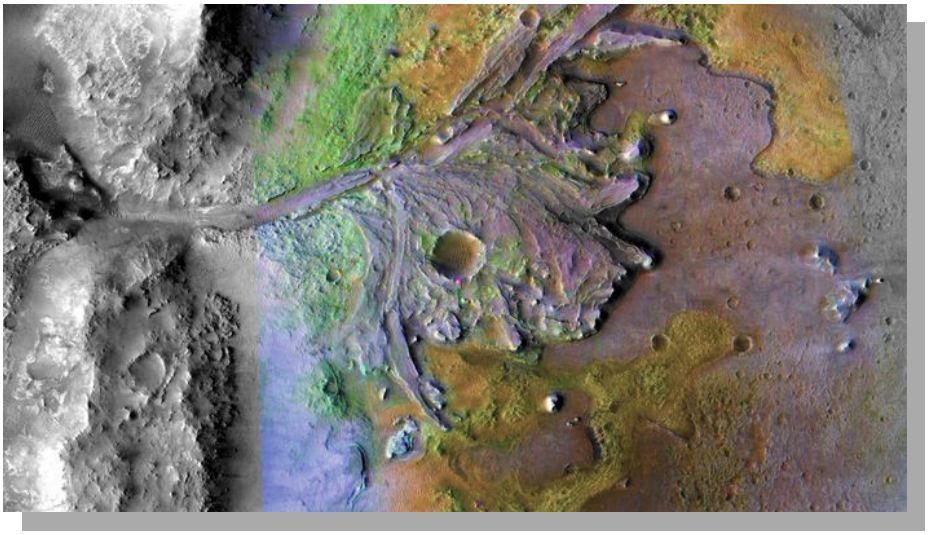
Our next meeting will be held on November 13, 2018, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. CCAS Member Speaker: John Conrad, NASA/JPL Ambassador.

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

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

NASA's Next Mars Rover Could Explore Former Mineral Springs and a Fossil River Delta

by Paul Voosen, Science Magazine



Jezero crater holds a fossil river delta, which may have concentrated and preserved signs of life. NASA/JPL/JHUAPL/MSSS/BROWN UNIVERSITY

Sometimes, a problem really can be solved by meeting halfway. For the past 4 years, planetary scientists have wrestled over where to send NASA's next Mars rover, a $2.5 billion machine to be launched in 2020 that will collect rock samples for eventual return to Earth. Next week, nearly 200 Mars scientists will gather for a final landing site workshop in Glendale, California, where they will debate the merits of the three candidate sites that rose to the top of previous discussions. Two, Jezero and Northeast Syrtis, hold evidence of a fossilized river delta and mineral springs, both promising environments for ancient life. Scientists yearn to visit both, but they are 37 kilometers apart—much farther than any Martian rover has traveled except Opportunity.

Now, the Mars 2020 science team is injecting a compromise site, called Midway, into the mix. John Grant, a planetary scientist at the Smithsonian Institution's Center for Earth and Planetary Studies at the National Air and Space Museum in Washington, D.C., who co-leads the landing site workshops, says the team wanted to know whether a rover might be able to study the terrains found at Jezero and Northeast Syrtis by landing somewhere in the middle.

So far, the answer appears to be yes. The Mars 2020 rover borrows much from the design of the Curiosity rover that has been exploring another Mars site for 6 years. But it includes advances such as a belly-mounted camera that will help it avoid landing hazards during its harrowing descent to the surface. This capability allowed scientists to consider Midway, just 25 kilometers from Jezero and close enough to drive there. At the same time, Midway's rocks resemble those of Northeast Syrtis, says Bethany Ehlmann, a planetary scientist at the California Institute of Technology (Caltech) in Pasadena and member of the Mars 2020 science team.

Midway and Northeast Syrtis

(Continued on page 10)

CCAS Observing Session Setup for Girl Scout Event

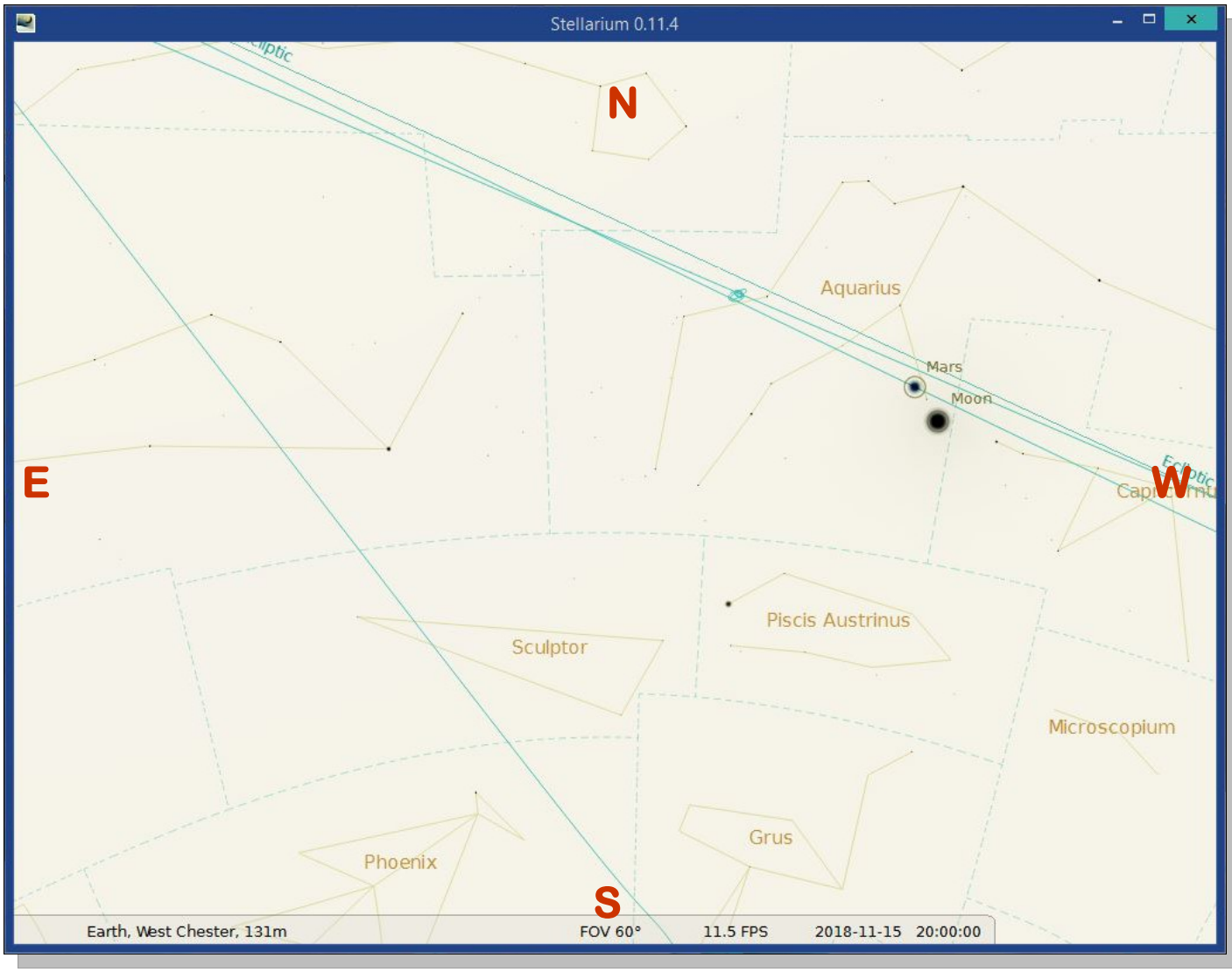
by Don Knabb, CCAS Treasurer & Observing Chair

CCAS members hosted over 70 Girl Scouts at the regular monthly observing session on October 12, 2018, at at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

The Sky Over Chester County

November 15, 2018 at 8:00 p.m. ET

Note: This screen capture is taken from Stellarium, the free planetarium software available for download at www.stellarium.org.



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
11/01/2018	7:01 a.m. EDT	7:29 a.m. EDT	5:59 p.m. EDT	6:26 p.m. EDT	10h 28m 37s
11/15/2018	6:16 a.m. EST	6:45 a.m. EST	4:44 p.m. EST	5:13 p.m. EST	9h 58m 43s
11/30/2018	6:32 a.m. EST	7:02 a.m. EST	4:36 p.m. EST	5:06 p.m. EST	9h 34m 13s

Moon Phases					
			New Moon	11/07/2018	11:01 p.m. EST
First Quarter	11/15/2018	9:54 a.m. EST	Full Moon	11/23/2018	12:39 a.m. EST
Last Quarter	11/29/2018	7:18 p.m. EST			

November 2018 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

4	**Daylight Saving Time ends, 2:00 a.m.**
6	**Mercury is at greatest eastern elongation**
7	**New Moon, 11:01 p.m. EST**
11	**The Moon is near Saturn**
15	**First Quarter Moon, 9:54 a.m. EST**
16	**The Lunar Straight Wall is visible**
17	**Leonid meteors peak**
15	**The Moon is near Mars**
23	**Full Moon, the Full Beaver Moon, or the Rivers Freezing Moon, 12:39 a.m. EST**
29	**Last Quarter Moon, 7:18 p.m. EST**

The best sights this month: Take a last look at Saturn before it drops low into the glow of the setting Sun in a few weeks. Also go hunting Uranus which is well placed for viewing late in the evening. This distant member of the solar system is a beautiful green/blue color. But my favorite November target is the lovely Pleiades, the jewel of the fall and winter skies.

Mercury: Mercury is at greatest eastern elongation on November 6th but this is a low apparition of Mercury so it will be difficult to find in the fading glow of the sunset.

Venus: The "morning star" leaps up from the eastern horizon, gaining height and brightness every day through November and peaks at magnitude -4.9 (!) at the end of the month. At that brightness it will be easy to find just before sunrise.

Mars: The red planet is due south around 8 p.m. at the start of November. Mars is growing dimmer as it falls behind us in the race around the Sun, but is still shines a bright red in the evening sky. Early in the month Mars is close to Delta Capricorni.

Jupiter: We saw Jupiter low in the glow of the setting Sun at two events in October, but in early November the king of the planets will be lost from view as it goes behind the Sun on November 26th.

Saturn: Enjoy Saturn just after darkness falls to get the view through the least amount of atmosphere. By month's end the ringed beauty will be setting just an hour after the sky becomes fully dark.

Uranus and Neptune: Distant Neptune is best viewed about three hours after sunset and Uranus is best viewed an hour or so later. We saw both planets at our October gathering at Brandywine Red Clay Alliance. Use your favorite astronomy app to find these dim inhabitants of the outer solar system.

The Moon: Full Moon is on November 23rd. This full Moon is the Full Beaver Moon. For Native Americans, the time of this full moon was the time to set beaver traps before the swamps froze, to ensure a supply of warm winter furs. It is sometimes also referred to as the Frosty Moon, but I don't think they were referring to the snowman, even though the Moon kind of looks like the head of a snowman. Native Canadian tribes called this the Rivers Freezing Moon.

Constellations: During November the Great Square of Pegasus is at "center stage". To the left of the Great Square, sweeping up to the left is the constellation Andromeda. Use your binoculars to find our neighbor galaxy, which is also named Andromeda. It is a large fuzzy spot located between the constellation Andromeda and Cassiopeia. And by 9 p.m. the beautiful Pleiades, that really little dipper, is rising in the east ahead of Taurus the Bull.

Messier/deep sky: I always look forward to autumn for viewing the Double Cluster between Cassiopeia and Perseus. This is a really nice binocular object. Rising behind Perseus is the constellation Auriga and its three star clusters M36, M37 and M38. If you stay up for late night observing you can get an early view of M42, the Great Orion Nebula.

Comets: There are no bright comets in the November sky, but if you want an observing challenge use the largest telescope you can carry and pick a clear night with no Moon in the sky then look high in the sky to find Comet 64P/Swift-Gehrels. A sky map to

(Continued on page 7)

Through The Eyepiece: Comet 46P/Wirtanen

by Don Knabb, CCAS Treasurer & Observing Chair

If predictions hold true – and when comets are concerned that is a big IF – we will have a naked eye comet to gaze upon later this year. The comet of which I speak is Comet 46P/Wirtanen. And so we are saying it correctly, Wirtanen is pronounced "WERE - tuh – nun."

Comet 46P/Wirtanen is a short-period comet with an orbital period of 5.4 years. The comet is relatively small in size with an estimated diameter of just 1.2 kilometers. The object was the original target for ESA's Rosetta spacecraft but the launch window was missed so 67P/Churymov-Gerasimenko was Rosetta's target in the end.

Comet 46P/Wirtanen was discovered by Carl A. Wirtanen in 1948 at the Lick Observatory, California, by examining a photographic plate. It took over a year before the object was recognized as a short-period comet due to a lack of observations.

Comet Wirtanen belongs to a small family of comets that boast a higher level of activity than expected for their nucleus size. These comets are called hyperactive comets. They emit more water vapor than they should. Comet outgassing is rated as a percent of their expected maximum level, so a comet might be rated as 10%, or 50%, etc. Comet Wirtanen is rated over 100%. How is that possible? It is believed that as the comet loses pieces of it as it nears the Sun the separated pieces all outgas at a high level, taking the total outgassing over 100% for the comet.

Perihelion, when Comet Wirtanen is closest to Earth, will be on December 16th 2018 when it will pass 7,220,000 miles from Earth. This is equal to about 30 times the distance from the Earth to our Moon. The icy space rock is expected to reach magnitude 3. This is currently the brightest prediction for all comets of 2018 unless a new discovery is made.

Magnitude 3 stars are easily seen in Chester County skies. However, a comet has a large surface area and therefore the total brightness is spread out over a large area, so you need to observe Comet Wirtanen on an evening when the Moon is absent from the sky. And binoculars will help tremendously to see this comet. In fact, if you use a telescope you might just look straight through the comet's coma.

Below is a sky chart showing the position of Comet 46P/Wirtanen.

(Continued on page 7)

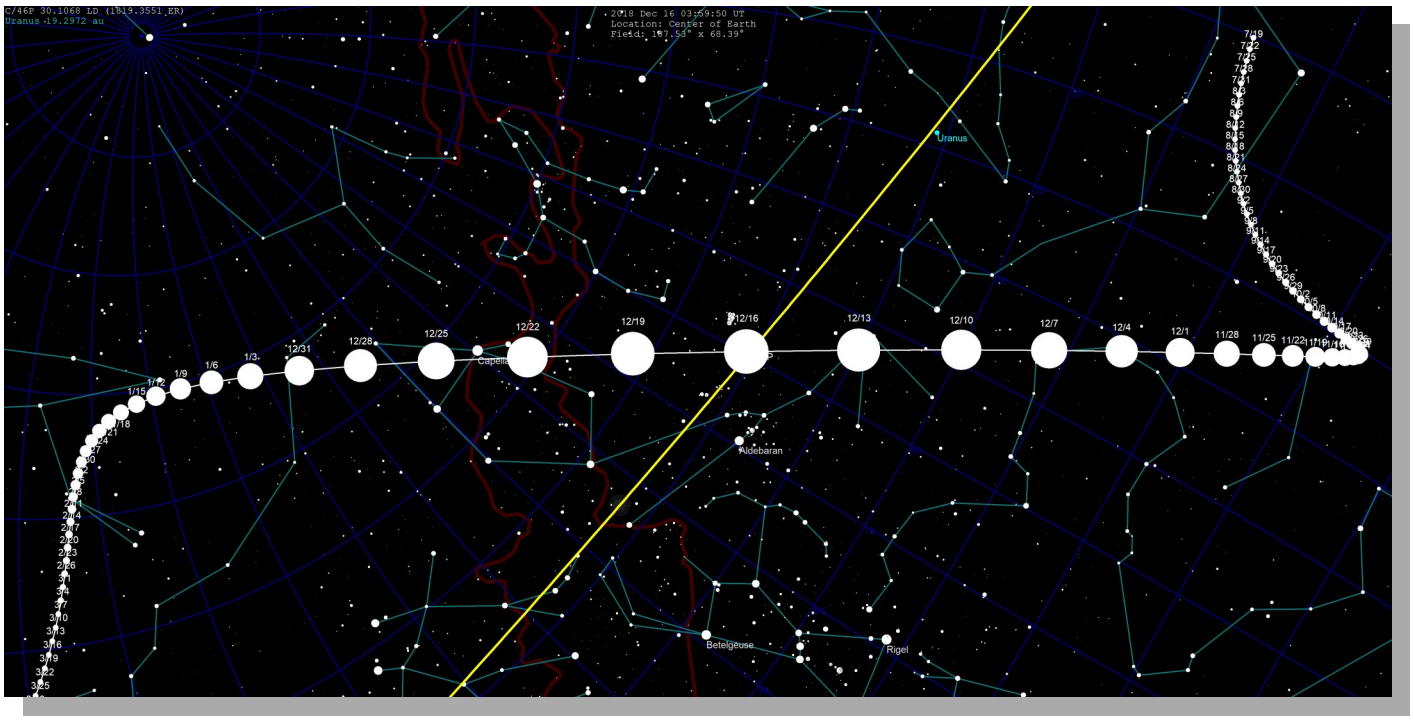
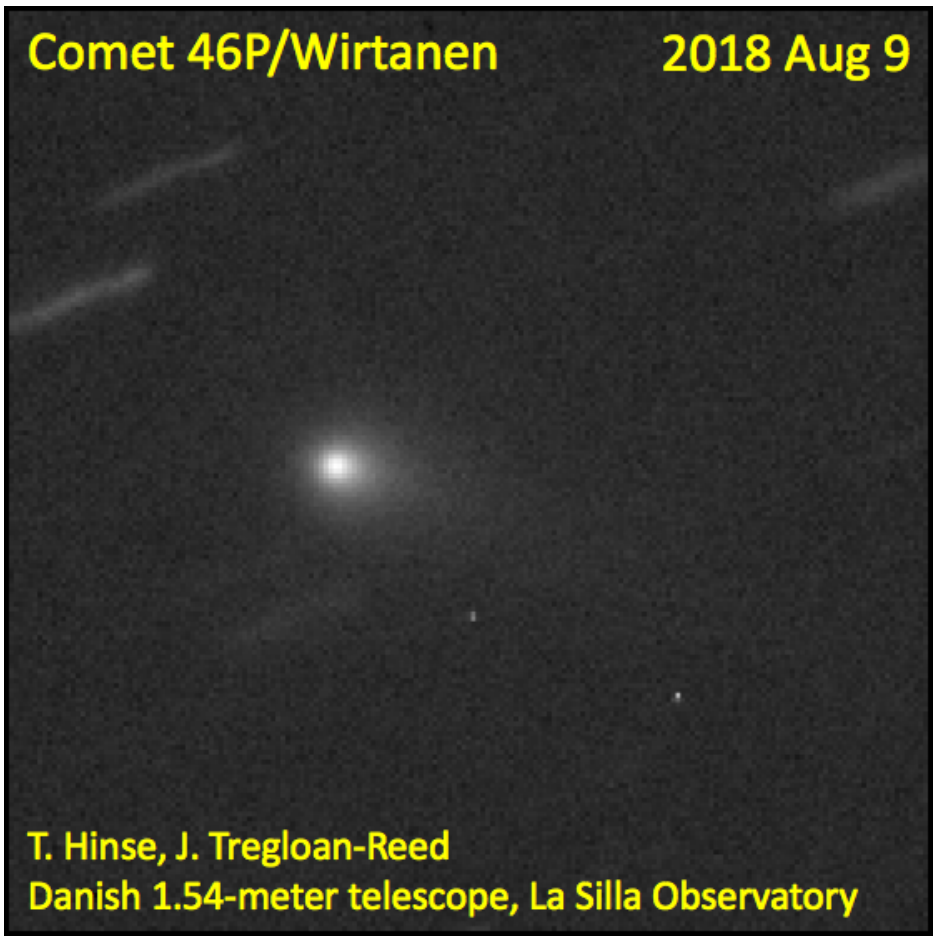


Chart credit: https://en.wikipedia.org/wiki/46P/Wirtanen#/media/File:C46P-sky.png,Tom Ruen

Eyepiece (Cont'd)



(Continued from page 6)

Throughout the summer months, the comet has moved from Aquarius to Cetus, brightening to magnitude 12 by the end of August. Wirtanen then dipped further south. Throughout autumn, the comet will begin to increase in brightness quite considerably but sinks ever lower as it reaches the midway point between Fornax and Sculptor making observation difficult at our latitude.

Things begin to improve through November after a dramatic U-turn moving swiftly north through Eridanus towards Taurus. This is where the comet will reach closest approach on December 16th 2018, between the Pleiades and Hyades clusters. Over the next few weeks the comet remains in a much more favorable position for northern sky observers high up in the sky after sunset.

Why is Wirtanen's 2018 apparition considered to be excellent? Observing conditions are excellent in December (other than the cold temperature), the comet is near opposition at close approach, it will be visible most of the night around close approach and will be visible for many hours for months before and after close approach. The comet is predicted to reach naked-eye brightness around close approach and in the most optimistic scenario, it could remain there for several weeks.

However, as I stated at the start of this article, comets are unpredictable. Comets do not like to be tied down by our expectations. Expect flare-ups, fades, and even dissolution of these highly volatile objects.

So let's hope the predictions for Comet 46P/Wirtanen come true. I can't remember the last naked eye comet that was in our sky – we are long overdue for such a treat!

Information credits:

http://www.cometwatch.co.uk/comet-46p-wirtanen/
http://wirta-nen.astro.umd.edu/46P/46P_2018.shtml
https://www.skyandtelescope.com/observing/bright-comet-prospects-for-2018/
https://en.wikipedia.org/wiki/Comet

Observing (Cont'd)

(Continued from page 5)

find this 10th magnitude fuzz ball is in the November issue of Astronomy magazine.

Or just wait until December to go comet hunting, when Comet 46P/Wirtanen should be easy to find with binoculars, assuming predictions of the comet's brightness hold true.

Meteor showers: The Leonid meteor shower peaks during the predawn hours of November 17th. We can expect up to 15 fast moving meteors per hour. With First Quarter Moon occurring a few days before the shower we will only see the brightest meteors, but we can expect bright meteors because the Leonids are considered the fastest of any meteors.

November's Dance of the Planets

by Jane Houston Jones and David Prosper

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

November's crisp autumn skies bring great views of our planetary neighbors. The Moon pairs up with Saturn and Mars in the evenings, and mornings feature eye-catching arrangements with dazzling Venus. Stargazers wanting a challenge can observe a notable opposition by asteroid 3 Juno on the 17th and watch for a few bright Leonid meteors.

Red Mars gleams high in the southern sky after sunset. Saturn sits westward in the constellation Sagittarius. A young crescent Moon passes near Saturn on the 10th and 11th. On the 15th a first quarter Moon skims by Mars, coming within 1 degree of the planet. The red planet receives a new visitor on November 26th, when NASA's InSight mission lands and begins its investigation of the planet's interior. News briefings and commentary will be streamed live at: bit.ly/landsafe

Two bright planets hang low over the western horizon after sunset as November begins: Jupiter and Mercury. They may be hard to see, but binoculars and an unobstructed western horizon will help determined observers spot them right after sunset. Both disappear into the Sun's glare by mid-month.

Early risers are treated to brilliant Venus sparkling in the

eastern sky before dawn, easily outshining everything except the Sun and Moon. On November 6th, find a location with clear view of the eastern horizon to spot Venus next to a thin crescent Moon, making a triangle with the bright star Spica. The following mornings watch Venus move up towards Spica, coming within two degrees of the star by the second full week of November. Venus will be up three hours before sunrise by month's end – a huge change in just weeks! Telescopic observers are treated to a large, 61" wide, yet razor-thin crescent at November's beginning, shrinking to 41" across by the end of the month as its crescent waxes.

Observers looking for a challenge can hunt asteroid 3 Juno, so named because it was the third asteroid discovered. Juno travels through the constellation Eridanus and rises in the east after sunset. On November 17th, Juno is at opposition and shines at magnitude 7.4, its brightest showing since 1983! Look for Juno near the 4.7 magnitude double star 32 Eridani in the nights leading up to opposition. It is bright enough to spot through binoculars, but still appears as a star-like point of light. If you aren't sure if you have identified Juno, try sketching or photographing its star field, then return to the same area over the next several days to spot its movement.

The Leonids are expected to peak on the night of the 17th

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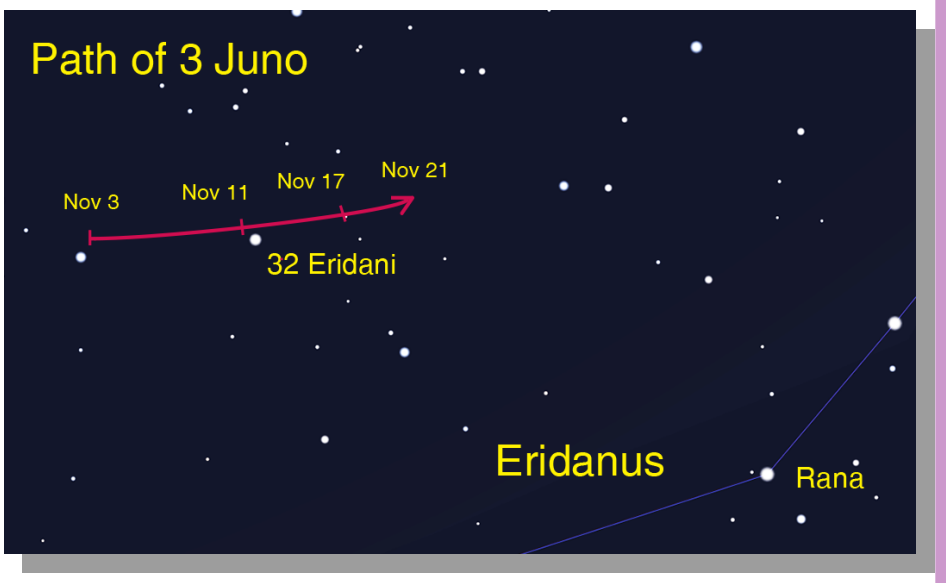


Caption: This finder chart shows the path of the asteroid 3 Juno as it glides past 32 Eridani in November 2018. The asteroid's position is highlighted for selected dates, including its opposition on the 17th. Image created in Stellarium for NASA Night Sky Network.

Night Sky Network (Cont'd)

(Continued from page 8)

through the morning of the 18th. This meteor shower has brought "meteor storms" as recently as 2002, but a storm is not expected this year. All but the brightest meteors will be drowned out by a waxing gibbous Moon.

Stay warm and enjoy this month's dance of the planets!

You can catch up on all of NASA's current and future missions at nasa.gov

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!

Call for CCAS Election Candidates!

by Dave Hockenberry, CCAS Program Chair

Our current President, Roger Taylor, is stepping down as our President this coming January. Roger has served CCAS since July of 2009, and our Society owes him immeasurable gratitude for all he has done for us during his tenure.

Normally each term for elected officers is 2 years, and Roger has given us 9 ½. Thank you, Roger.

We now face the task of electing new leadership. There are four elected positions that need to be filled – President, Vice President, Secretary, and Treasurer.

We also have open chairs for Education and Public Relations, which are appointed positions.

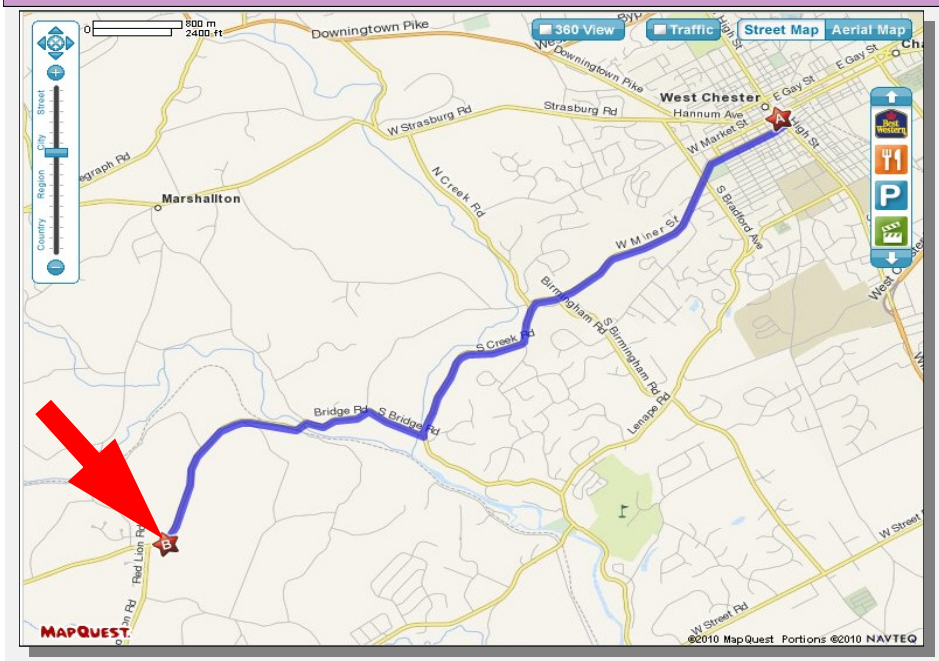
Don Knabb has indicated that he is willing to continue as Treasurer, unless someone else would like to take over. All of these positions must be filled.

Anyone interested and willing to fill any of these positions should contact the Secretary, Ann Miller (secretary@ccas.us) or Treasurer (Don Knabb, treasurer@ccas.us). Normally this is done during the April and May meetings, but we do not have the luxury of time before the Presidency will be vacant in January.

If you are interested, please let us know by the beginning of the next meeting Tuesday, November 13th, so that our Society can move ahead into a new era of leadership.

Thank you all for your participation and interest in CCAS, and especially Roger for his many years of service.

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.

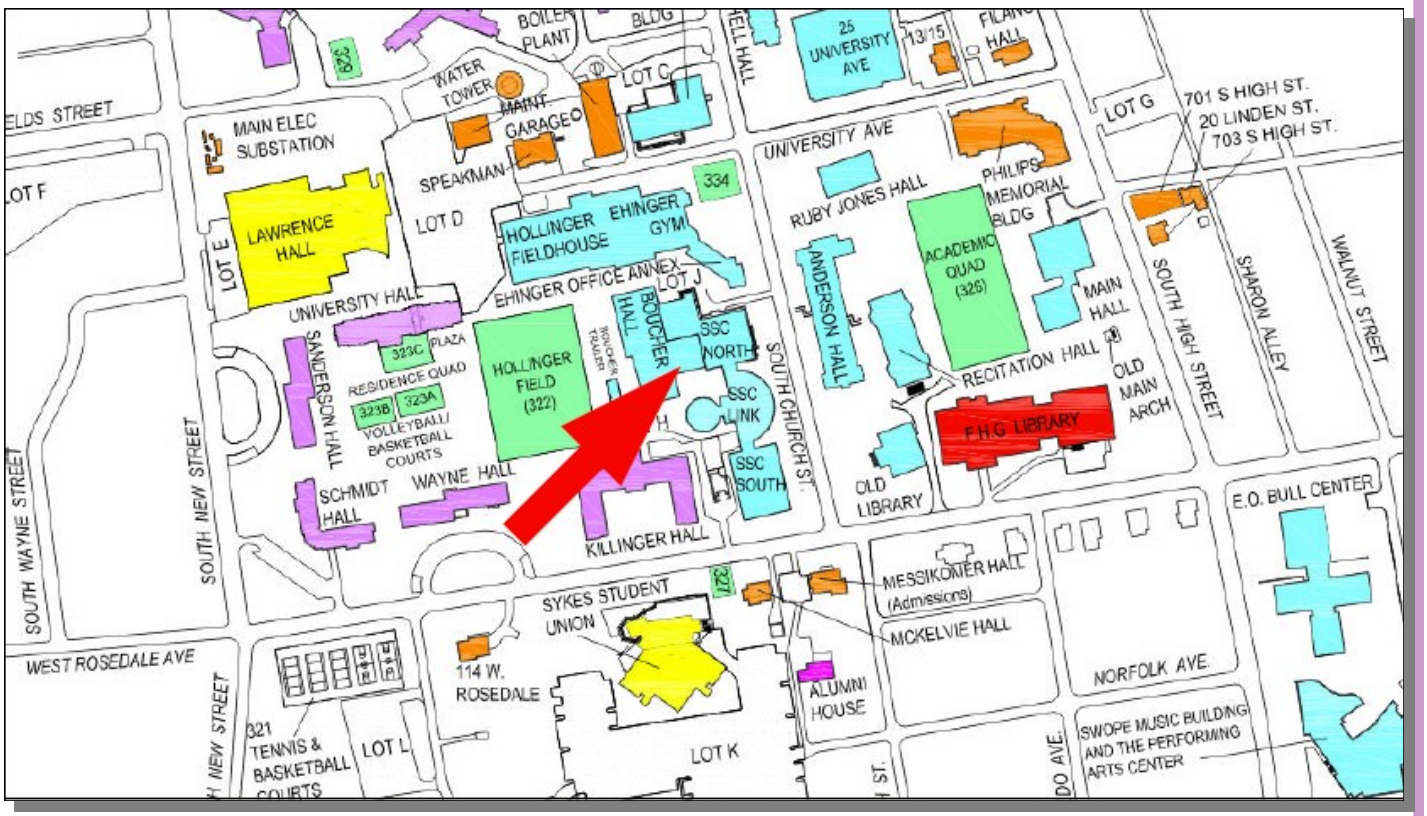
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route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



Mars Site (Cont'd)

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both hail from a time, some 4 billion years ago, when Mars was warmer and wetter. Surveys from orbit suggest the sites harbor rocks that formed underground in the presence of water and iron, a potential food for microbes. The rocks, exposed on the flanks of mesas, include a layer of carbonate deposits that many scientists believe were formed by underground mineral springs. Right now, the Mars 2020 team favors landing at Jezero and driving uphill to Midway, says Matt Golombek, a planetary scientist at NASA's Jet Propulsion Lab (JPL) in Pasadena, and the other workshop co-leader.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

Oct. 2018 Financial Summary

Beginning Balance	$1,061
Deposits	$74
Disbursements	-$204
Ending Balance	$931

New Member Welcome!

Welcome new CCAS members Stella Bentley and Susan Zacharkiw, both from West Chester, 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

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

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Fax: **610-327-3553**

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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.

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