



# Observations

A Monthly Publication Of The  
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 24, No. 8

Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009

August 2016

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## Perseid Meteor Shower



*Astronomer Fred Bruenjes recorded a series of many 30 second long exposures spanning about six hours on the night of Aug. 11 and early morning of Aug. 12, 2004 using a wide angle lens. Combining those frames which captured meteor flashes, he produced this dramatic view of the Perseids of summer. There are 51 Perseid meteors in the composite image, including one seen nearly head-on.*

## Membership Renewals Due

08/2016	Buki Knabb Family Lurcott, L.
09/2016	Armored Lurcott, E.
10/2016	Caldwell Conrad Kazmi Kurtis Leiden Rosenblatt, Harriet Rosenblatt, Herb Zandler

## August 2016 Dates

- 2nd • New Moon, 4:44 p.m. EDT
- 10th • First Quarter Moon, 2:20 p.m. EDT
- 12th • The Perseid Meteor Shower peaks.
- 18th • Full Moon, 5:26 a.m. EDT
- 24th • Last Quarter Moon, 11:40 p.m. EDT
- 24th • Mars, Antares, and Saturn form a vertical line 6° long.



## 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, August 27, 2016** - CCAS Special Observing Session, Nottingham County Park, Nottingham, PA.
- ☼ **Saturday, September 10, 2016** - CCAS Special Observing Session, Anson Nixon Park, Kennett Square, PA.
- ☼ **Saturday, September 24, 2016** - CCAS Special Observing Session, Bucktoe Creek Preserve in Avondale, PA.

## Summer / Autumn 2016 Society Events

### August 2016

**3rd** • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**5th** • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

**10th-13th** • [ALCon](#), the [Astronomical League's](#) annual convention, in Washington, DC.

**11th-12th** • The von Kármán Lecture Series: [The Rosetta Mission: Comet C-G up Close](#), at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**11th-12th** • Perseid Meteor Shower Peaks. The Perseids is one of the best meteor showers to observe, producing up to 60 meteors per hour at their peak. The shower's peak usually occurs on August 12th & 13th, but you may be able to see some meteors any time from July 23rd through August 22nd.

**20th** • Open call for articles and photographs for the September 2016 edition of [Observations](#).

**26th** • Deadline for newsletter submissions for the September 2016 edition of [Observations](#).

**27th** • CCAS Special Observing Session, Nottingham County Park, Nottingham, PA.

### September 2016

**2nd** • West Chester University Planetarium Show: "We Are Star Stuff," in the Schmucker Science Building. The show starts at 7 p.m. and runs approximately one hour in length. For more information and reservations, visit the [WCU Public Planetarium Shows](#) webpage.

**3rd** • CCAS Summer Party at Barb & Don Knabb's home in West Chester, PA. The party is for CCAS members and their families starting at 6:00 p.m. See the September 2016 edition of [Observations](#) for more details about the party and for directions to Barb & Don's home.

**7th** • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**9th** • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

**10th** • CCAS Special Observing Session, Anson Nixon Park, Kennett Square, PA.

**13th** • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. Meet & Greet over coffee and refreshments for members and non-members alike from 7:00 to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. Guest Speaker: Dr. Alex Hill, a senior post-doctorate fellow at Haverford College. His research is on interstellar gas mediums.

**20th** • Open call for articles and photographs for the October 2016 edition of [Observations](#).

**24th** • CCAS Special Observing Session, Bucktoe Creek Preserve in Avondale, PA.

**24th-25th** • The von Kármán Lecture Series: [Revealing Saturn-Cassini Science Highlights and the Grand Finale](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**26th** • Deadline for newsletter submissions for the October 2016 edition of [Observations](#).

## CCAS Original Astrophotography

by Don Knabb, CCAS Observing Chair & Treasurer



Luanr X: Image taken with a Canon 7D DSLR on a Televue 127is refractor, mounted on a Losmandy G-11 equatorial mount. Image capture was with Canon EOS Utility 2 software directly into a PC. The raw image was cropped and sharpened with Canon Digital Photo Professional 4. Then the blown up area of the X was extracted, then combined into the main photo using Irfanview. The final image was exported as a jpeg.

## September 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on September 13, 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 will be Alex Hill, a senior post-doctorate fellow at Haverford College. His research is on interstellar gas mediums.

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, Frank Angelini will speak at the October meeting, and John Conrad will be presenting in November. We are looking for presenters for future meetings in our spring 2017 season. If you are interested in presenting, or know someone who would like to participate, please contact me at [programs@ccas.us](mailto:programs@ccas.us).

## A Visit to Leviathan in Birr, Ireland

by Dave Hockenberry, CCAS Program Chair



*Leviathan Restored*

While planning a recent trip to the Emerald Isle, I was excited to learn that a wedding we had been asked to attend was occurring just a stone's throw from Birr Castle. Birr used to be named Parsonstown, after the Parsons family. The eldest male of the Parson clan was given the title of the Earl of Rosse. Many of us in the astronomy community will recognize this name, especially the Third Earl of Rosse. He was the man who built some of the largest telescopes in the 19<sup>th</sup> century, and several deep space objects were named by him and others at the eyepiece of his telescope.

Messier and Herschel had been busy identifying and cataloging nebulae for over 50 years, and scientists of the day were looking to explain the phenomena. The early 19<sup>th</sup> century mind was bent towards finding a single explanation for the heavenly nebula. Some of the brighter nebulae had been resolved into

stars, such as the Beehive, by small telescopes. The hope was that if the other nebula, perhaps too far away to be resolved easily, could also be resolved into stars then a single explanation of nebulae could be found. Herschel's telescope in Slough had failed to resolve most faint nebulae into individual stars. Lord Rosse's 3-foot telescope in 1884, while the largest extant, was slightly smaller than the Slough instrument. The only way to resolve the faint nebula into stars, if indeed it could be done, was to build a bigger telescope. Therefore, in 1842 Lord Rosse set about building the biggest telescope.

After several tries welding the metal blanks together, his forgers were finally able to piece together a useable metal mirror 6 feet in diameter, twice as large as any existing up to that point. Since speculum metal was unsilvered, it had to be highly polished to reflect, and another mir-

ror had to be forged before a useable telescope could be made. By 1845, the second primary mirror was completed.

The huge speculum mirrors were quite an achievement, but only the beginning of the project. The mirrors weighed three tons each. The tube for the telescope wound up being 54 feet long and including the mirror weighed in at 12 tons. To raise and lower the tube two large stone walls were constructed and the back of the scope was placed in a gimbal for altitude adjustment. Two chains on either side of the tube attached to a block and tackle mechanism provided the leverage. Wooden scaffolding was constructed at the front base of the walls and at the top of the western wall for the observer to get to the eyepiece. This was easily 60 feet in the air when the telescope was pointed towards the zenith.

Construction of the Leviathan and its supporting walls were big news to both the scientific community and the public, and press reports gave the public regular updates during the process. Leviathan was finally completed by the beginning of 1845.

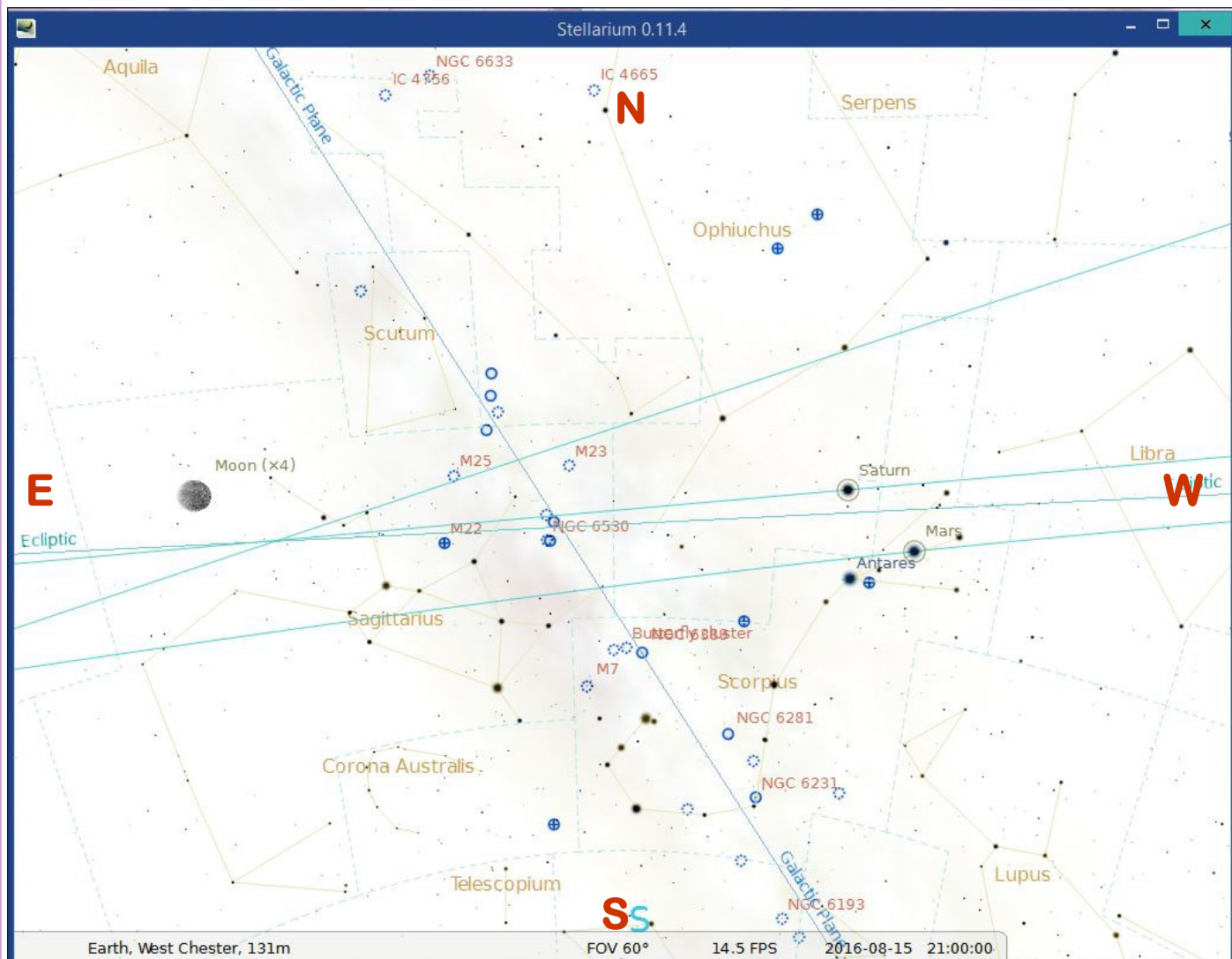
Unfortunately, the crowning achievement of early 19<sup>th</sup> century telescope construction was cursed with placement under Ireland's "lovely" weather. Initial reports and observations were few and far between, mostly owing to sky conditions.

*(Continued on page 6)*

# The Sky Over Chester County

August 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](http://www.stellarium.org).



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
8/01/2016	5:29 a.m. EDT	6:00 a.m. EDT	8:14 p.m. EDT	8:44 p.m. EDT	14h 14m 03s
8/15/2016	5:44 a.m. EDT	6:13 a.m. EDT	7:57 p.m. EDT	8:29 p.m. EDT	13h 43m 41s
8/31/2016	6:00 a.m. EDT	6:28 a.m. EDT	7:33 p.m. EDT	8:01 p.m. EDT	13h 04m 51s

### Moon Phases

New Moon	8/02/2016	4:44 p.m. EDT	First Quarter	8/10/2016	2:20 p.m. EDT
Full Moon	8/18/2016	5:26 a.m. EDT	Last Quarter	8/24/2016	11:40 p.m. EDT

## August 2016 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	New Moon, 4:44 p.m. EDT
5	Jupiter is less than 2° above the Moon.
10	First Quarter Moon, 2:20 p.m. EDT
11	The Moon, Mars, Saturn, and Antares form a diamond shape in the evening.
12	The Perseid meteors peak in the early morning hours.
18	Full Moon, the Full Sturgeon Moon, 5:26 a.m. EDT
24	Last Quarter Moon, 11:40 p.m. EDT
24	Mars, Antares, and Saturn form a vertical line 6° long.
27	Venus and Jupiter are extremely close in the glow of the sunset. This will be a difficult conjunction to observe at our latitude.

**The best sights this month:** Beginning August 23<sup>rd</sup> we have nice groupings in both the southeast and the west. In the west we watch Venus, Jupiter and Mercury just as the sky darkens, and in the southeast we watch Mars, Antares and Saturn after the show in the west concludes. On the 24th Mars, Antares and Saturn form a nearly straight vertical line!

**Mercury:** Mercury reaches greatest elongation on August 16<sup>th</sup>, but still remains quite low in the glow of the fading sunset, so you will need a viewing location with a low western horizon. On August 27<sup>th</sup> Mercury is only 0.1° away from Jupiter, but at our latitude this will be difficult to observe since the planets will be so close to the horizon.

**Venus:** The evening star begins to be visible in the fading glow of the sunset around mid-month. Look low in the west after the Sun has set and the sky just begins to darken. For the next week watch Venus, Mercury and Jupiter dance together as they sink into the horizon.

**Mars:** Although Mars is getting smaller as it falls behind Earth as we orbit the big yellow ball of hydrogen in the sky it still shines brightly as a red “star” in the southeast and south all evening. All month we can watch Mars, Saturn and Antares in

Scorpio the Scorpion form an interesting group and on the 24<sup>th</sup> the three form a nearly straight vertical line.

**Jupiter:** The king of the planets seems to dive into the sunset as August progresses, disappearing into the glow of the sunset by the end of the month. We had a great time watching Jupiter’s moons and Great Red Spot this summer!

**Saturn:** Saturn shrinks slightly as August progresses but it is still the star of the never-ending show that is the night sky. When the sky is fully dark center Saturn in your telescope then take your scope to the highest power that still gives a sharp view and just stare at those amazing rings!

**Uranus and Neptune:** The outer gas giants are best observed just before dawn for the next several months.

**The Moon:** Full moon is on August 18<sup>th</sup>. Native Americans called this the Full Sturgeon Moon. The fishing tribes are given credit for the naming of this Moon, since sturgeon, a large fish of the Great Lakes were most readily caught during this month. A few tribes knew it as the Full Red Moon because as the Moon rises it appears reddish through the sultry haze of summer.

**Constellations:** The Summer Triangle rules the night sky overhead after you stare at the wonders in the southern sky. Find a driveway, put down a sleeping bag and feel the heat of the sun come back out of the driveway, warming your back as you stare upward at Cygnus as it flies down the Milky Way. It’s easy to hold binoculars straight up if you are lying on your back. Scan between Aquila and Lyra with your binoculars to find the Coat Hanger Cluster and the Cygnus Star Chain. Then just drink in the stars of our home galaxy the Milky Way.

**Messier/deep sky:** M13 and M92, bright globular clusters in Hercules are nearly overhead so they are in a great position for viewing with binoculars or a telescope. Don’t miss the southern Messier objects in Scorpius and Sagittarius while we have the chance to see them. That part of the sky is filled with incredible objects that are visible for only a

*(Continued on page 11)*

## Leviathan (cont'd)

*(Continued from page 3)*

Furthermore, the amount of sky the telescope could point at was rather limited, since it could only move in azimuth about 3 degrees. However, one of the first reports made public were observations of the Crab nebula, which was reported to be resolved into individual stars. More nebulae, including the Orion nebula, were reported to be resolved into stars.

Today, we know that the nebulae are far more complex and varied than mid-19<sup>th</sup> century astronomers understood. Some of the reported observations were in error, but others gained by the Leviathan were amazingly accurate. William Parson's drawing of the Whirlpool nebula is almost spot-on, quite an achievement for speculum metal primary mirrors that had to be removed from the back of the scope every two weeks for repolishing (hence the need for two mirrors).

Some of the deep space object names we use today were coined by Lord Rosse and other observers at Birr – The Wild Duck Cluster, the Crab nebula, Whirlpool galaxy, and the Omega nebula among them. However, by the 1860's Sir William Huggins and his Irish wife Margaret were performing spectroscopic examination of space objects. Stars and the sun emit a continuous spectrum, gaseous nebula do not. The issue was completely resolved almost overnight, since astronomers needed only to attach a modified prism to the back of whatever telescope they had. No need to build world-



*Parson's Drawing of the Whirlpool Nebula*

beating aperture to prove the point.

Sadly, Irish astronomers didn't seem to want to push the envelope of astronomical knowledge forward, but only to continue doing what they had already done. The great Irish telescopes had fallen largely into disuse by the 1870's. Astronomical advances would thereafter be made in other countries, especially places with clearer skies and better seeing conditions. Leviathan, the world's largest telescope from 1845 until 1917 (when the Hooker telescope went on-line at Mt. Wilson), was already in serious decline. It would fall into complete disrepair before the turn of the 20<sup>th</sup> century. But Birr Castle remained, and in the 1990's interest in the old telescope renewed. Restoration projects were finally complete by

1998. A new, modern silvered glass mirror was fashioned to replace the old metal mirror.

Birr Castle is a short 3-minute walk from the center of downtown. Approaching the walls enclosing the grounds, the visitor experiences imposing stone and ironworks that convey a great sense of antiquity and grandeur. Gates open into a courtyard that has some of the old foundries still visible. A snack bar and soft serve ice cream is available here. Through the gift shop, tickets are sold to enter the grounds, and for a few extra Euros, a limited tour of the castle is offered. We chose to do this, as I wanted to see where Lord and Lady Rosse lived and hatched their Georgian miracle. The current Earl of Rosse and his family still live here 11

*(Continued on page 7)*

## Leviathan (cont'd)



CCAS Secretary Ann Miller Checking Out Leviathan

tracks and can move along with the telescope through its somewhat limited azimuth travel. The tube can point upwards in declination very close to the zenith, but at almost 60 feet in the air a special curved gangway at the top was constructed to keep the observer at the eyepiece. It looks precarious, and gives the impression that Parsons was solving

*(Continued from page 6)*

months out of the year, so only a few rooms can be toured and never during lunch when the Parsons family is dining. The castle is impressive, but also feels homey and “lived in.” Lady Rosse was an early pioneer in photography. Her dark room is still extant, and is the oldest darkroom in the world. Indeed, she and her husband made early attempts at astrophotography by attaching her cameras to the Leviathan. Unfortunately, the tracking system was too crude for the slow emulsions of the day. She did record the construction of the telescope, and her photographs and drawings were essential in the restoration project over 100 years later.

On leaving the castle, the visitor follows a path past part of the

gardens along the river and to the telescope. The 60-foot walls are thick stone 2 feet deep at least, and have arches fashioned into the sides. My first impression was of a fortress rampart with an enormous black cannon poking out from between the two walls. There is no roof or dome – the telescope is exposed to the elements all year. The size and scale of the thing is impressive even by today’s standards, and I can only imagine what an impact it must have made in 1845!

On close inspection, the tube reveals itself to be made of wooden staves. The construction is almost exactly like a wooden barrel, and the tube is even somewhat bowed in the center like an old wooden keg. The scaffolding in front of, and on the walls beside the scope, is on

these engineering problems as he went along.

At the back end of the telescope, there are railroad style tracks that lead down to the large gimbal that contains the primary mirror. The sheer weight of the mirror must have necessitated this design, as it had to be swapped out so often for polishing. At one time, the tracks led all the way back to the castle and its foundry rooms where a special steam-operated polishing machine was invented and kept for just this purpose. Those tracks no longer exist. After admiring the telescope for some time, we then followed a path to the “azimuth stones” and to a spiral garden path in the shape of the Whirlpool galaxy. It was set up to commemorate the 100<sup>th</sup> year of the discovery of

*(Continued on page 9)*

## Looking Up: The Perseid Meteor Shower

by Don Knabb, CCAS Treasurer & Observing Chair



Above: A Perseid fireball photographed August 12, 2006, by Pierre Martin of Arnprior, Ontario, Canada. Source: NASA's Marshall Space Flight Center and Science@NASA, [http://science.nasa.gov/headlines/y2007/11jul\\_greatperseids.htm](http://science.nasa.gov/headlines/y2007/11jul_greatperseids.htm).

One event I always look forward to in the summer is the Perseid Meteor shower. Nothing in the sky compares with seeing a Perseid fireball travel most of the way across the sky on a warm August night. Yes, seeing Saturn or Jupiter gets “ooohs” and “aaaaahs” from the stargazers, but a good Perseid fireball gets a yell! You feel like you have really seen something special, especially if it is a shared experience.

This year we should have a great show if the weather cooperates. That's because the Moon sets around 1 a.m. so we'll have dark skies when the shower is at its peak. At the peak of the shower one could see one or two Perseids a minute!

You won't have any trouble seeing the “shooting stars” but the

point in the sky from which the meteors will radiate is in the constellation Perseus, therefore we call this the Perseid Meteor Shower.

The source of the shower is Comet Swift-Tuttle. Although the comet is nowhere near Earth, the comet's tail intersects Earth's orbit. We glide through it every year in August. Tiny bits of comet dust hit Earth's atmosphere traveling at 132,000 mph. At that speed, even a smidgen of dust makes a vivid streak of light--a meteor--when it disintegrates.

It's hard to believe, but each day the Earth sweeps up at least 400 tons of meteoric debris. Most of it is microscopic dust that just floats to the ground months or years later. But some of the bits of debris are large

enough to flash as visible meteors. Rarely, a meteor is big enough to travel all the way to the ground and we then call it a meteorite.

The Perseid shower has already begun and it will grow in intensity as we approach the night of August 11/12. That's a Thursday night/Friday morning, so why not take off work on Friday so you can stay up late to see the show!

Find a place where you can lie down on a warm driveway or use a lounge chair, but do your best to get horizontal. That way you will be looking straight up and you can see most of the sky. And you get the added bonus that if you fall asleep you are already lying down! Don't worry about where you look,

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## Perseids (cont'd)

(Continued from page 8)

just keep your eyes open and you will see the fireworks.

The show begins between 9:00 and 10:00 pm on Thursday, August 11<sup>th</sup>, when Perseus rises in the northeast. This is the time to look for Perseid earth grazers - meteors that approach from the horizon and skim the atmosphere overhead like a stone skipping the surface of a pond. These will be less in number, but when you see one you will never forget it!

As the night unfolds, Perseus climbs higher and the meteor rate will increase. Near dawn you could see more than a meteor or two every minute. A good reason to take a look in the hours just before dawn is a prediction that this year could see an unusually high rate of meteors because it is believed that Jupiter nudged the stream of debris that causes the shower closer to Earth's orbit.

The famous Perseid meteor shower has been observed for

about 2000 years, with the first known information on these meteors coming from the Far East. In early Europe, the Perseids came to be known as the "tears of St. Lawrence." Don't miss this one! Mark your calendar now!

Information credits:

<http://stardate.org/nightsky/meteors/>

[http://en.wikipedia.org/wiki/Meteor\\_shower](http://en.wikipedia.org/wiki/Meteor_shower)

Pasachoff, Jay M. 2000. *A Field Guide to the Stars and Planets*. New York, NY. Houghton Mifflin.

Dickinson, Terence 2006. *Nightwatch: a practical guide to viewing the universe*. Buffalo, NY. Firefly Books.

## Leviathan (cont'd)

(Continued from page 7)

M51's spiral nature. At the center is a large stone with a rough etched copy of Parson's drawing. The pathway then goes on to the formal gardens, a delightful spot to rest and enjoy the estate grounds.

Back at the visitor's center, we explored the display room. It has the Parson's extensive family tree going back to the 1500's, and several of the Third Earl's notebooks are open on display. One is open to his engineering notes on polishing procedures and materials, at one point concluding "Only way." There are also letters to and from the noted astronomers of his day. These are remarkable.

When the Parsons started their astronomical endeavors, they were eschewed by the established astronomers from the Royal Society. Nevertheless, the Parsons persevered, and it wasn't long before the best astronomers of the day were coming to

Birr for a look through Leviathan. Irish weather being what it is, they were often stymied by clouds, and found themselves being guests of Lord Rosse for many days and weeks waiting for the chance to observe. These included J. L. E. Dreyer, who spent many months at Birr working on his "New General Catalog." We use his designations today.

Rosse's telescope and his observations proved so important that eventually he—somewhat abashedly—was nominated to be President of the Royal Society in his later years. His polite and thorough discourse in the open letters are perhaps quite revealing to the essential character of the man, and should not be overlooked by any visitor.

I came away from my visit to Birr with a profound respect for William Parsons and his wife Mary. The Leviathan telescope was an enormous undertaking in the mid-1800's both technically

and financially. The Parsons, without any formal astronomical or optical training, managed to create an instrument that was the envy of professional astronomers for decades. They were the first to see the spiral nature of some galaxies. They were among the first to attempt astrophotography.

Most of all, they started as amateurs with a passion and drive that wound up earning the respect of the best professional astronomers of their day. To me, they are positively inspirational people who give all of us rank amateurs something to aspire to.

To anyone whose travel plans take them to Ireland, the detour to Birr Castle, gardens, and the Leviathan telescope are well worth including in the itinerary. Birr is about an hour and 20 minutes from Dublin by car. Don't miss it, and when driving in Ireland remember to stay to the left!

## Venus and Jupiter Prepare for Their Close-up This August

by Dr. Ethan Siegel

As Earth speeds along in its annual journey around the Sun, it consistently overtakes the slower-orbiting outer planets, while the inner worlds catch up to and pass Earth periodically. Sometime after an outer world—particularly a slow-moving gas giant—gets passed by Earth, it appears to migrate closer and closer to the Sun, eventually appearing to slip behind it from our perspective. If you've been watching Jupiter this year, it's been doing exactly that, moving consistently from east to west and closer to the Sun ever since May 9th.

On the other hand, the inner worlds pass by Earth. They speed away from us, then slip behind the Sun from west to east, re-emerging in Earth's



evening skies to the east of the Sun. Of all the planets visible from Earth, the two brightest are Venus and Jupiter, which experience a conjunction from our perspective only about once per year. Normally, Venus and Jupiter will appear separated by approximately  $0.5^\circ$  to  $3^\circ$  at closest approach. This is due to the fact that the Solar System's planets

don't all orbit in the same perfect, two-dimensional plane.

But this summer, as Venus emerges from behind the Sun and begins catching up to Earth, Jupiter falls back toward the Sun, from Earth's perspective, at the same time. On August 27th, all three planets—Earth, Venus and Jupiter—will make nearly a perfectly straight line.

As a result, Venus and Jupiter, at 9:48 PM Universal time, will appear separated by only 4 arc-minutes, the closest conjunction of naked eye planets since the Venus/Saturn conjunction in 2006. Seen right next to one another, it's startling how much brighter Venus appears than Jupiter; at magnitude  $-3.80$ , Venus

*(Continued on page 11)*

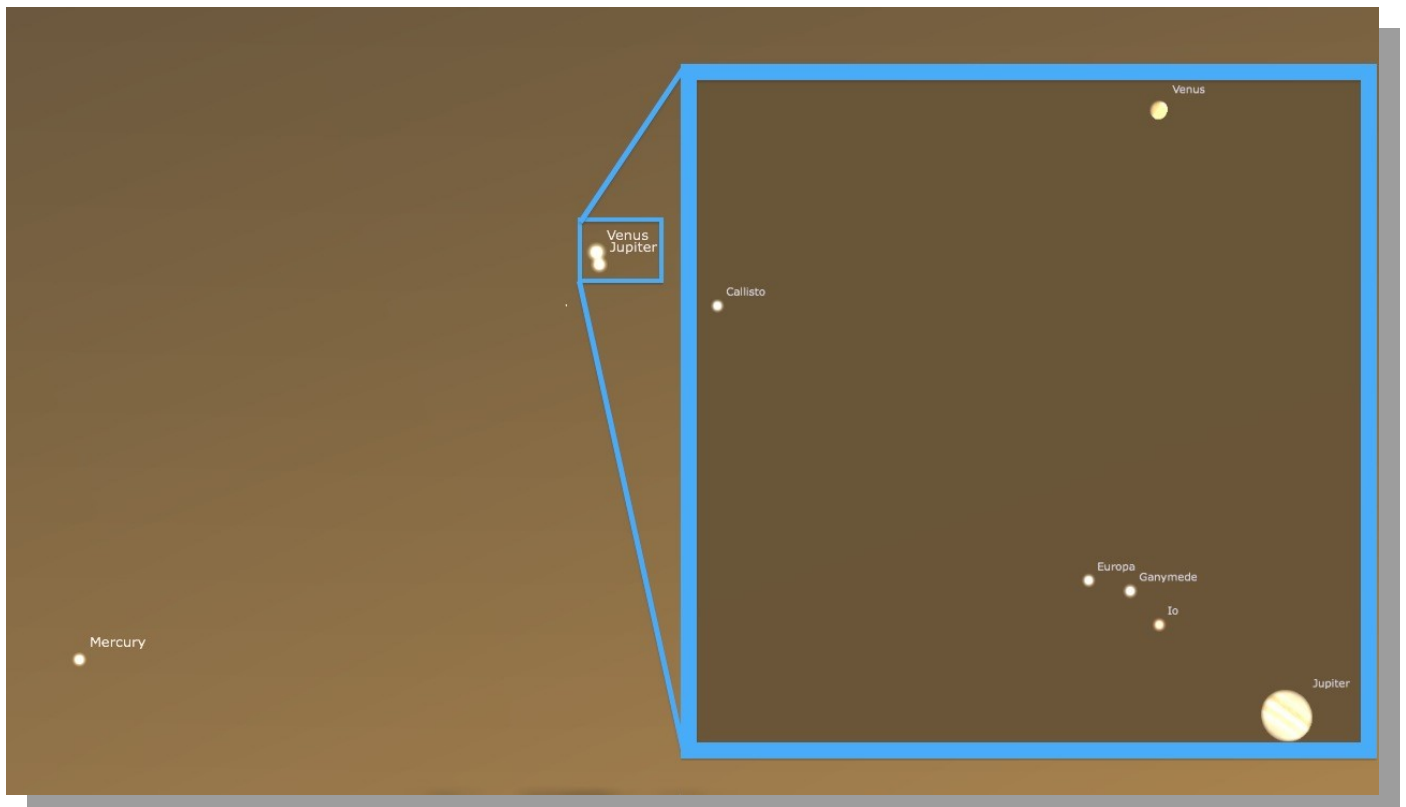


Image credit: E. Siegel, created with Stellarium, of a small section of the western skies as they will appear this August 27th just after sunset from the United States, with Venus and Jupiter separated by less than 6 arc-minutes as shown. Inset shows Venus and Jupiter as they'll appear through a very good amateur telescope, in the same field of view.

## Space Place (Cont'd)

(Continued from page 10)

appears some *eight times brighter than* Jupiter, which is at magnitude -1.53.

Look to the western skies immediately after sunset on August 27th, and the two brightest planets of all—brighter than all the stars—will make a dazzling duo in the twilight sky. As soon as the sun is below the horizon, the pair will be about two fists (at arm's length) to the left of the sun's disappearance and about one fist above a flat horizon.

You may need binoculars to find them initially and to separate them. Through a telescope, a large, gibbous Venus will appear no more distant from Jupiter than Callisto, its farthest Galilean satellite.

As a bonus, Mercury is nearby as well. At just 5° below and left of the Venus/Jupiter pair, Mercury achieved a distant conjunction with Venus less than 24 hours prior. In 2065, Venus will actually occult Jupiter, passing in front of the planet's disk. Until then, the only comparably close conjunctions between these two worlds occur in 2039 and 2056, meaning this one is worth some special effort—including traveling to get clear skies and a good horizon—to see!

To teach kids more about Venus and Jupiter, visit the NASA Space Place webpages titled "[All About Venus](#)" and "[All About Jupiter](#)."

(Continued on page 12)

## Observing (Cont'd)

(Continued from page 5)

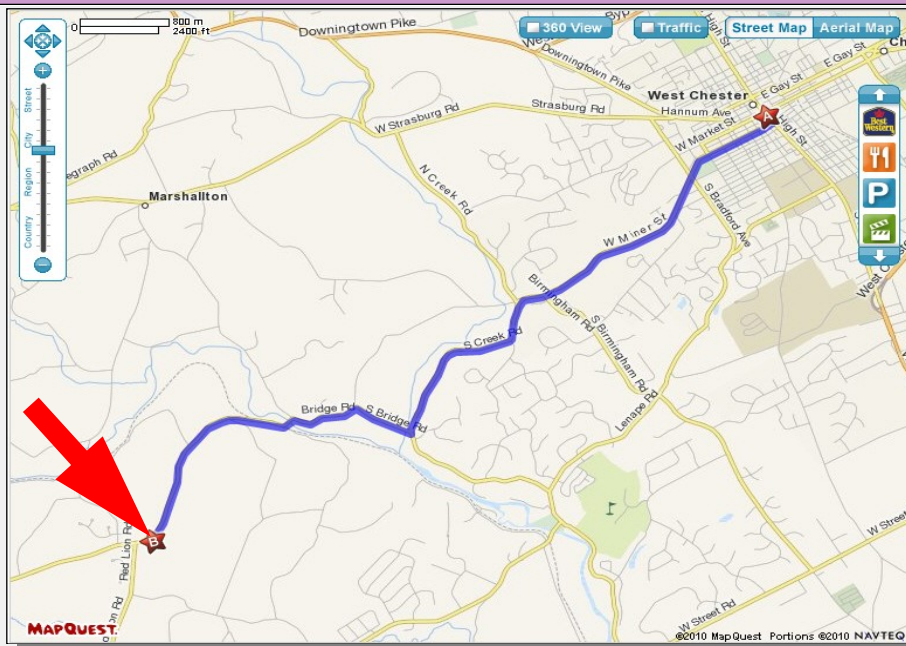
short time from Chester County.

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

**Meteor showers:** It is again time for the best summer meteor shower, the Perseid shower! Viewing conditions should be good this year because the Moon sets around 1 a.m. But my favorite part of this shower is earlier in the evening when you will see fewer shooting stars but you have a good chance of seeing an "Earth grazer" that travels nearly all the way across the sky. When you see a fireball cross the sky you will never forget it.

(Continued on page 12)

## CCAS Directions



### Brandywine Red Clay Alliance

1760 Unionville Wawaset Rd  
West Chester, PA 19382  
(610) 793-1090

<http://brandywinewatershed.org/>

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

### Brandywine Red Clay Alliance

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

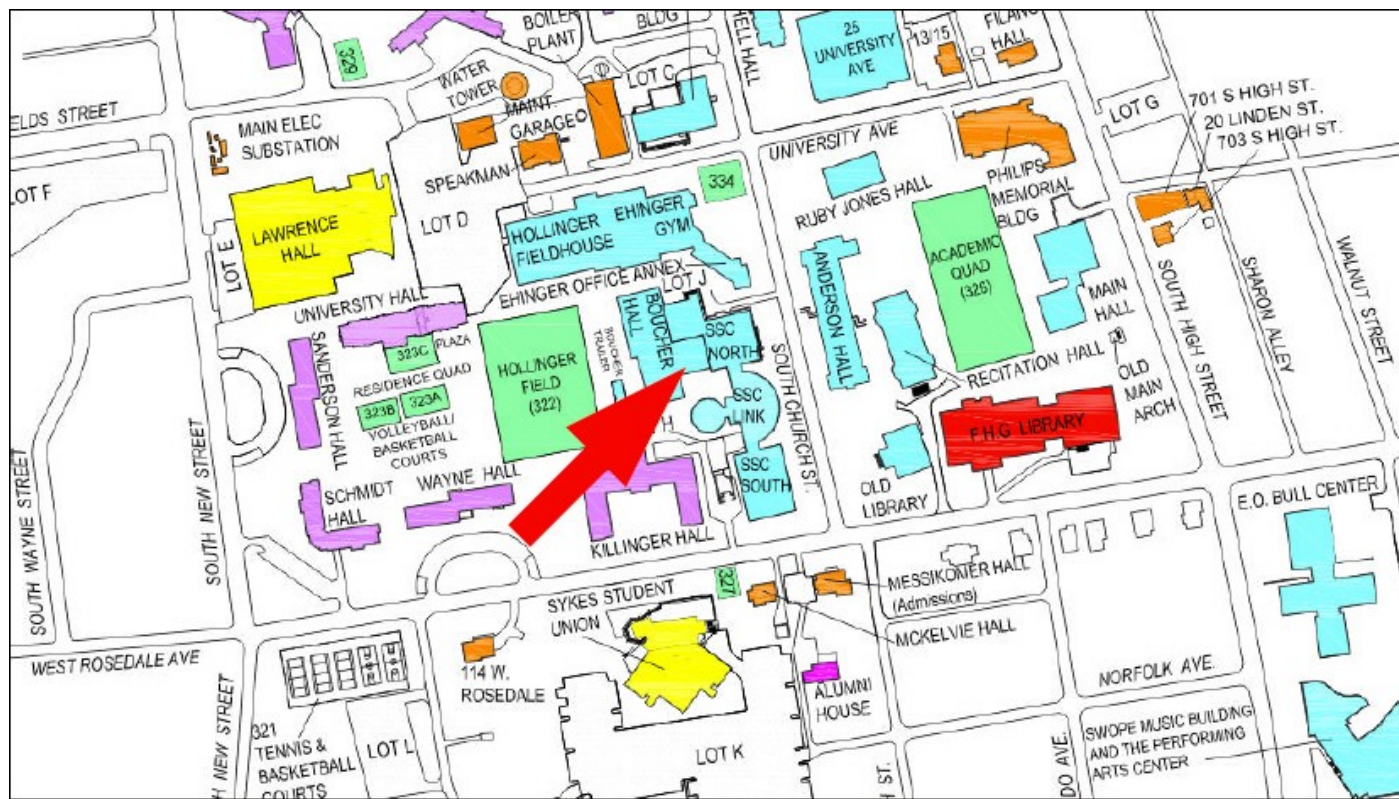
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route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

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

## CCAS Directions

### West Chester University Campus

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



### Observing (Cont'd)

*(Continued from page 11)*

However, a good reason to take a look in the hours just before dawn is a prediction that this year could see an unusually high rate of meteors because it is believed that Jupiter nudged the stream of debris that causes the shower closer to Earth's orbit.

### Space Place (Cont'd)

*(Continued from page 11)*

*This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](http://spaceplace.nasa.gov) to explore space and Earth science!*

### CCAS Membership Information and Society Financials

#### Treasurer's Report by Don Knabb

<b>July 2016 Financial Summary</b>	
Beginning Balance	\$2,806
Deposits	\$42
Disbursements	<u>\$0</u>
Ending Balance	\$2,848

#### New Member Welcome!

Welcome new CCAS member Bob Tiedemann from Parkesburg, 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.

**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](mailto: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>



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](mailto:newsletter@ccas.us)

Or mail the contribution, typed or handwritten, to:

**John Hepler**  
21103 Stripper 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](mailto: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](mailto: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:

<b>President:</b>	Roger Taylor 610-430-7768
<b>Vice President:</b>	Liz Smith 610-842-1719
<b>ALCor, Observing, and Treasurer:</b>	Don Knabb 610-436-5702
<b>Secretary:</b>	Ann Miller 610-558-4248
<b>Librarian:</b>	Barb Knabb 610-436-5702
<b>Program:</b>	Dave Hockenberry 610-558-4248
<b>Education:</b>	Kathy Buczynski 610-436-0821
<b>Webmaster and Newsletter:</b>	John Hepler 410-639-4329
<b>Public Relations:</b>	Deb Goldader 610-304-5303



### CCAS Membership Information

The present membership rates are as follows:

<b>REGULAR MEMBER</b> .....	\$25/year
<b>SENIOR MEMBER</b> .....	\$10/year
<b>STUDENT MEMBER</b> .....	\$ 5/year
<b>JUNIOR MEMBER</b> .....	\$ 5/year
<b>FAMILY MEMBER</b> .....	\$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](mailto:treasurer@ccas.us)

### Sky & Telescope 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**.