



# Observations

A Monthly Publication Of The  
CHESTER COUNTY ASTRONOMICAL SOCIETY

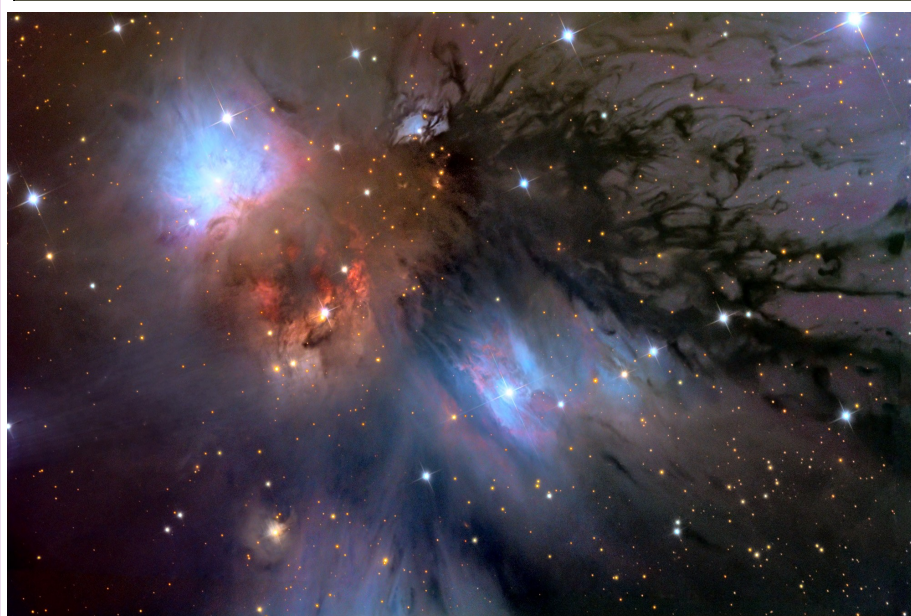
Vol. 25, No. 3 **Three-Time** Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016

March 2017

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## NGC 2170: Still Life with Reflecting Dust



*Image Credit & Copyright: Adam Block, Mt. Lemmon SkyCenter, U. Arizona* In this beautiful celestial still life composed with a cosmic brush, dusty nebula NGC 2170 shines at the upper left. Reflecting the light of nearby hot stars, NGC 2170 is joined by other bluish reflection nebulae, a compact red emission region, and streamers of obscuring dust against a backdrop of stars. Image retrieved from [Astronomy Picture of the Day](#) on March 4, 2017.

## Membership Renewals Due

03/2017	Angelini Fulton Sterrett
04/2017	Hepler Imburgia Miller Richter
05/2017	Cunningham Deis, R. Deis, M. Klapholz LaFrance O'Hara

## March 2017 Dates

- 5th** • First quarter Moon, 6:32 a.m. EST
- 12th** • Daylight Saving Time begins, 2:00 a.m. Set clocks one hour ahead.
- 12th** • Full Moon, the Full Worm Moon, 10:53 a.m. EDT
- 20th** • Last quarter Moon, 11:58 a.m. EDT
- 20th** • Spring Equinox, 6:32 a.m. EDT
- 27th** • New Moon, 10:57 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, April 1, 2017** - CCAS Special Observing Session, Hoopes Park West Chester, PA, from 8:00 to 9:30 p.m. This event is open to the general public.
- ☼ **Saturday, April 22, 2017** - CCAS Special Observing Session at Bucktoe Creek Preserve, Avondale, PA, from 8:30 to 10:00 p.m. This event is open to the general public.
- ☼ **Saturday, April 29, 2017** - CCAS Special Observing Session celebrating International Astronomy Day, Nottingham County Park, Nottingham, PA, from 8:00 to 10:00 p.m. This event is open to the general public.

## Winter/Spring 2017 Society Events

### March 2017

**1st** • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**9th-10th** • The von Kármán Lecture Series: [The Cold Atom Laboratory Mission: The Coldest Spot in the Universe](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**10th** • Reservations open for the March 31st planetarium show. To make a reservation, visit the [WCU Public Planetarium Shows](#) webpage.

**12th** • Daylight Saving Time starts at 2:00 a.m. Turn clocks ahead one hour.

**14th** • 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. CCAS Guest Speaker: Gordon Richards, PhD, from Drexel University will present "The LSST and Upcoming Discoveries."

**20th** • Spring Equinox, 6:23 a.m. EDT. First day of Spring.

**20th** • Open call for articles and photographs for the April 2017 edition of [Observations](#).

**24th** • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

**26th** • Deadline for newsletter submissions for the April 2017 edition of [Observations](#).

**31st** • West Chester University Planetarium Show: "A Universe of Galaxies" 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.

### April 2017

**1st** • CCAS Special Observing Session, Hoopes Park West Chester, PA, from 8:00 to 9:30 p.m. This event is open to the general public.

**5th** • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**6th-7th** • The von Kármán Lecture Series: [Harnessing Our Sun's Light to Explore Our Planet and the Universe](#) at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**7th** • Reservations open for the April 28th planetarium show. To make a reservation, visit the [WCU Public Planetarium Shows](#) webpage.

**11th** • CCAS Monthly Meeting, Room 112, 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. CCAS Member Speaker: Dennis O'Leary.

**20th** • Open call for articles and photographs for the May 2017 edition of [Observations](#).

**21st** • CCAS Monthly Observing Session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

**22nd** • CCAS Special Observing Session at Bucktoe Creek Preserve, Avondale, PA, from 8:30 to 10:00 p.m. This event is open to the general public.

**26th** • Deadline for newsletter submissions for the May 2017 edition of [Observations](#).

**28th** • West Chester University Planetarium Show: "A Total Solar Eclipse," 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.

**29th** • CCAS Special Observing Session celebrating International Astronomy Day, Nottingham County Park, Nottingham, PA, from 8:00 to 10:00 p.m. This event is open to the general public.

## Minutes from the February 14, 2017, CCAS Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor welcomed 22 members and guests to our Valentine's Day meeting on February 14, 2017.
- Roger presented the Astronomical League Outreach Award to Barb Knabb. This award is given by the Astronomical League to individuals who promote the hobby of astronomy through sharing, teaching, and mentoring.
- Roger next presented the NASA Night Sky Awards certificates and pins to many club members. These awards were given in recognition of "sharing the wonders of the night sky and the inspiration of the NASA missions with students, families, and your community." The awards were given to John Conrad, Steve Leiden, Roger Taylor, Herb Rosenblatt, Harriet Rosenblatt, Andy Moynihan, Gary Calobrisi, Bea Mazziot-ta, Ed Lurcott, Barb Knabb, Don Knabb, Pete Kellerman, David Hockenberry, and Ann Miller at our meeting. Also receiving the award but not present were Kathy Buczynski, David Linskens, Karen Moynihan, Colin Moynihan, Linda Taylor, Sue Johnston, Don Miller, Dennis O'Leary and Liz Smith. Thanks to all who so generously contribute to our club outreach programs at star parties and classes.
- Don Knabb shared the highlights of the night sky for the next month using the Sky Safari app. Don highlighted several clusters that he admits are named through "averted imagination."
- Don made several recommendations of history in the night sky. Mizar, the easily split visual target, was historically used as a test of visual acuity.
- Don recommended reading "The Glass Universe" by Dava Sobel. It is the story of "the women employed by the Harvard College Observatory in the mid nineteenth century to be used as human computers to interpret the observations their male counterparts made of the night sky via the

(Continued on page 9)

## March 2017 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on March 14, 2017, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. Our guest speaker is Gordon Richards, PhD, from Drexel University, who will present "The LSST and Upcoming Discoveries."

For our April meeting, CCAS Member Denis O'Leary will be our featured speaker. For our meeting in May, Ed Guinan, PhD, from Villanova University will present "Proxima Centauri

B – Is Anybody Home at our Closest Star?"

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 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).



## Juno Will Stay in Current Orbit Around Jupiter

by Dave Dickinson, *Sky & Telescope Magazine*



Stormy times over Jupiter's southern pole. This image was captured by JunoCam on February 2, 2017, from a range of 62,800 miles (101,000 kilometers). NASA / JPL-Caltech / SwRI / MSSS / John Landino

NASA has decided to leave the Juno spacecraft in its current 53-day orbit around Jupiter for the remainder of the mission. The decision follows the discovery of a possible engine malfunction in October 2016. Maintaining a wide-ranging orbit will allow the spacecraft's instruments to safely complete the mission's science objectives, while avoiding the risk of another engine malfunction stranding the spacecraft in an unplanned orbit.

"Juno is healthy, its science instruments are fully operational, and the data and images we've received are nothing short of amazing," says Thomas Zurbuchen (NASA-Science Directorate) [in a recent press release](#). "The decision to forego the burn is the right thing to do — preserving a valuable asset so that Juno can continue its exciting journey of discovery."

Launched on August 5, 2011, atop an Atlas 5 rocket from Cape Canaveral Air Force Station, [Juno entered its initial and current orbit](#) on July 4, 2016.

The plan was to make two wide [initial capture orbits](#) around Jupiter, burning the main engine on October 19, 2016, to enter a series of 34 shorter, 14-day science orbits.

However, the unexpected occurred last October: [Juno went into safe mode](#) following what was to be the final firing of the spacecraft's main engine. Telemetry later indicated that a pair of helium check valves in the main engine took several minutes to open, longer than on previous firings.

Engineers analyzed the situation and decided that the best bet was for the spacecraft to stay put, rather than risk another firing of the main engine. Juno will still be able to accomplish its main mission objectives, including probing the magnetosphere, radiation belts, and the gas giant's deep interior. It will now focus on documenting the far reaches of the planet's magnetic field as well. Also, the quality of the data gathered on each pass will remain the same, as the closest

passage on the current orbit is identical to those on the hoped-for science orbits. The only difference now is the span of time between passes.

Juno's current orbit takes it from a perijove (closest approach) of just 2,600 miles (4,100 kilometers) over the Jovian cloud tops, to far out past the orbit of Callisto with an apojove of 5 million miles (8.1 million kilometers) distant.

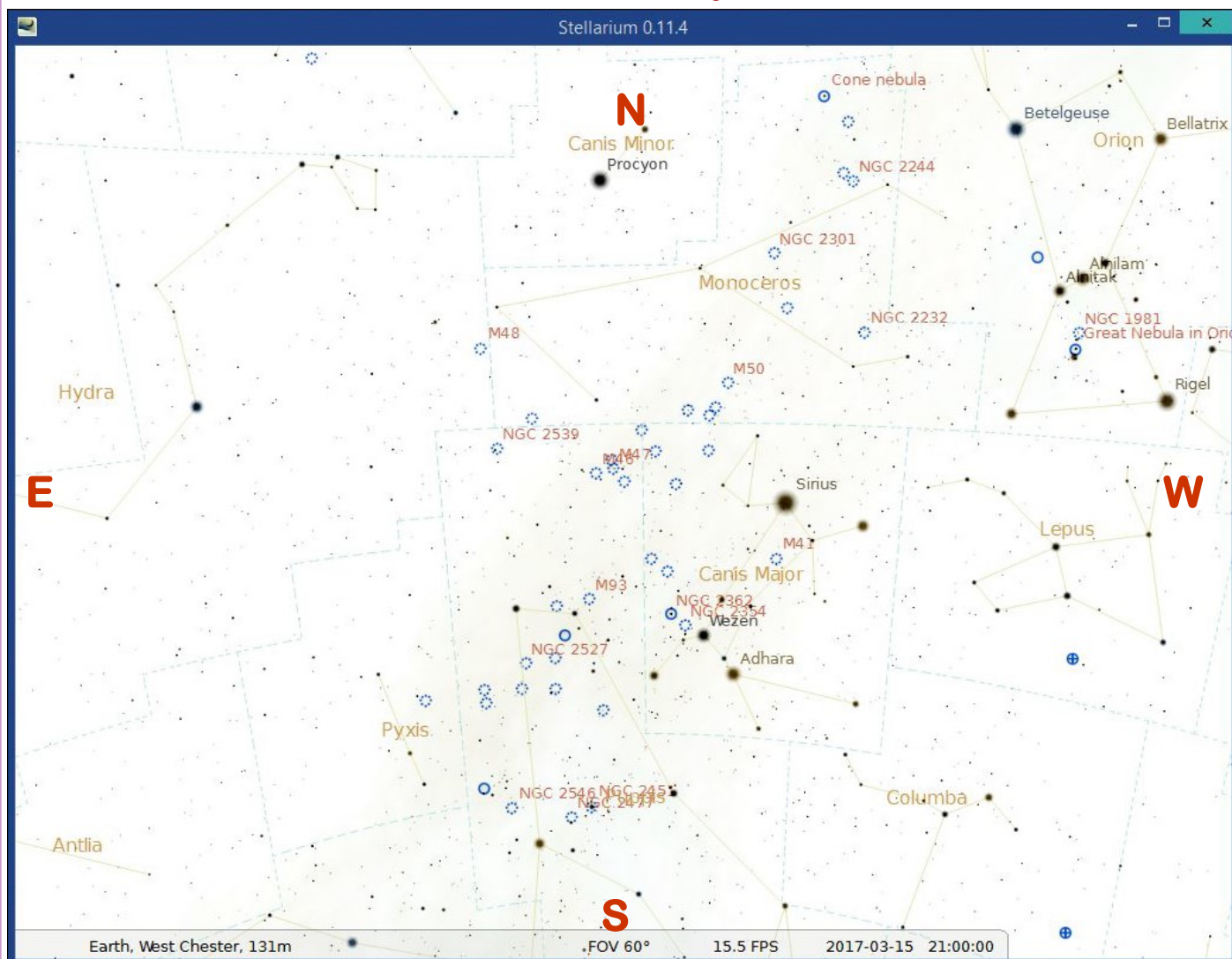
Juno has completed four orbits of Jupiter thus far, giving us some amazing never-before-seen views of the [planet's polar regions](#), and we're expecting to see some of the first science papers using this data in the coming months. [Citizen scientists](#) are also making good use of images provided by JunoCam, presenting us with some compelling views. The next perijove pass is set for March 27, 2017.

There's another silver lining to the engine anomaly, as Juno may get a brief reprieve before its grand finale. The original plan called for the mission to terminate by entry into Jupiter's atmosphere about a year from now, in February 2018. Juno receives a large amount of radiation on each successive pass, degrading the instruments and spacecraft controls. Engineers planned for a controlled entry in order to protect Jovian moons, such as Europa, from contamination. Orbital precession also carries Juno deeper into Jupiter's radiation belts on each successive pass. Now, NASA plans to operate the mission through July 2018, for a total of 12 orbits, before proposing for a mission extension.

# The Sky Over Chester County

March 15, 2017 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
3/01/2017	6:02 a.m. EST	6:33 a.m. EST	5:52 p.m. EST	6:19 p.m. EST	11h 19m 16s
3/15/2017	6:44 a.m. EDT	7:11 a.m. EDT	7:07 p.m. EDT	7:34 p.m. EDT	11h 56m 01s
3/31/2017	6:18 a.m. EDT	6:45 a.m. EDT	7:24 p.m. EDT	7:51 p.m. EDT	12h 38m 15s
Moon Phases					
First Quarter	3/05/2017	6:32 a.m. EST	Full Moon	3/12/2017	10:53 a.m. EDT
Last Quarter	3/20/2017	11:58 a.m. EDT	New Moon	3/27/2017	10:57 p.m. EDT

## March 2017 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

4	The Moon occults Aldebaran at approximately 11:10 p.m.
5	First Quarter Moon, 6:32 a.m. EST
6	The Lunar Straight Wall (Rupes Recta) is visible
12	Daylight Saving Time begins
12	Full Moon, the Full Worm Moon, 10:53 a.m. EDT
14	The Moon, Jupiter and Spica for a triangle in the east around 10 p.m.
15	The Zodiacal Light is visible after evening twilight for the next 2 weeks
20	Last Quarter Moon, 11:58 a.m. EDT
20	Spring equinox, 6:32 a.m.
27	New Moon, 10:57 p.m. EDT

**The best sights this month:** Watch as Venus falls from the evening sky as March progresses. It will drop quickly and appear in the morning sky at the end of the month. On March 12<sup>th</sup> the Moon occults Aldebaran in Taurus. This is an amazing event to watch as Aldebaran will “wink out” as the Moon passes between the star and our line of sight.

At the end of March, we have our best opportunity of 2017 to see Mercury. Use binoculars about a half hour after sunset to add this dim planet to your “life list”.

**Mercury:** Mercury enters the evening sky around mid-month and passes 8 degrees from Venus on the 18<sup>th</sup>. At the end of the month we have a great opportunity to see Mercury as it will be 12 degrees above the horizon at sunset and still 7 degrees high 30 minutes after sunset. The best day of the year to see Mercury is on April 1<sup>st</sup> when it will be at its highest point in the evening sky.

**Venus:** Our sister planet passes Earth in our race around the Sun on March 24<sup>th</sup>. This is called inferior conjunction. Because Venus’ orbit is approximately 8 degrees north of the Sun we are actually able to see it in the evening sky and the morning sky in the

days around inferior conjunction. I will miss seeing that bright “evening star” in the glow of the setting Sun. Venus will show a thin crescent in a telescope or binoculars.

**Mars:** Dim Mars is visible in the west as the glow of the sunset fades, setting about 3 hours after the Sun.

**Jupiter:** Jupiter rises well after dark and is highest in the sky after midnight all month. On the 14<sup>th</sup> Jupiter, Spica and the waning gibbous Moon make a nice grouping in the eastern sky around 10 p.m.

**Saturn:** The ringed planet is still an early morning object, rising high into the sky just before dawn.

**Uranus and Neptune:** Uranus is below Mars in the west and is falling into the glow of the sunset during March. Neptune passes behind the Sun on the 2<sup>nd</sup>, so it is not visible all month.

**The Moon:** Full Moon is on March 12<sup>th</sup>. This is the Full Worm Moon according to Native Americans. As the temperature warms and the ground begins to thaw, earthworm casts appear (an earthworm cast is a nice word for worm poop), heralding the return of the robins. This full moon is also called the Full Crow Moon, the Full Crust Moon and the Full Sap Moon.

On March 4<sup>th</sup> the Moon occults Aldebaran in Taurus around 11:00 p.m. This is an amazing event to watch through a telescope.

**Constellations:** In mid-March around 9:00 pm the winter constellations are in the western half of the sky heading toward their summer sleep before too many weeks pass. Catch the Pleiades, Taurus and Orion before we lose them to the spring constellations that are rising in the east. In the spring constellation group Leo the Lion is heading toward center stage. The Big Dipper in Ursa Major is high overhead. Follow the arc of the Dipper handle to bright Arcturus in Boötes.

**Messier/deep sky:** There are many wonderful deep sky sights as winter turns to spring. Early in the evening look to the left of Canis Major, Orion’s

*(Continued on page 7)*



## Through the Eyepiece: M 46, Open Cluster in Puppis

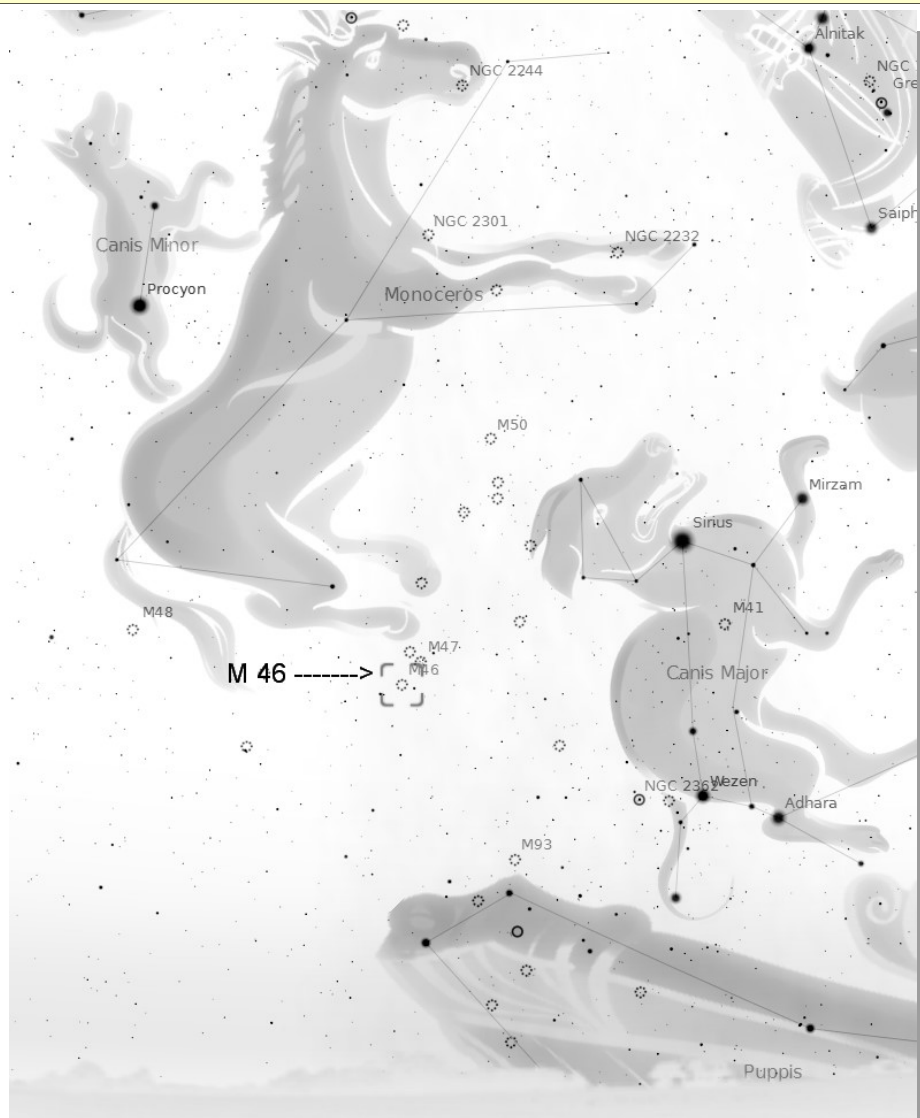
by Don Knabb, CCAS Treasurer & Observing Chair

During March we have a chance to look at some southern constellations as they peek above the horizon for a few weeks before they disappear below the horizon in mid spring. One of these constellations is Puppis and it contains a beautiful open cluster, M 46. Terence Dickinson in his classic book *Night-watch* refers to M 46 as "beautiful in small scopes; richest in this region."

I recently observed M 46 as I was seeking Messier objects in pursuit of the Astronomical League Messier Club. I was immediately struck by the beauty of this open cluster. It is a large cluster with many small stars. To me it appears to be a slightly smaller and brighter version of one of my favorite open clusters, Caroline's Rose, NGC 7789 in Cassiopeia. M 46 is a dramatic contrast to open cluster M 47 just to the west of M 46. M 47 is a sparse cluster with several bright stars.

*Puppis* is the Latin word for the poop deck of a ship, and Puppis represents the deck of the ship and its deckhouses. Puppis was originally part of an over-large constellation, the ship of "Jason and the Argonauts", Argo Navis, which was centuries later divided into three parts, the other two being Carina (the keel and hull), and Vela (the sails of the ship).

It is actually easier to find M 46 using the bright star Sirius as a guide as you can see on the star chart below. Just scan to the left (east) of Sirius with your binoculars and you will find both M 46 and M 47.



*Sky map made with Stellarium planetarium software*

M 46 was discovered by Charles Messier in 1771. Messier added it to his catalog three days after publishing the first edition of his list (containing M 1 - M 45).

M 46 appears in a rich region of the Milky Way in northern Puppis, about 1.5 degrees east of M 47. The two clusters fit well in a binocular or wide-angle telescope field. M 46 is very rich, with 150 stars of magnitude 10 - 13, and probably a total popula-

tion over 500 stars. Its members are scattered over an angular diameter of about 27 arc minutes; the brightest is of apparent magnitude 8.7. The cluster has a total visual magnitude of 6.0.

If you use a large telescope you might also see NGC 2438, a planetary nebula within the cluster, near its northern fringes. However, this nebula is probably not a member of the

*(Continued on page 7)*

## Eyepiece (cont'd)

*(Continued from page 6)*

cluster. Planetary nebulas are late states in stellar evolution, visible only for a few thousands of years before their material disperses into interstellar space. They occur only for stars of less than 3 solar masses (more massive stars go supernova). These stars, however, need more than a billion years to evolve until they eject their envelope to form the planetary nebula. This is much longer than the age of M 46.

Below is a picture taken by CCAS member Pete LaFrance from his observatory in Avondale, Pennsylvania. What an eyepiece full of stars this is!

NGC 2438 can be seen near the top of Pete's picture, just to the left of center.

So if we get a break from the March winds, grab your binoculars or telescope and seek out M 46 and enjoy this beautiful open cluster.

Information sources:

Sky Safari Pro planetarium software

[http://en.wikipedia.org/wiki/File:Puppis\\_IAU.svg](http://en.wikipedia.org/wiki/File:Puppis_IAU.svg)

<http://en.wikipedia.org/wiki/Puppis>

## Observing Cont'd)

*(Continued from page 5)*

hunting dog companion, for M46, a beautiful open cluster. The star clusters in Auriga are heading toward the western horizon but are still well positioned for viewing through the minimum amount of atmosphere early in the evening. Later in the night look overhead to find the galaxies M81 and M82 in Ursa Major. And use your binoculars to look for M35 in Gemini, an open star cluster containing several hundred stars in an area the size of the full Moon.

**Comets:** At the end of the month

*(Continued on page 10)*



*Photo courtesy of CCAS Member Pete LaFrance*



## Solar Eclipse Provides Coronal Glimpse

by Marcus Woo

On August 21, 2017, North Americans will enjoy a rare treat: The first total solar eclipse visible from the continent since 1979. The sky will darken and the temperature will drop, in one of the most dramatic cosmic events on Earth. It could be a once-in-a-lifetime show indeed. But it will also be an opportunity to do some science.

Only during an eclipse, when the moon blocks the light from the sun's surface, does the sun's corona fully reveal itself. The corona is the hot and wispy atmosphere of the sun, extending far beyond the solar disk. But it's relatively dim, merely as bright as the full moon at night. The glaring sun, about a million times brighter, renders the corona invisible.

"The beauty of eclipse observations is that they are, at present, the only opportunity where one can observe the corona [in visible light] starting from the solar surface out to several solar radii," says Shadia Habbal, an astronomer at the University of Hawaii. To study the corona, she's traveled the world having experienced 14 total eclipses (she missed only five due to weather). This summer, she and her team will set up identical imaging systems and spectrometers at five locations along the path of totality, collecting data that's normally impossible to get.

Ground-based coronagraphs, instruments designed to study the corona by blocking the sun, can't view the full extent of the corona. Solar space-based telescopes don't have the spectrographs needed to measure how



the temperatures vary throughout the corona. These temperature variations show how the sun's chemical composition is distributed—crucial information for solving one of long-standing mysteries about the corona: how it gets so hot.

While the sun's surface is ~9980 Farenheit (~5800 Kelvin), the corona can reach several millions of degrees Farenheit. Researchers have proposed many explanations involving magnetoacoustic waves and the dissipation of magnetic fields, but none can account for the wide-ranging temperature distribution in the corona, Habbal says.

You too can contribute to science through one of several citizen science projects. For example, you can also help study the corona through the Citizen CATE experiment; help produce a high definition, time-expanded video of the eclipse; use your ham radio to probe how an eclipse affects the propagation of radio waves in the ionosphere; or even observe how wildlife responds to such a unique event.

Otherwise, Habbal still encourages everyone to experience the eclipse. Never look directly at the sun, of course (find more safety guidelines here: <https://eclipse2017.nasa.gov/safety>).

But during the approximately 2.5 minutes of totality, you may remove your safety glasses and watch the eclipse directly—only then can you see the glorious corona. So enjoy the show. The next one visible from North America won't be until 2024.

For more information about the

*(Continued on page 9)*

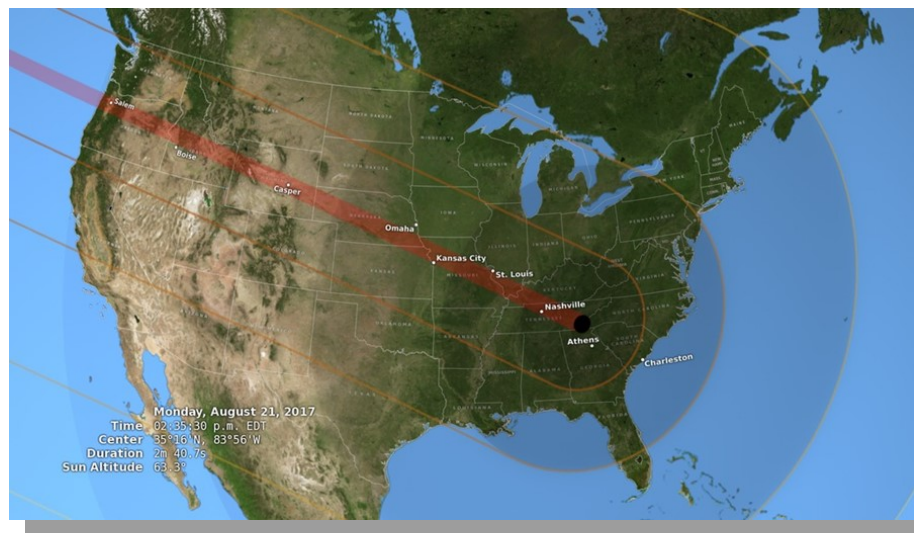


Illustration showing the United States during the total solar eclipse of August 21, 2017, with the umbra (black oval), penumbra (concentric shaded ovals), and path of totality (red) through or very near several major cities. Credit: Goddard Science Visualization Studio, NASA



## Space Place (Cont'd)

(Continued from page 8)

upcoming eclipse, please see:

### NASA Eclipse citizen science page

<https://eclipse2017.nasa.gov/citizen-science>

### NASA Eclipse safety guidelines

<https://eclipse2017.nasa.gov/safety>

Want to teach kids about eclipses? Go to the NASA Space Place and see our article on solar and lunar eclipses! <http://spaceplace.nasa.gov/eclipses/>

*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!*

## Minutes (Cont'd)

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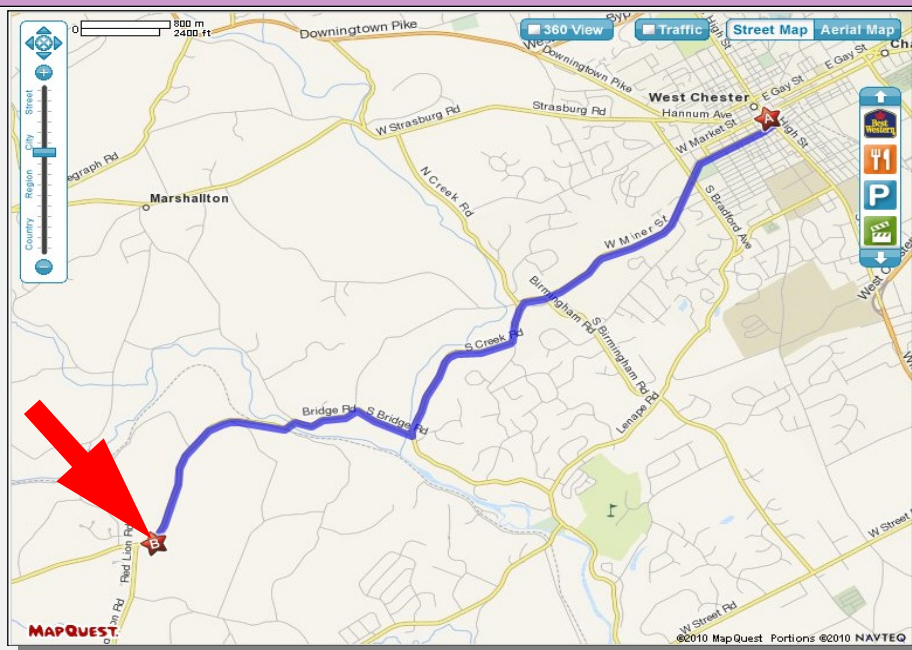
telescope."

- Don also recommends the movie "Hidden Figures" which is in the movie theaters now. Hidden Figures is the "incredible untold story of Katherine G. Johnson, Dorothy Vaughan, and Mary Jackson who were African American mathematicians at NASA who calculated flight trajectories for Project Mercury and their missions." Their calculations allowed for the successful launch and safe re entry of John Glenn and Friendship Seven space craft. Katherine also calculated the trajectories for Apollo 11 and Apollo 13.
- Dave Hockenberry introduced our speaker, John Conrad. John is a CCAS club member and NASA Solar System Ambassador. John presented "Cassini-Huygens: Mission to Saturn

and Titan." The mission launch was October 15, 1997. The Grand Finale Timeline for the mission was initiated November 30, 2016 where the ring grazing orbit begins. On April 22, 2017 begins the last targeted Titan flyby. September 11, 2017 is the last non-targeted Titan flyby. September 15, 2017 is the scheduled day for the probe to intentionally dive into the gas giants atmosphere.

- You can review the Top Ten discoveries at Titan by the European Space Agency research team at <http://sci.esa.int/Cassini-Huygens/55221-Huygens-Titan-science-highlights/>.
- For more information about the *Titan: Cold Case Files* you can find information at [Saturn.jpl.nasa.gov](http://Saturn.jpl.nasa.gov).

## 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)

look for Comet 41P/Tuttle-Giacobini-Kresak near the bowl of the Big Dipper. If predictions hold true, the comet could reach 5<sup>th</sup> or 6<sup>th</sup> magnitude which will make for easy viewing in binoculars or a telescope. A sky map is in the March issue of Astronomy Magazine or on the [Astronomy Magazine website](#).

**Meteor showers:** There are no major meteor showers during March.

### CCAS Membership Information and Society Financials

#### Treasurer's Report by Don Knabb

##### Feb. 2017 Financial Summary

Beginning Balance	\$1,446
Deposits	\$60
Disbursements	\$0
Ending Balance	\$1,506

#### New Member Welcome!

Welcome new CCAS member John Scovill of Paoli, PA. We're glad you decided to rejoin 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!

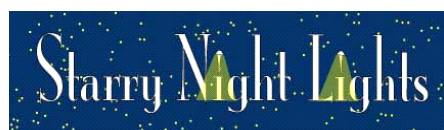
Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

<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:

**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](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**.

