Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 18, No. 11 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ¤ 2006 & 2009* *November 2010*

In This Issue

Membership Renewals Due

11/2010	Athens Hepler Holenstein O'Hara
12/2010	Constante Goll Gupta Hardie, Jr. Jafar
01/2011	Bronstein Lessley Smith Thota

A Night of Stars at Marion Center High School

by John Hepler, CCAS Webmaster & Newsletter Editor

Amy Rankin, one of 40 IUP Elementary Education majors assisted in a star party at Marion Center High School, organized by Randy Corosu, Marion Center Middle School science teacher. See page 8 for story.

Important November 2010 Dates

6th • New Moon 2:52 a.m.

7th • Daylight Savings Time ends at 2:00 a.m.

13th • First Quarter Moon 11:39 a.m.

17th • Leonid meteor shower peaks.

21st • Full Moon 12:27 p.m.

28th • Last Quarter Moon 3:36 p.m.

CCAS Upcoming Nights Out

CCAS has several "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 5, 2010** - Night Out at Springton Manor, Glenmoore, PA.

¤ **Friday, November 12/Saturday, November 13, 2010** - Jupiter Star Party, Simpson Meadows, Downingtown, PA.

Fall/Winter 2010 Society Events

November 2010

4th • PA Outdoor Lighting Council monthly meeting, starting at 7:30 p.m. Meetings are open to the public. For more information and directions, visit the PA Outdoor Lighting Council website (http://www.polcouncil.org/).

5th • CCAS Monthly Observing Session, Night Out at Springton Manor, Glenmoore, PA.

9th • DVD Lecture Series: "When Geometry is Destiny," half-hour video presentation of a lecture by Professor Alex Filippenko, UC Berkeley. Room 113, Merion Science Center (former Boucher Building), West Chester University. The presentation immediately precedes the monthly meeting and starts at 7:00 p.m.

9th • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. Guest Speaker, Dr. Beth William, PhD, Haverford College: "On (Nearly) Invisible Galaxies." The meeting starts at 7:30 p.m.

12th • West Chester University Planetarium Show, "Raining Stars", Schmucker Science Building, Show starts at 7 p.m. and run approximately one hour in length. For more information and reservations, please contact Dr. Karen Vanlandingham, Planetarium Director, via the planetarium's webpage (http://geology.wcupa.edu/planetarium).

20th • Open call for articles and photographs for the December 2010 edition of Observations.

20th • Reservations start for the December 11th planetarium show at the WCU Planetarium. For more information, please contact Dr. Karen Vanlandingham, Planetarium Director, via the planetarium's webpage.

26th • Deadline for newsletter submissions for the December 2010 edition of *Observations*.

December 2010

2nd • PA Outdoor Lighting Council monthly meeting, starting at 7:30 p.m. Meetings are open to the public. For more information and directions, visit the PA Outdoor Lighting Council website (http://www.polcouncil.org/).

10th • CCAS Monthly Observing Session, Myrick Conservancy Center, BVA (inclement weather date December 11th).

10th • West Chester University Planetarium Show, "The Final Frontier," Schmucker Science Building, Show starts at 7 p.m. and run approximately one hour in length. For more information and reservations, please contact Dr. Karen Vanlandingham, Planetarium Director, via the planetarium's webpage.

14th • CCAS Holiday Party in West Chester, PA. The party is for CCAS members and their families and starts at 6:00 p.m. See the December 2010 edition of *Observations* for location and directions.

20th • Open call for articles and photographs for the January 2011 edition of Observations.

26th • Deadline for newsletter submissions for the January 2011 edition of *Observations*.

Minutes from the October 2010 CCAS Monthly Meeting

by Don Knabb, CCAS Secretary and Observing Chair

- Approximately 15 members were in attendance.
- DVD presentation: *The Age of the Universe* was shown.
- Program – Vic Long presented *"Classic Japanese Telescopes and My Experience Restoring One, or How I Saved a Nice Old Scope from the Dumpster."* [Ed. Note: Thanks Vic! I hear it was great!]
- The BVA observing session the previous Friday was well attended with approximately 16 members and guests enjoying the clear skies.
- There is a Jupiter party scheduled for Simpson Meadows on November 12th or 13th.
- Constellation of the Month: Dave Hockenberry presented Piscis Austrinus. We need volunteers to present constellations for the next few meetings.
- A discussion was held on how to involve the young members of the club. We could consider an activity at the start of the meeting instead of the DVD presentation one month, or set up a program for young members to present any astronomy projects they might be working on.

CCAS Original Astrophotography

by Don Knabb

September Harvest Moon, taken in West Chester with a Canon 7D DLSR.

November 2010 Guest Speaker

by Dave Hockenberry, CCAS Program Chair

Dr. Beth Willman

Originally scheduled for earlier this year, this month's guest speaker is Dr. Beth Willman. Her topic is "On (Nearly) Invisible Galaxies."

Dr. Willman is a professor of Physics and Astronomy at Haverford College. She received her B.A. in astrophysics at Columbia University and a Ph.D. in astronomy at the University of Washington. She has been a James Arthur Fellow at the Center for Cosmology and Particle Physics, and a Clay Fellow at the Harvard-Smithsonian Center for Astrophysics.

The focus of her research is to use comparisons between theory and observations of the local universe to learn about dark matter and galaxy formation. In particular, she investigates whether observations of the Milky Way and the ultra-faint galaxies orbiting it are consistent with the Cold Dark Matter model of the Universe.

2011 Spring Speaker Series

by Dave Hockenberry, CCAS Program Chair

We are looking for speakers for our 2010-2011 Spring season. If you have any suggestions for future speakers, or are interested in being a speaker yourself, please contact Dave Hockenberry at programs@ccas.us.

We are also looking for Constellation of the Month (COM) presenters for the 2011 season. COM is a great way to learn the night sky and a useful tool if you are pursuing one of the Astronomical League's observing club awards. Participating is easy! Contact Kathy Buczynski at vp@ccas.us for a COM template to fill out.

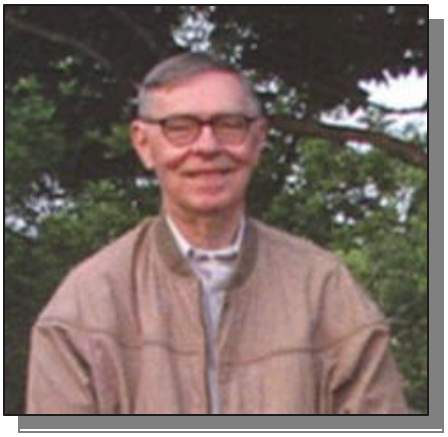
Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change to the program, CCAS members will be notified via e-mail with as much advance notice as possible.

Remembering Robert H. Koch

by Joanne Koch, Michael Corcoran, Bruce Holenstein & Edward Sion

Robert H. Koch, emeritus professor of astronomy and astrophysics at the University of Pennsylvania, passed away at his home in Ardmore, Pennsylvania on 11 October 2010 after a brief illness. Bob was 80 years old and remained sharp and intellectually engaged with the astronomical community up until the onset of complications from a brain tumor.

Bob was born in York, Pennsylvania on 19 December 1929, and graduated from York Catholic High School in 1947. He attended the University of Pennsylvania on a senatorial scholarship, graduating in 1951. After two years in the United States Army, he enrolled in graduate school at the University of Pennsylvania, doing his doctoral research on the photoelectric photometry of R CMa, AO Cas, AS Eri, and XY Leo at the Steward Observatory, University of Arizona in Tucson. Bob would continue this exploration of close binary stars, their atmospheres and interactions, for the rest of his career. Bob met his future spouse, Joanne C. Underwood, while in graduate school in 1957 and they were married in 1959. Bob received his PhD in astronomy in 1959 and moved to Amherst, Massa-



Robert H. Koch, Ph.D.
1929-2010

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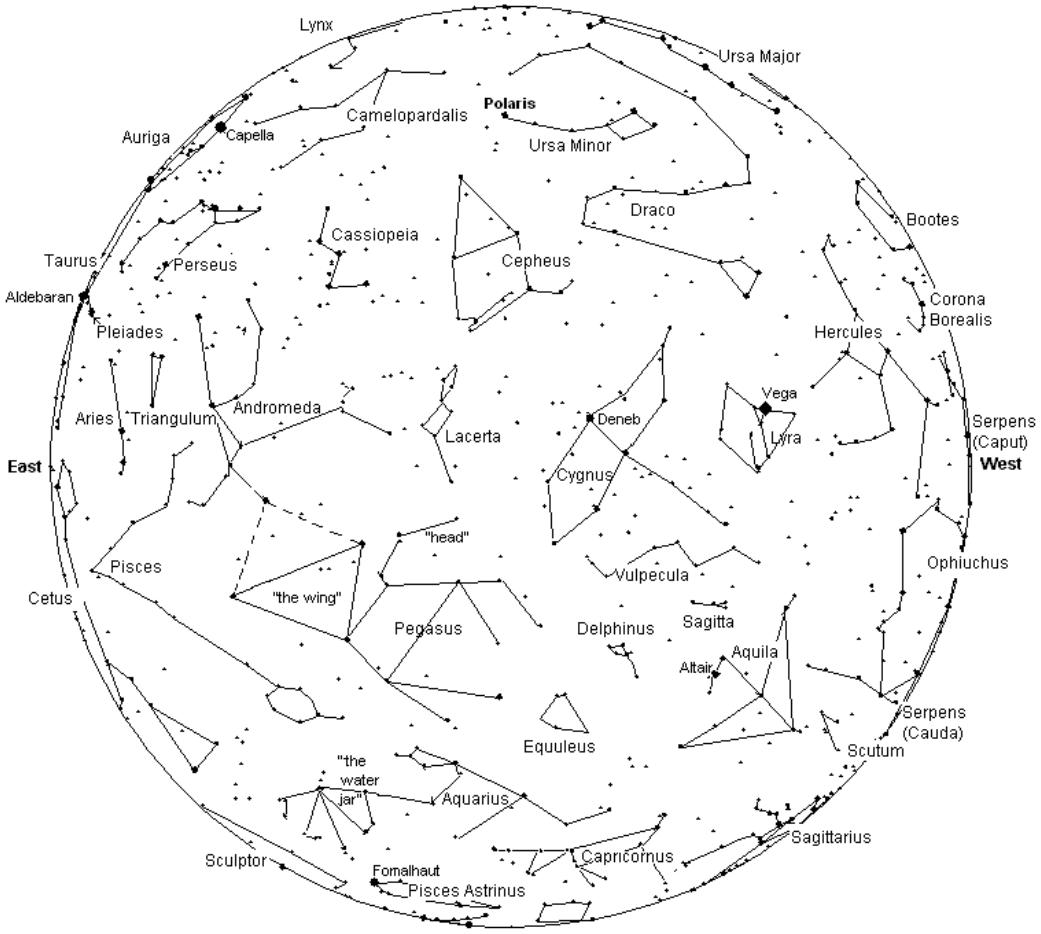
The Sky Over Chester County

November15, 2010 at 9:00 p.m. EST

Note: the constellation stick figures used on the chart above were adapted from the book *The Stars: A New Way to See Them*, by H. A. Rey. This excellent guide to learning the constellations can be purchased at many area book stores, or from online booksellers.



This chart was produced using *Guide 8.0* skymapping software by Project Pluto, Bowdoinham, Maine

The faintest stars shown on this chart are fifth magnitude.

Date	Sunrise	Sunset	Moon Phases		
10/01/2010	7:30 a.m. EDT	5:58 p.m. EDT	First Quarter	11/13/2010	11:39 a.m. EST
10/15/2010	6:46 a.m. EST	4:44 p.m. EST	Full Moon	11/21/2010	12:27 p.m. EST
10/31/2010	7:02 a.m. EST	4:36 p.m. EST	Last Quarter	11/28/2010	3:36 p.m. EST
			New Moon	11/06/2010	2:52 a.m. EDT

November 2010 Observing Highlights

by Don Knabb, CCAS Secretary & Observing Chair

November 1-18	The Taurid meteor shower is active
November 6	New Moon, 2:52 a.m.
November 7	Daylight Saving Time ends at 2 a.m.
November 13	First-quarter Moon, 11:39 a.m.
November 15	The Moon is to the upper right of Jupiter
November 16	The Moon is to the upper left of Jupiter
November 17	The Leonid meteor shower peaks
November 21	The Full Moon is at 12:27 p.m. and the Pleiades are nearby the Moon all night
November 28	Last Quarter Moon, 3:36 p.m.

The best sights this month: Jupiter continues to be the highlight of the evening sky during November. A telescope will show at least one dark band and up to 4 moons. If you stay up late there is a chance of seeing Comet Hartley 2 with binoculars or a telescope. And if you are at a dark sky site you might glimpse this 5th magnitude fuzz ball with your naked eyes!

Mercury: Late in the month Mercury will be low in the glow of the sunset.

Venus: Venus passed us in our race around the Sun at the end of October so it is now the "morning star". By the middle of the month it will be 15 degrees above the horizon at sunrise.

Mars: The red planet continues to hang around, very low in the glow of the setting Sun. You'll need binoculars to find this dim planet.

Jupiter: Jupiter continues to put on a great show throughout November. Although it has faded slightly from its maximum it continues to shine at magnitude -2.7! A telescope will show you a great deal of detail with a distinct band visible in even a small telescope.

Saturn: The ringed planet is rising just before the Sun early in the month but by the end of November it will rise around 2 a.m. The best viewing will be just before the sky brightens with the glow of dawn.

Uranus and Neptune: Uranus continues to hang out with Jupiter through November. By month's end it is within 3 degrees of Jupiter. At high magnification you can see the pale green disk of this distant gas giant. Neptune rises a couple of hours ahead of Jupiter and Uranus so it is reasonably high in the sky as the glow of the sunset fades. Finder charts are available at skyandtelescope.com/uranusneptune.

The Moon: The full Moon of November is called 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. Another interpretation suggests that the name Full Beaver Moon comes from the fact that the beavers are now actively preparing for winter. It is sometimes also referred to as the Frosty Moon.

Constellations: Now that we are well into autumn and back to Eastern Standard Time after November 7th, there are many hours of star gazing possible without staying up late. The Summer Triangle is past center stage and is heading for the western horizon. Pegasus is well up in the southern sky in the early evening, and the jewels that are the Pleiades are rising in the east. Capella in Auriga is a bright point of light above Taurus. As it gets a bit later our old friend Orion returns from his summer vacation.

Messier/deep sky: The deep sky highlight of this time of year for me is the Andromeda Galaxy, M31. You don't need to be up late to catch the wonderful Double Cluster in Perseus and the compact star cluster M34 is just a bit to the south, also in Perseus. Around 9:00 you can see the star clusters in Auriga: M36, M37 and M38. Compare the structure of these open clusters and log them as a great start in pursuit of the binocular or telescopic Messier club of the

(Continued on page 7)

Through the Eyepiece: The Triangulum Galaxy, Messier 33

by Don Knabb, CCAS Secretary & Observing Chair

During November the skies are clear but it is not too cold yet, so this is a great time of year to seek out some of the faint fuzzies that would leave you with chattering teeth and frozen toes if you try to find them when winter settles in. One such object on my list for the next time I am under dark skies is The Triangulum Galaxy, M33.

The constellation Triangulum is easy find using some of the fall constellations as guides. If you first find the Great Square of Pegasus and then find the Pleiades, just look between them for a small constellation in the shape of a triangle (I suppose you could have guessed its shape). Then use the sky map to the right to star hop to the area of M33.

Don't expect M33 to stand out in the sky. Although it is considered to be a naked eye object under dark skies, those will need to be very dark skies indeed! M33 is a very large object in the night sky and it has low surface brightness. The galaxy covers approximately a full degree of sky which is about 1/3 of the field of view of average binoculars and is typically too large for an average telescope eyepiece. So grab your binoculars and lie back, let your eyes adjust for about a half an hour and stare into the abyss to seek out this faint fuzzy!

If you use a telescope to find M33 be sure to select your lowest power (highest number) eyepiece, such as a 32 or 40mm eyepiece. And any light pollution or moonlight will make finding the Triangulum Galaxy very difficult.

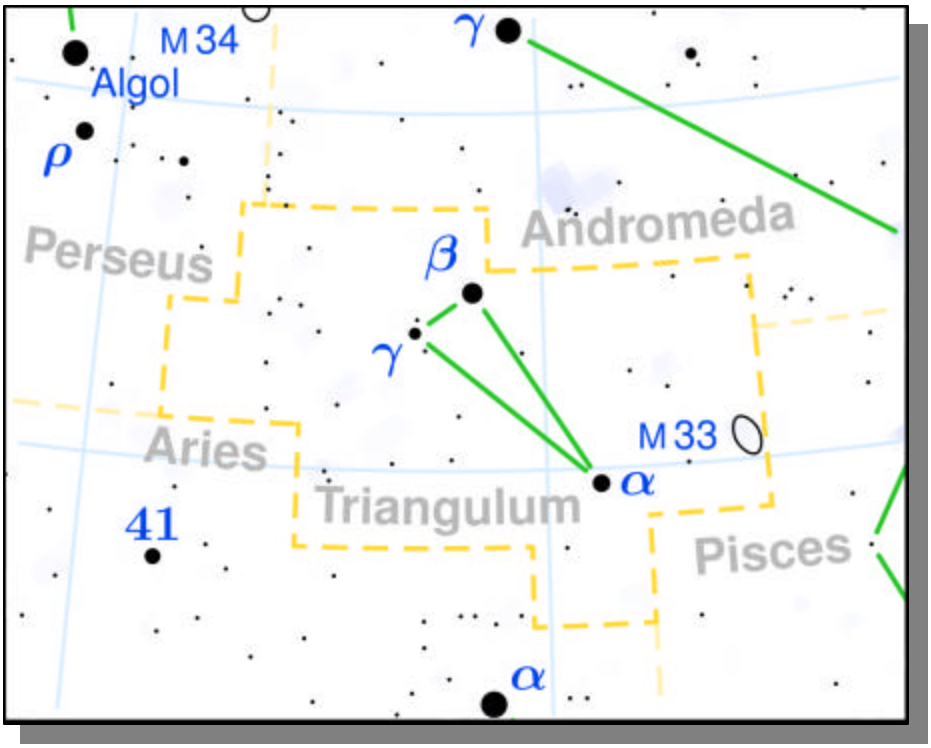


Photo credit: Michael Jaeger

Photo courtesy of CCAS member Pete LaFrance.

The picture above taken by CCAS member Pete LaFrance shows the pinwheel structure of this galaxy. Some sources refer to M33 as the Pinwheel Galaxy, but that name is more generally given to Messier 101. The Tri-

(Continued on page 11)

Koch (Cont'd)

(Continued from page 3)
chusetts where he taught as a member of the Four College Astronomy Department until 1966.

Following a year at the University of New Mexico in Albuquerque, Bob joined the Astronomy Department at Penn, teaching and doing research there until his retirement in 1996. Bob's main interests were the study of close and eclipsing binary stars, stellar envelopes and winds, intrinsic variables, transits and occultations, and the Milky Way Galaxy, producing well over 100 refereed publications. Bob was partial to photoelectric photometry and polarimetry, conducting most of his observational research at the University of Pennsylvania Flower and Cook Observatory, and at other ground- and space-based observatories.

As an international figure in the area of binary stars, Bob had widespread collaborations with scientists at other institutions, in the US and throughout the world, and made significant contributions to the understanding of the process of mass transfer and accretion in close binary star systems and in developing stellar polarization standards. A number of astronomers were the recipients of his inspiration and mentorship as doctoral students at Penn.

Bob was a polymath who was able to expound eloquently on the intricacies of observational polarization measures or the various dealings of notable figures of the High Middle Ages with no advance notice. Along with his friend, biochemist Dr. Robert E. Davies, Bob helped establish at Penn one of the first courses to examine the astrophysical and biological implications for life beyond earth, long before NASA's own focus on the subject took shape. Bob was active in the astronomical community and served as president of IAU Commission 42 (close binaries).

A life-long love of astronomy led Bob to continue pursuing many areas of astronomical research during retirement. As an emeritus professor, he made important contributions to the detection of exoplanets by the eclipse-timing method, and explored the development of large, lightweight telescope mirrors for ground- and space-based observatories.

In his retirement, Bob also researched and wrote a history of observational astronomy at the University of Pennsylvania. He also was an active gardener and a talented musician, and learned to play the mandolin when he was 77. In addition, Bob and Joanne both loved traveling and bird watching, visiting nearly 30 countries during his retirement years. Besides Joanne, Bob's survivors include sons Thomas and James (Dana), daughters Elizabeth (Murray) and Patricia Budlong (Steven), seven grandchildren, a brother and a sister. Bob once wrote that he long ago decided "to control my career so as to have as much fun as grief"; in this he was successful beyond his dreams.

For more information:
http://www.legacy.com/obituaries/mainlinemedianews/obituary.aspx?n=robert-h-koch&pid=146110910
http://www.upenn.edu/almanac/volumes/v57/n08/obit.html#koch

Observing (Cont'd)

(Continued from page 5)
Astronomical League. If you stay out late you can zoom in on the Great Orion Nebula, M42, in the sword of Orion.

Comets: Comet Hartley 2 was not a naked eye object when I observed it during early October but it was easily visible in binoculars. There are predictions that the comet will reach 5th magnitude in November, but to see it we'll need to stay up until the early morning hours as Hartley 2 passes near Procyon in Canis Minor, then into Monoceros around mid-month. There are finder charts at skyandtelescope.com under the Celestial Objects section.

Meteor showers: The Taurid meteor shower peaks during the first two weeks of November. This is not a very active shower, with only 5 meteors per hour predicted. The Leonid meteor shower should be quite a bit better with up to 20 meteors per hour predicted at the peak on the night of November 17th. The best time for observing shooting stars is after the Moon sets around 3 a.m.

From CCAS-West: A "Night of Stars" in Marion Center, Pennsylvania

text & photos by John Hepler, CCAS Webmaster & Newsletter Editor

On Thursday, October 10th, 2010, I attended a star party in Marion Center, PA. My first "excursion" north in Indiana county, it took about a half-hour to get there on secondary roads with some pretty views of fall foliage along the way.

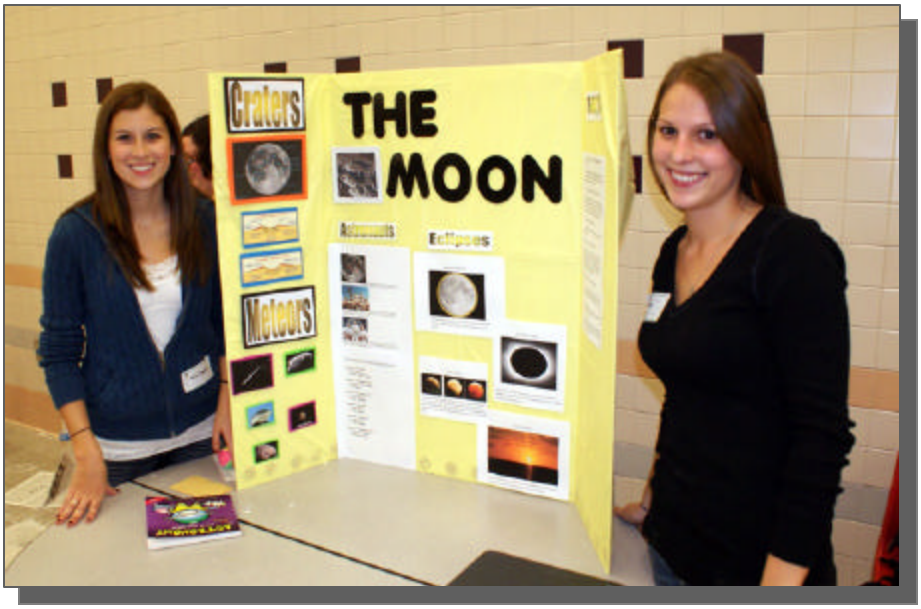
The weather had not been cooperating, and I was concerned that the event would be canceled, or even worse, no one would show up. But the organizers, Randy Corosu, Marion Center Area High School science teacher, and Drs. Mark & Meghan Twiest of IUP, had planned for bad weather by scheduling indoor activities as well as observing the night sky.

I didn't need to be concerned about being the only participant that evening: despite the weather, well over 120 parents and kids showed up over the course of the evening.

Eventually the clouds parted and participants ventured back outside to get a glimpse of Jupiter and its Galilean satellites and the Moon.

Local astronomers Rod Allshouse and Vince Gratton were on hand with a variety of telescopes and mounted binoculars in the elementary school parking lot.

Lending a hand with the telescopes outside and manning an impressive series of 15 learning stations inside the school were



IUP Elementary Science students manned 15 learning stations in the Marion Center High School Gymnasium as part of the "A Night of Stars" star party. On top: Mandi Coppola & Nikki Young at one of the Moon stations; bottom left, Katrina Papantonakis & fellow students explained the seasons and the inclination of the earth's axis; at right, Hannah Allison & Shannon Stevens demonstrate how craters on the Moon were created using flour and cocoa powder (It's little difficult to see in the photo just how covered in powder they were by the end of the night).

40 IUP juniors and seniors in the university's teaching of elementary science methods program.

In the auditorium, one student ran a series of presentations using the latest Starry Night® software.

The McCreery Elementary School's planetarium was open

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Night of Stars (Cont'd)

Upper left: LeeAnn Badzik, Marissa Butler & Alexis DeLuca gave advice on binoculars, telescopes, laser pointers, etc.; top right: Kaylee Tyler & Shannon King and the Andromeda Galaxy; lower top right: Brianna Whalen, Ashley Moyer & Lea Nelson dispelled misconceptions of the night sky; Middle: Leslie Campbell, Jessica Cummings, Shannon Johns & Jennifer Spangler explained other objects in the sky; Lower left: Joshus Ely in Deep Space; and lower right: Ana Aquino, Angelica Guzzo & James Clark explained the apparent motion of the night sky.

(Continued from page 8)

during the evening, and Ray Socol, the school district's Earth and Space Science teacher, gave a series of 15-minute demonstrations to show visitors some of the Spitz planetarium's capabilities.

The student learning stations were: 1) Directions with the night sky; 2) Equatorial Constellations; 3) Misconceptions in the sky; 4 & 5) The Moon; 6 & 7) The Planets; 8 & 9) Great Galaxy of Andromeda; 10) Objects in the sky; 11) Motion of the sky; 12) Search from home; 13) Planetarium showcase; 14) Starry Night Software presentation; and 15) Binary stars, Multiple stars.

What really impressed me was that the students only had 2 weeks to research and prepare their topics; they clearly had rehearsed their presentations and were able to successfully field questions from parents and children alike (and some of those kids asked tough questions).

The IUP students I spoke with were all preparing for a 5-week stint teaching science in local schools and were looking forward to a full semester of student teaching in the spring.

Funding for the evening and some of the observing hardware came from a $5000 grant from the Lowes Charitable and Educational Foundation that Mr. Corosu secured. The Toolbox for

(Continued on page 11)

Close Encounters with Jupiter

by Dr. Tony Phillips

Jupiter and Earth just had a close encounter—and it was a good one. In late September 2010, the two worlds were 31 million km (about 19 million miles) closer than at any time in the past 11 years. Soaring high in the midnight sky, Jupiter shone six times brighter than Sirius and looked absolutely dynamite through a backyard telescope.

Planetary scientist Scott Bolton of the Southwest Research Institute isn't satisfied. "I'd like to get even closer," he says.

Bolton will get his wish in July 2016. That's when a NASA spacecraft named "Juno" arrives at Jupiter for a truly close-up look at the giant planet. Swooping as low as 5,000 km (about 3,000 miles) above the cloud tops, Juno will spend a full year orbiting nearer to Jupiter than any previous spacecraft.

The goal of the mission is to learn what lies inside the planet.

Astronomers have been studying Jupiter since the invention of the telescope 400 years ago, but in all that time the planet's vast interior has remained hidden from view. Even the Galileo probe, which dived into the clouds in 1995, penetrated no more than about 0.1% of Jupiter's radius.

"Our knowledge of Jupiter is truly skin deep," says Bolton, Juno's principal investigator. "There are many basic things we just don't know—like how far down does the Great Red Spot go? And does Jupiter have a heavy core?"

Juno will improve the situation without actually diving into the clouds. Bolton explains how. "Juno will spend a full year in close polar orbit around Jupiter, flying over all latitudes and longitudes. We will thus be able to fully map Jupiter's gravitational field and figure out how the interior is structured."

But that's not all. Researchers have good reason to believe that much of Jupiter's interior is filled with liquid metallic hydrogen, an exotic metal that could form only in the high-pressure, hydrogen-rich core of a giant planet. Jupiter's powerful magnetic field almost certainly springs from dynamo action inside this vast realm of electrically conducting metal.

"Juno's magnetometers will precisely map Jupiter's magnetic field," says Bolton. "This map will tell us a great deal about planet's inner magnetic dynamo—what it's made of and how it works."

Finally, Juno will probe Jupiter's atmosphere using a set of microwave radiometers. "Our sensors can measure the temperature 50 times deeper than ever before," says Bolton. Researchers will use that information to figure out how much water is underneath

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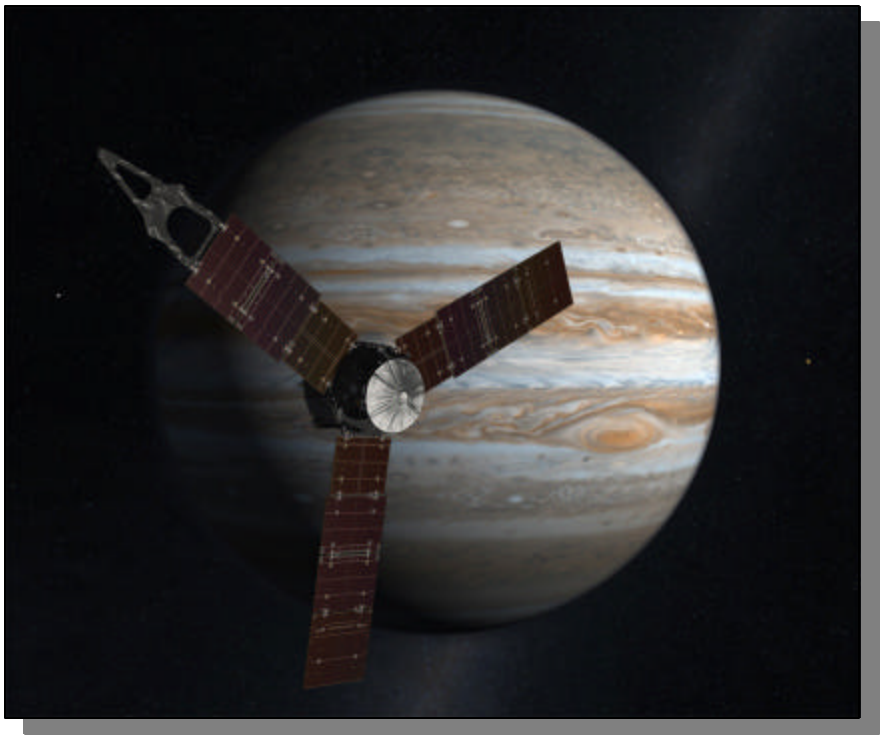


The Juno mission, arriving at Jupiter in July 2016, will help to solve the mystery of what's inside the giant planet's core.

Through the Eyepiece (Cont'd)

(Continued from page 6)

angulum Galaxy is the third-largest member of the Local Group of galaxies, which includes the Milky Way Galaxy, the Andromeda Galaxy and about 30 other smaller galaxies. It is one of the most distant permanent objects that can be viewed with the naked eye under ideal conditions.

While the Triangulum Galaxy was probably first observed by Hodierna before 1654 (back when skies were dark), it was independently rediscovered by Charles Messier, and cataloged by him on August 25, 1764. Messier writes: "I have discovered a nebula between the head of the northern Fish and the large Triangle."

While Sir William Herschel wouldn't publish papers on Messier's findings, he was an astronomically curious soul and couldn't help but study M33 intently on his own, writing: "There is a suspicion that the nebula consists of exceedingly small stars. With this low power it has a nebulous appearance." He would continue to observe this grand galaxy again and again over the years, cataloging its various regions with their own separate numbers and keeping track of his findings: "The stars of the cluster are the smallest points imaginable."

Herschel also cataloged The Triangulum Galaxy's brightest and largest nebula separately from the galaxy itself, which eventually obtained NGC number 604. As seen from Earth NGC 604 is located northeast of the galaxy's central core.

So before temperatures drop below freezing and the winds of winter howl try to find this faint fuzzy and add it to your Messier list!

http://en.wikipedia.org/wiki/Triangulum_Galaxy
http://www.skyandtelescope.com/community/skyblog/stargazing/69562222.html?pageSize=0
http://www.universetoday.com/34008/messier-33/

Space Place (cont'd)

(Continued from page 10)

Jupiter's clouds. "Microwave measurements of Jupiter's water content are particularly exciting because they will help discriminate among competing theories of the planet's origin."

Now *that's* a close encounter. Stay tuned for Juno.

Find out more about the Juno mission at http://www.nasa.gov/mission_pages/juno. Play the new Solar System Explorer super game, which includes the Juno Recall mini-game at http://spaceplace.nasa.gov/en/kids/solar-system. It's not just for kids!

This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Night of Stars (cont'd)

(Continued from page 9)

Education grant was the first awarded in Indiana County.

Corosu reported that he spent about $4000 of the $5000 on telescopes and binoculars. He said that Lowe's of Indiana helped stretch the remaining dollars to purchase red flashlights people used in the planetarium and outside to find their way around in the dark while maintaining their night vision.

Now in its fifth year, the Lowe's Toolbox for Education grant program has furnished more than $20 million in grants for nearly 5,000 schools and school parent-teacher groups across the nation, according to the company's website.

For more information about the Lowe's Toolbox for Education grant program visit the official website http://www.toolboxforeducation.com/.

For more about IUP's Department of Professional Studies in Education, visit the official website at http://www.iup.edu/pse/. The department offers undergraduate, master's, and doctoral degree and certification programs intended to serve the needs of professional educators at all levels (K through 12), or the superintendent's letter of eligibility.

To learn more about the Marion Center Area School District, visit the official website at http://www.mcasd.net/.

How to Weigh a Star Using a Moon

provided by Harvard-Smithsonian Center, Cambridge MA

How do astronomers weigh a star that's trillions of miles away and way too big to fit on a bathroom scale? In most cases, they can't, although they can get a best estimate using computer models of stellar structure.

New work by astrophysicist David Kipping says that in special cases, astronomers can weigh a star directly. If the star has a planet, and that planet has a moon, and both of them cross in front of their star, then scientists can measure their sizes and orbits to learn about the star.

"I often get asked how astronomers weigh stars," said Kipping from the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts. "We've just added a new technique to our toolbox for that purpose," he said.

Astronomers have found more than 90 planets that cross in front of, or transit, their stars. By measuring the amount of starlight that's blocked, they can calculate how big the planet is relative to the star. But they can't know exactly how big the planet is unless they know the actual size of the star. Computer models give a very good estimate, but in science, real measurements are best.

Artist's concept of an exoplanet and its moon transiting a sun-like star. Such a system could be used to directly weigh the star. David A. Aguilar (CfA)

Kipping realized that if a transiting planet has a moon big enough for astronomers to see — by also blocking starlight — then the planet-moon-star system could be measured in a way that lets them calculate exactly how large and massive all three bodies are.

(Continued on page 13)

CCAS Original Astrophotography

by Gaston Baudat

NGC6888, crescent nebula. Taken on October 9th, 2010, from my back yard observatory at Glenmoore PA. Image is 15 x 8 minutes exposure for a total of one hour. Dark, flat and bias frame calibration, processing Maxim DL. Mount: CGE; Scope: C11 at prime focal; Imager: SBIG ST4000XCM + AO8; Guider: SBIG remote guiding head & a homemade on-axis guider.

Weighing a Star (cont'd)

(Continued from page 12)

"Basically, we measure the orbits of the planet around the star and the moon around the planet. Then through Kepler's laws of motion, it's possible to calculate the mass of the star," said Kipping.

The process isn't easy and requires several steps. By measuring how the star's light dims when planet and moon transit, astronomers learn three key numbers: 1) the orbital periods of the moon and planet; 2) the size of their orbits relative to the star; and 3) the size of planet and moon relative to the star.

Plugging those numbers into Kepler's third law yields the density of the star and planet. Because density is mass divided by volume, the relative densities and relative sizes gives the relative masses. Finally, scientists measure the star's wobble due to the planet's gravitational tug, known as the radial velocity. Combining the measured velocity with the relative masses, they can calculate the mass of the star directly.

"If there was no moon, this whole exercise would be impossible," said Kipping. "No moon means we can't work out the exact density of the planet, so the whole thing grinds to a halt." Kipping hasn't put his method into practice yet because no star is known to have both a planet and moon that transit. However, NASA's Kepler spacecraft should discover several such systems. "When they're found, we'll be ready to weigh them," said Kipping.

CCAS Night Out at Jenner's Pond

by Don Knabb

CCAS hosted a Jupiter viewing party at Jenner's Pond assisted living facility on Friday, October 22nd, 2010. We set up a telescope just outside the dining area and started observing Jupiter before it was even dark! Our contact at the site, Jessica Rochester, who in the top photo, said that many of the residents were looking forward to the event. We showed Jupiter to about a dozen residents and perhaps that many staff members. It was a great deal of fun and Jessica said she saw many genuine smiles from the residents.

Jim Lovell Lectures at Indiana University of Pennsylvania

by IUP Student Megan Guza (Journalism)

Captain Jim Lovell appeared at IUP as part of the First Commonwealth Endowed Lecture Series on November 1, 2010. He spoke mainly of his experience aboard spacecraft in his lecture "Apollo 13: A Successful Failure."

Lovell prefaced his experiences by telling of John F. Kennedy's 1961 speech in Houston, Texas, in which Kennedy said he planned to land a man on the moon and bring him home safely by the end of the decade.

"That was a very strong commitment," Lovell said. "That was a very bold statement."

He talked about how the craft was originally on a free-return path—if something were to go wrong, it would be able to make it to the moon, around the moon, and eventually back. After about thirty hours, he said, Mission Control took the craft off the free-return path.

"I didn't worry about it," Lovell said. "This was my second time to the moon—the sights, the sounds, even the smells were all familiar to me."

A live feed from a camera in Apollo 13 was broadcast to several different network stations, most of which, he said, were uninterested.

"Everybody in Houston was watching the ball game," he said, "including the people in the control room."

Captain Jim Lovell spoke before a standing room only crowd in Fischer Auditorium at IUP on November 1, 2010. Photo by Keith Boyer.

It was right after the live feed ended that the three astronauts in the craft felt a sudden impact.

"I looked up at Fred Haise to see if he knew what was causing all the commotion. From his expression, I could tell—he had no idea.

"I looked up at Jack Swigert. Jack's eyes were wide as saucers. Not only did he not know what was going on, but he was saying to himself, 'Why am I here?'"

It was at that point that numerous control panels on board Apollo began shutting down. Two liquid oxygen storage tanks began leaking alarmingly quickly.

"We would have no electricity and lose the entire propulsion system," he said.

Lovell went on to tell of the tense return trip, which involved abandoning the command module in favor of the lunar module, which was designed for two people.

"Finally," he said, "I got a message [from Mission Control]. They said, 'Jim, we've been thinking about your problem for a long time trying to figure out how to get you back. We've all come to the conclusion that with

(Continued on page 15)

Lovell Lecture (Cont'd)

(Continued from page 14)

the conditions of the situation you're in right now, you're not going to get home.'"

Lovell told them he'd already come to that conclusion; what he needed was a solution.

"I learned something that I took with me from the public sector of space to the private sector of business: Always expect the unexpected."

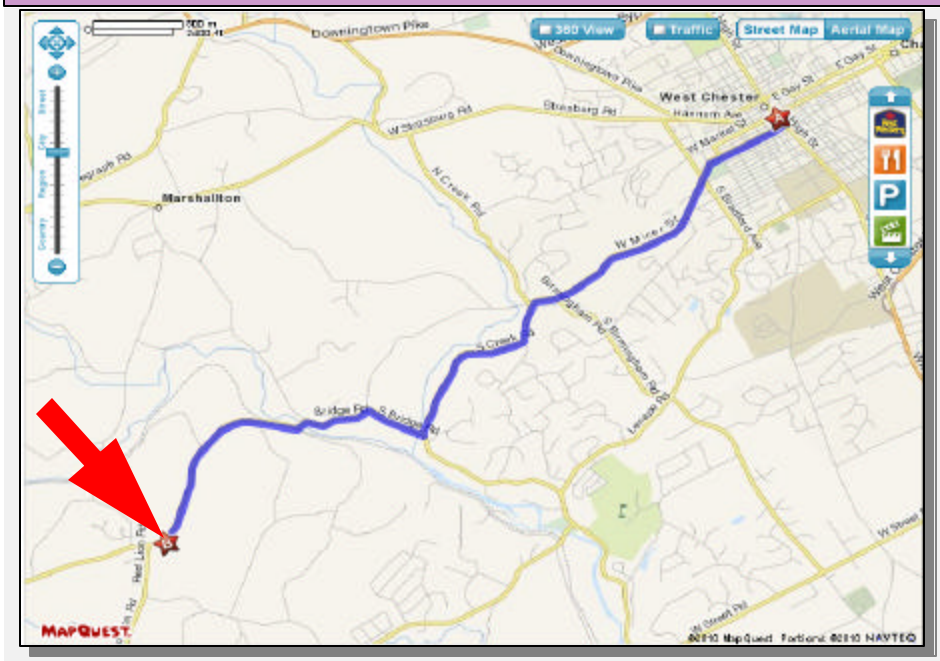
After six days, Apollo 13 finally splashed down in the Pacific Ocean. Ships tracking the craft's position were on hand to pull the astronauts from the water.

(Continued on page 16)

Nicholas's Cartoon Corner

by Nicholas La Para

CCAS Directions



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

BVA 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 Valley Association

The monthly observing sessions (held year-round) are held at the Myrick Conservation Center of the Brandywine Valley Association.

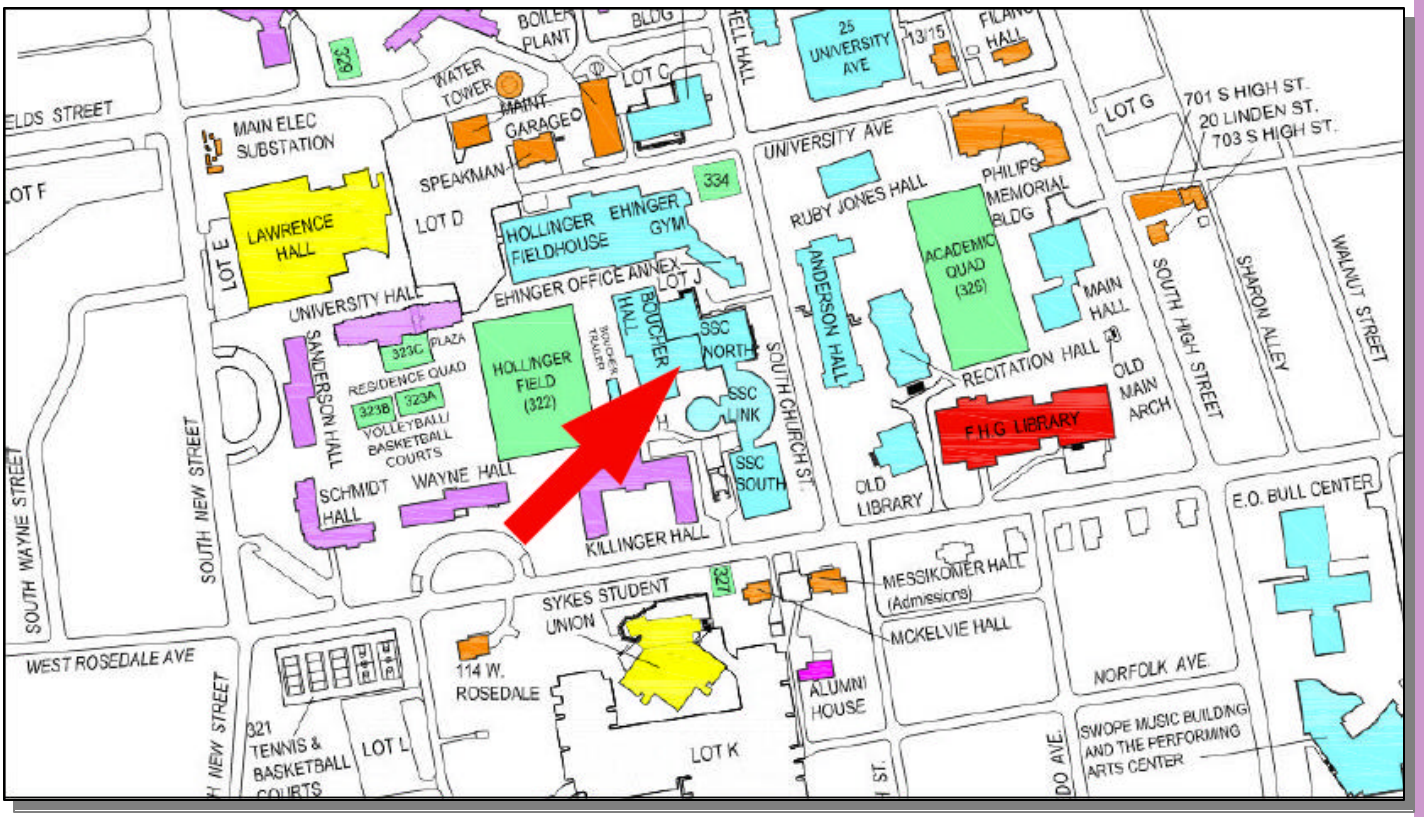
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 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 113 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).



Lovell Lecture (Cont'd)

(Continued from page 15)

"What's the moral of this story? I shouldn't be here to talk to you," he said.

"I'm here because of a dedicated group of people in that control center, using those attributes—those characteristics—that are so important: good leadership all the way through the organization, teamwork, perseverance. It turned almost certain catastrophe into a successful recovery."

[Ed. Note: The event was so well-attended I didn't get a chance to buy Lovell's book: they were sold out before I even arrived!]

CCAS Membership Information and Society Financials

Treasurer's Report

by Bob Popovich

Sept. 2010 Financial Summary

Beginning Balance	$1,508
Deposits	$170
Disbursements	$0
Ending Balance	$1,678

Annual CCAS Holiday Party

Save the date! Wednesday, December 15th, 2010, CCAS members and their families will celebrate the holiday season at the Four Dogs Tavern, starting at 6:30 P.M. For the tavern's address & directions, call (610) 692-4367, or visit the official website at http://www.marshaltoninn.com/.

Membership Renewals

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

Bob Popovich
416 Fairfax Drive
Exton, PA 19341-1814

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

Note that our CCAS Webmaster John Hepler has a link to the IDA home page set up on our Society's home page at **http://www.ccas.us**.

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"!

CCAS Event Information

We've set up a special phone number you can dial to find out if our monthly observing session and other scheduled events will be held or postponed. Call **610-436-0829** after 5 PM ET to hear a recording to find out the latest news.

Good Outdoor Lighting Websites

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

Starry Night Lights

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

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

http://www.starrynightlights.com

★ ★ ★ ★ ★

Green Earth Lighting
Formerly
Outdoor Lighting Associates

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

Green Earth Lighting LLC
620 Onion Creek Ranch Rd
Driftwood, Texas 78619

Phone: **512-944-7354**

http://www.greenearthlighting.com

Local Astronomy-Related Stores

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

Skies UNLIMITED

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

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

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

http://www.skiesunlimited.net

★ ★ ★ ★ ★

Spectrum Scientifics
Quality Science Products for All Ages

Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

4403 Main Street
Philadelphia, PA 19127

Phone: **215-667-8309**
Fax: **215-965-1524**

Hours:
Tuesday thru Saturday: 10AM to 6PM
Sunday and Monday: 11AM to 5PM

http://www.spectrum-scientifics.com

CCAS Information Directory

CCAS Lending Telescopes

Contact Kathy Buczynski 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. Kathy's phone number is 610-436-0821.

CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: **newsletter@ccas.us**

Or mail the contribution, typed or handwritten, to:

John Hepler
2115 Lazor St.
Apt. 227
Indiana, PA 15701

CCAS Newsletters via E-mail

You can receive the monthly newsletter (in full color!) via e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to John Hepler, the newsletter editor, at: **newsletter@ccas.us**.

CCAS Website

John Hepler is the Society's Webmaster. You can check 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 (724-801-8789) 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 Pres:	Kathy Buczynski 610-436-0821
ALCor and Treasurer:	Bob Popovich 484-467-5562
Secretary and Observing:	Don Knabb 610-436-5702
Librarian:	Barb Knabb 610-436-5702
Program:	Dave Hockenberry 610-558-4248
Education:	Kathy Buczynski 610-436-0821
Webmaster and Newsletter:	John Hepler 724-801-8789
Public Relations:	Deb Goldader 610-304-5303

CCAS Membership Information

The present membership rates are as follows:

REGULAR MEMBER……$25/year
SENIOR MEMBER…….$10/year
STUDENT MEMBER……..$ 5/year
JUNIOR MEMBER……..$ 5/year
FAMILY MEMBER…….$35/year

Membership Renewals

Check the Treasurer's Report in 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:

Bob Popovich
416 Fairfax Drive
Exton, PA 19341-1814

Phone: 484-467-5562
e-mail: B2N2@verizon.net

*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 Bob Popovich.

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 Bob first at **610-363-8242.**

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 Bob Popovich.**