



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

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April 2009

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CCAS Upcoming Nights Out

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

- ✘ On Saturday, April 4th, at 8:00 PM, CCAS and West Chester Recreation are hosting a night under the Moon and stars at Hoopes Park . This event is part of a world wide event called The 100 Hours of Astronomy, celebrating 2009 as the International Year of Astronomy.
- ✘ Saturday, May 2nd, as part of National Astronomy Day, we are hosting a night out at Anson Nixon Park in Kennett Square.
- ✘ Saturday, June 20th, we are hosting the Nottingham County Park Star Party in southern Chester county.
- ✘ Saturday, August 22nd, we are hosting a star party at Ridley Creek State Park (tentative—awaiting confirmation). Ridley Creek State Park is located in Delaware county between Newtown Square and Media.

Membership Renewals Due

04/2009	Baudat Bower Popovich Imburgia
05/2009	Armore Devoe Fletcher Kutta Long, Jr. Welch
06/2009	Bickel Churchman Hebding Hooper Leiden Siskind

Important April 2009 Dates

- 2nd** • First Quarter Moon at 10:43 a.m.
- 9th** • Full Moon at 10:56 a.m..
- 17th** • Last Quarter Moon at 9:46 a.m.
- 22nd** • Lyrid meteor shower peaks. About 10-20 meteors per hour might be seen.
- 24th** • New Moon at 11:23 p.m.



Spring 2009 Society Events

April 2009

4th • Chester County Astronomical Society and West Chester Recreation host a "night out" at Hoopes Park starting at 8:00 p.m.

7th • Introductory Astronomy Class: The Days of Stars' Lives, Room 113, Boucher Building, WCU. Class starts at 7:00 p.m.

8th • PA Outdoor Lighting Council monthly meeting.

10th • West Chester University Planetarium Show: "Fire in the Sky", Schmucker Science Building.

14th • CCAS Monthly Meeting: A field trip to Spitz, Inc. in Chadds Ford, PA.

21st • Introductory Astronomy Class: West Chester University Planetarium Show, Schmucker Science Building, WCU. Class starts at 7:00 p.m.

24th • CCAS Monthly Observing Session, Myrick Conservancy Center, BVA (inclement weather date April 25th). The observing session starts at sunset.

May 2009

2nd • CCAS hosts a "night out" at Anson Nixon Park in Kennett Square.

5th • Introductory Astronomy Class: The Stars on Your Computer, Room 113, Boucher Building, West Chester University. The class starts at 7:00 p.m.

6th • PA Outdoor Lighting Council monthly meeting.

8th • West Chester University Planetarium Show: "The Final Frontier", Schmucker Science Building.

12th • DVD Lecture Series: "Stars: Distant Suns", 7:00 p.m.

12th • CCAS Monthly Meeting, Room 222, 2nd floor, Schmucker Science Building, West Chester University. The meeting starts at 7:30 p.m. Guest Speaker, Dr. Fronefield Crawford: Stellar Death. Constellation of the Month: Virgo by Dave Hockenberry.

15th • CCAS Monthly Observing Session, Myrick Conservancy Center, BVA (inclement weather date May 16th). The observing session starts at sunset.

19th • Introductory Astronomy Class: Beyond Naked Eye: Binoculars, Telescopes & Mounts, Room 113, Boucher Building, West Chester University. The class starts at 7:00 p.m.

19th • Hercules Observing Cluster meets in West Goshen Township, weather permitting. Contact Kathy Buczynski for directions and details.

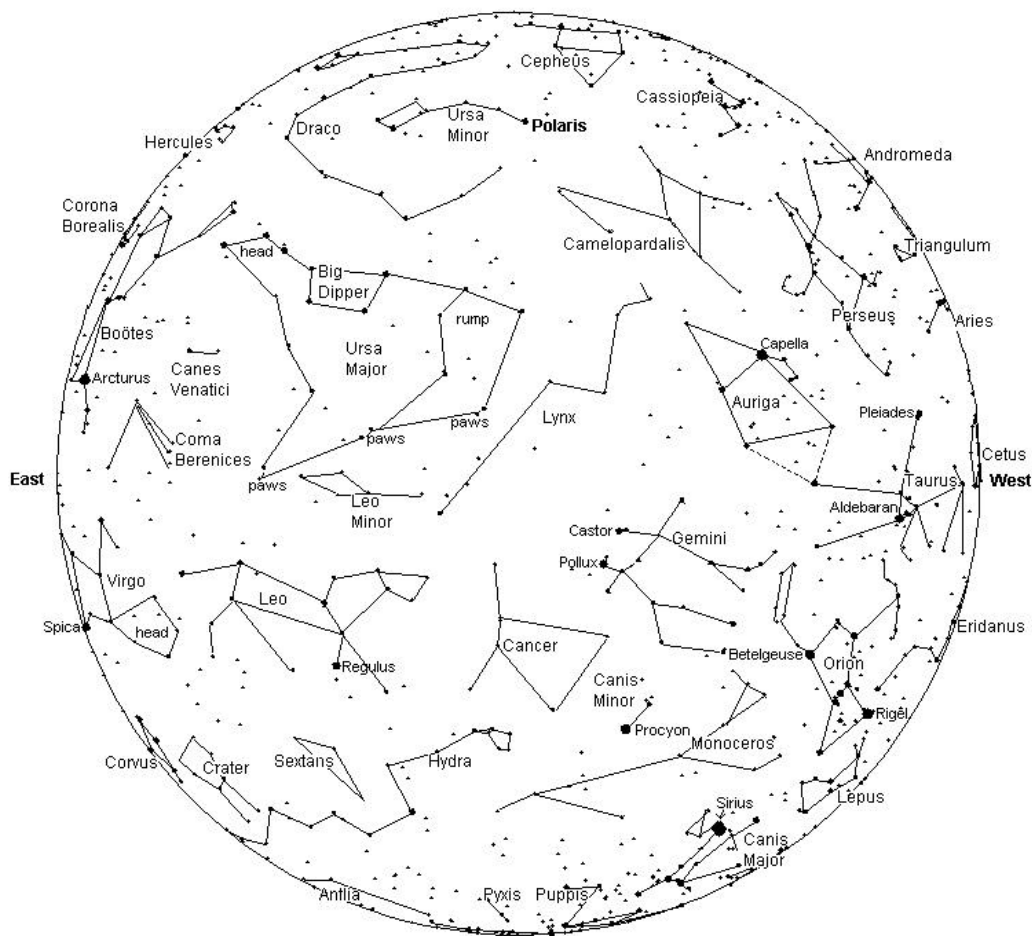
27th • Hercules Observing Cluster meets in West Goshen Township, weather permitting. Contact Kathy Buczynski for directions and details.

Minutes of the March 10, 2009 meeting of the CCAS

- 13 members and 1 guest presenter were in attendance.
- Video presentation: *Special Relativity and Interstellar Travel* DVD was shown.
- Program – “Star Formation”, part of the presentation *Super Star Clusters in Our Own Backyard* by Dr. Mark Gagné, Department of Geology & Astronomy, West Chester University.
- Constellation of the month: *Libra*, presented by Robert Fellwock.
- The presentation and a question and answer session was a bit long, so the regular agenda reports were covered briefly or skipped.
- Observing – Our next regular observing session at BVA is scheduled for March 27/28. Then we have our Astronomy Day star party at Hoopes Park in West Chester on April 4th. On May 2nd we have a star party at Anson Nixon Park in Kennett Square.
- Simpson Meadows star party – Ed Lurcott will be hosting a star party at Simpson Meadows on April 2nd and would like a member or two to bring telescopes to view the sky at 7:30 p.m.
- Elections – Kathy reviewed the CCAS constitution where elections are discussed. Ed Lurcott has volunteered to lead the Election Committee and Steve Leiden will assist Ed. Kathy will send out a Members note to ask for one more person to help telephone members to ask if anyone would like to run for an office.
- Franklin Institute Galileo exhibit – the Franklin Institute will host an exhibit of Galileo’s instruments and accomplishments starting April 4th. We will pick a day this summer to meet at the exhibit. Don will forward an e-mail from the Franklin to CCAS members.
- April CCAS Monthly Meeting – For our April meeting we have a field trip to Spitz, Inc. in Chadds Ford, PA. Spitz is the company that manufactures the projection equipment and domes for planetariums. We'll meet at Spitz at 7 p.m. and the tour will last until 9 p.m., followed by refreshments. Kathy will send out a Members note with directions.
- Earth Hour – On March 28th at 8:30 p.m. to 9:30 p.m. everyone is asked to turn out your outside lights to celebrate Earth Hour.

The Sky Over Chester County April 15, 2009 at 9:00 p.m. EDT

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		
04/01/2009	6:44 a.m. EDT	7:25 p.m. EDT	First Quarter	04/02/2009	10:43 a.m. EDT
04/15/2009	6:22 a.m. EDT	7:39 p.m. EDT	Full Moon	04/09/2009	10:56 a.m. EDT
04/30/2009	6:02 a.m. EDT	7:55 p.m. EDT	Last Quarter	04/17/2009	9:36 a.m. EDT
			New Moon	04/24/2009	11:23 p.m. EDT

April 2009 Observing Highlights

by Don Knabb, CCAS Observing Chair

April 2	First quarter Moon 10:43 a.m.
April 9	Full Moon 10:56 a.m.
April 11-26	Look for the zodiacal light in the evening sky between 1 and 2 hours after sunset
April 16-24	Mercury is visible about a half hour after sunset. This is as good as it gets to see Mercury!
April 17	Last quarter Moon 9:36 a.m.
April 22	The Lyrid meteor peaks between 1 a.m. and 4 a.m.
April 24	New Moon 11:23 p.m.
April 26	At dusk the Pleiades Mercury and the crescent Moon are close in the western sky.

The Planets: Saturn is one of the highlights of the April night sky, shining under Leo the Lion's hind foot as it becomes dark. April is also the best month of the year to see Mercury in the fading glow of the sunset. And on April 26th see Mercury, a crescent Moon and the beautiful star cluster the Pleiades in the sky. If you get up before dawn you can see Jupiter, Mars and Venus.

Mercury: From April 16th to May 4th we have a great opportunity to see elusive Mercury, so if you have not seen this tiny planet shining in the glow of the sunset make the effort to find it this month. All you need is a view with a low western horizon. Look for it about a half hour after sunset in the west-northwest. You should be able to see it easily with your naked eyes, but binoculars can be a great help to find it.

Don't miss the sight in the west on April 26th when a crescent Moon, Mercury and the Pleiades are close in the sky. Find a place with a low western horizon and look around 8:30 p.m. This will be a beautiful sight!

Venus: The Evening Star has become the Morning Star as Venus slipped behind the Sun at the end of March. Near the end of April Venus will be very bright as it rises about an hour and a half before the Sun.

Mars: The red planet is also in the morning sky but is much dimmer than bright Venus. Later this year Mars will be much easier to see.

Jupiter: Jupiter is now rising several hours before the Sun but it stays fairly low in the east and therefore the view is clouded by a large amount of atmosphere. Wait until late summer for fine views of the king of the planets.

Saturn: April is a great month for viewing Saturn! Let the ringed planet rise fairly high into the sky for the best view through the least amount of atmosphere. The rings are tilted only 3 or 4 degrees from edgewise so they appear very thin.

Uranus and Neptune: Both gas giants are low in the morning sky during April.

Pluto: Pluto is in the south before morning twilight starts and is, of course, very dim. You'll need a big telescope and good charts to find this tiny speck of an ex-planet.

The Moon: Full Moon is on April 9th at 10:56 a.m. Native Americans called this the Full Pink Moon. This name came from the herb moss pink, or wild ground phlox, which is one of the earliest flowers of the spring. Other names for this full Moon are the Full Sprouting Grass Moon and among coastal tribes the Full Fish Moon because this was the time that the shad swam upstream to spawn.

Constellations: Say good bye to our friend Orion setting in the west as his pal Hercules rises in the east. Bright Arcturus in Boötes is also rising in the east, followed by the lovely Corona Borealis. Leo the Lion is at center stage with bright Saturn under his hind foot.

Messier/Deep Sky: April is a good month to go galaxy hunting. Look for M64 in Coma Berenices, M51, M81 and M82 in Ursa Major and M104 near bright Spica in Virgo. Of course, you will need to go hunting on a night with no bright Moon.

Comets: Comet Lulin has faded considerably as it heads away from Earth. On a moonless night at a dark sky site you can find it with a telescope not far from the star cluster M35. There is a chart for finding Comet Lulin at the Sky and Telescope web site.

Meteor showers: The Lyrid meteor show peaks in the early morning hours of April 22nd. You should be able to see 10 to 20 bright, fast meteors at the peak of the shower.

Through the Eyepiece: Globular Cluster M3

by Don Knabb, CCAS Observing Chair

As spring progresses our view of the night sky is once again beginning to turn toward the center of the Milky Way. That, of course, means it is globular cluster time! So grab your binoculars or your telescope and join the search for these treasures of the sky. On a dark night a good view of a globular cluster in your telescope will get a nice response from family and friends.

Messier 3, also known as M3 or NGC 5272, is a globular cluster in the constellation Canes Venatici. It was discovered by Charles Messier in 1764, and resolved into stars by William Herschel around 1784. This cluster is one of the largest and brightest, and is made up of around 500,000 stars. It is located at a distance of about 33,900 light-years away from Earth. M3 has an apparent magnitude of 6.2, making it visible to the naked eye under very dark conditions.

M3 is one of four objects in the constellation Canes Venatici that appeared in Messier's catalog. The other three Messier objects are all galaxies discovered years later: M51 (discovered in 1773), M63 (discovered in 1779), and M94 (discovered in 1781). In addition, M106 in Canes Venatici is also included as a Messier object on modern versions of the Messier list.

A globular cluster is a spherical collection of stars that orbits a galaxy as a satellite. They can



Image of globular cluster M3 taken by Robert J. Vanderbei

contain anywhere from ten thousand to a million stars. These stars orbit the collective center of mass of the cluster in a veritable bee hive of motion, and the cluster itself orbits the Milky Way as a distinct object, occasionally plunging right through the main disk and out the other side. Although the cluster appears extremely dense, the distance between individual stars is actually quite large. As a result, stars within them rarely collide, and globular clusters survive relatively unscathed by their passage through the galaxy's disk.

It is interesting to contemplate what the night sky might look like if we lived on a planet revolving around a star in M3. Contrary to what seems obvious, one would not be dazzled by a

sky swarming with stars. There might be a dozen or so stars much brighter than any we see and perhaps a hundred as bright as our brightest but it would still get dark out. However, as it would be lighter than our darkest skies, we just might not have a clue of the dim galaxies and nebulae that lie outside our cluster. The Milky Way would probably be about as exciting as it is from the middle of football stadium at night.

Globular cluster M3 is extremely rich in variable stars, more than in every other globular cluster in our Milky Way galaxy. M3 also contains a relatively large number of so-called Blue Stragglers, blue main-sequence stars which appear to be rather young, much

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CCAS Directions

West Chester University Campus

The monthly meetings (September through May) are held in Room 113 in Boucher Hall, 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).



New Star Atlas Published

by Jim Mullaney

I hope CCAS members will remember me from a lecture I gave there several years ago on deep-sky observing.

I'm writing to let you know that the *Cambridge Double Star Atlas*, co-authored by famed celestial cartographer Wil Tirion and myself, has just been released by Cambridge University Press (<http://www.cambridge.org>). There's not been anything like this since the original Norton's Star Atlas, which also designated double and multiple stars on its maps, as you know. And like Norton's, it's an all-purpose atlas showing many other types of prominent deep-sky wonders.

CCAS Membership Information and Society Financials

Treasurer's Report

by Bob Popovich

Feb. 2009 Financial Summary

Beginning Balance	\$1,846
Deposits	\$185
Disbursements	\$320
Ending Balance	\$1,711

Welcome New Members!

This month we welcome new members to the Society: Donald Baker from Lancaster; and Mark Kania & family from Glenmoore. 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:

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.

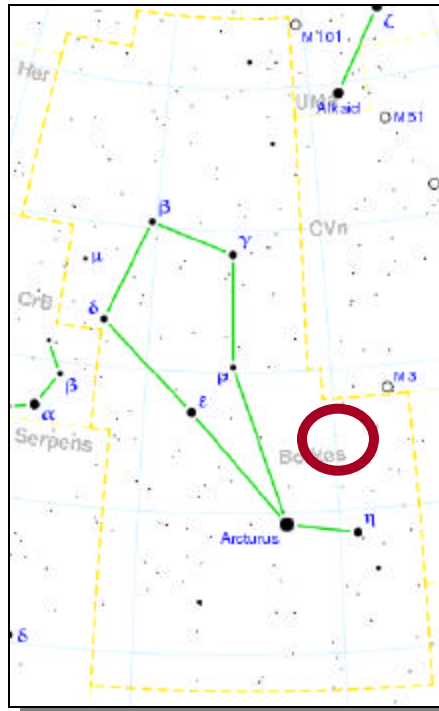
Messier 3

(Continued from page 5)

younger than the rest of the globular's stellar population would suggest. A mystery for a long time, these stars are now thought to have undergone dramatic changes in stellar interactions, getting their cooler outer layers stripped away in close encounters, which occasionally occur when stars are passing through the dense central regions of globular clusters.

M3 is visible to the naked eye only under very good conditions and stays just below the limit of visibility under more average conditions. It can be easily seen with the aid of binoculars or any telescope. In binoculars, it appears just like a hazy, nebulous patch. A 4-inch telescope shows its bright compact core within a round and mottled, grainy glow, which fades slowly and uniformly to the outer edges. A 6-

inch telescope resolves the outer two thirds of the cluster into faint stars on a background glow formed by the unresolved fainter member stars of the cluster. An



Look for M3 at a right angle from Arcturus and Eta Boötis (?).

8-inch telescope shows stars throughout the cluster but in the very core, which is resolved into stars by larger telescopes.

Although M3 is in the constellation Canes Venatici, I locate it more easily using the constellation Boötes. As you can see in the star chart, if you make an approximate right triangle from Arcturus and Eta Boötis (?) you can find M3 relatively easily. I have not seen it naked eye but find it easily with hand held binoculars.

So the next night that the Moon is not obscuring the view of deep sky objects seek out M3. It is a nice way to put 500,000 stars in your eyepiece!

Information credits:

<http://www.seds.org/messier/m/m003.html>
http://en.wikipedia.org/wiki/Messier_3

WHYY to Host Reception & Preview at the Franklin Institute

by Kathy Buczynski, CCAS President and Education Chair

Our PBS Station, WHYY, is hosting a preview of the film "400 Years of the Telescope: A Journey of Science, Technology and Thought" at the Franklin Institute on Tuesday, April 7, 2009, 6-9PM. The film will debut on WHYY TV Tuesday, April 14 at 10 p.m.

As part of this special event, guests will enjoy a cocktail reception and tour of the Franklin's exhibit *Galileo, Medici and the Age of Astronomy* before screening a preview of "400

Years of the Telescope: A Journey of Science, Technology and Thought" and a new full-dome planetarium film titled "Two Small Pieces of Glass."

There will be a post-film Q&A session with the film's producer Kris Koenig and the co-hosts of WHYY-FM's SkyTalk, Dr. Derrick Pitts (Chief Astronomer at the Franklin Institute) and Dave Heller. Attendees will also have the opportunity to gaze upon the night sky through a variety of telescopes compliments of the

Delaware Valley Amateur Astronomers.

As part of their outreach supporting the film, WHYY is conducting a sweepstakes wherein a school within the station's broadcast area will be awarded a new Celestron CPC® 800 GPS XLT telescope. The lead science teacher at the winning school will also receive telescope training from Dr. Derrick Pitts.

For more information, or to register for the event, visit:
www.whyy.org/membereperience.

Apollo Upgrade

by Jet Propulsion Laboratory

The flight computer onboard the Lunar Excursion Module, which landed on the Moon during the Apollo program, had a whopping 4 kilobytes of RAM and a 74-kilobyte “hard drive.” In places, the craft’s outer skin was as thin as two sheets of aluminum foil.

It worked well enough for Apollo. Back then, astronauts needed to stay on the Moon for only a few days at a time. But when NASA once again sends people to the Moon starting around 2020, the plan will be much more ambitious—and the



hardware is going to need a major upgrade.

“Doing all the things we want to do using systems from Apollo would be very risky and perhaps not even possible,” says Frank Peri, director of NASA’s Exploration Technology Development Program. So the program is designing new, more capable hardware and software to meet the demands of NASA’s plan to return humans to the moon. In-

stead of staying for just a few days, astronauts will be living on the Moon’s surface for months on end.

Protecting astronauts from harsh radiation at the Moon’s surface for such a long time will require much better radiation shielding than just a few layers of foil. And rather than relying on food and water brought from Earth and jettisoning urine and other

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The Chariot Lunar Truck is one idea for a vehicle equal to the lunar terrain. Each of the six wheels pivot in any direction, and two turrets allow the astronauts to rotate 360°.

Apollo Upgrade

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wastes, new life support systems will be needed that can recycle as much water as possible, scrub carbon dioxide from the air without depending on disposable filters, and perhaps grow a steady supply of food—far more than Apollo life-support systems could handle.

Next-generation lunar explorers will perform a much wider variety of scientific research, so they'll need vehicles that can carry them farther across the lunar surface. ETDP is building a new lunar rover that outclasses the Apollo-era moon buggy by carrying two astronauts in a pressurized cabin. "This vehicle is like our SUV for the Moon,"

Peri says.

The Exploration Technology Development Program is also designing robots to help astronauts maintain their lunar outpost and perform science reconnaissance. Making the robots smart enough to take simple verbal orders from the astronauts and carry out their tasks semi-autonomously requires vastly more powerful computer brains than those on Apollo; four kilobytes of RAM just won't cut it.

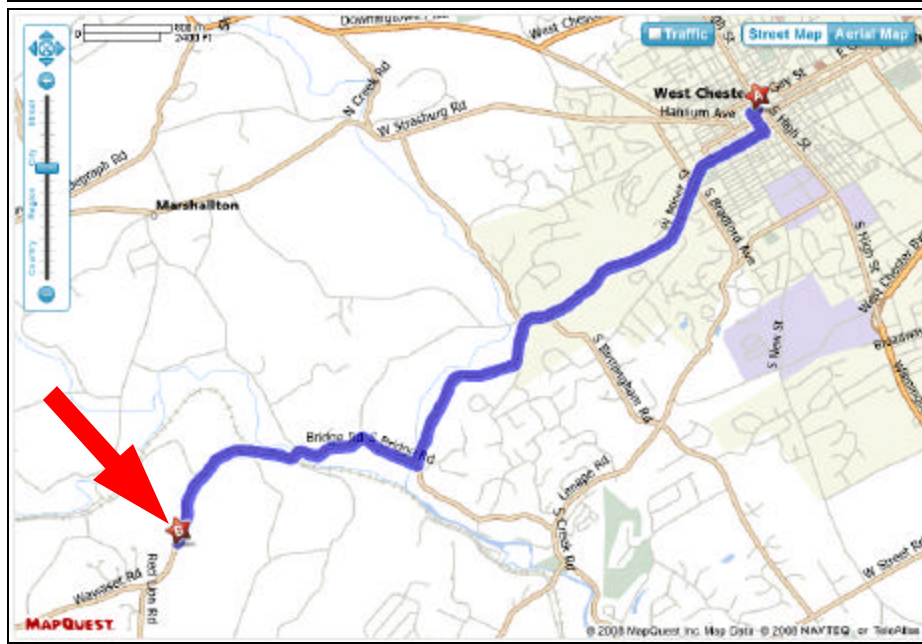
The list goes on: New rockets to carry a larger lunar lander, spacesuits that can cope with abrasive moon dust, techniques for converting lunar soil into building materials or breathable oxygen. NASA's ambitions for

the Moon have been upgraded. By tapping into 21st century technology, this program will ensure that astronauts have the tools they need to turn those ambitions into reality.

Learn more about the Exploration Technology Development Program at www.nasa.gov/directorates/esmd/aboutesmd/acd/technology_dev.html. Kids can build their own Moon habitat at spaceplace.nasa.gov/en/kids/exploration/habitat.

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

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 Visit to Spitz, Inc.

by Kathy Buczynski



Instead of our regularly scheduled monthly meeting on April 14th, we will be touring Spitz, Inc., the world's leading projection dome supplier with over 1,200 installations. Spitz, Inc. is located in Chadds Ford, PA, off Route 1 near the intersection with Route 202. For directions, go to <http://www.spitzinc.com/docs/directions.html>.

If you use GPS, it's best to enter the Harley Davidson store address instead (they sit in front of Spitz, Inc. on Rt. 1), or the movie theater address in Painter's Crossing shopping center). Spitz's street address has recently been changed (new street name) and most GPS systems have not yet been updated.

Joyce Towne, Customer Accounts Director, will greet us and act as our guide. The tour starts at 7:00 p.m. and lasts approximately 2 hours. We will start with a tour of the plant (not quite as fun as when people are working by day, but still worth it). Then we will go into one of the theaters to learn about what Spitz, Inc. is doing these days (domes, projects, trends, and Starry Night software in particular). Following the discussion, we will have a demonstration of one of the company's SciDome planetariums, powered by Starry Night Dome software.

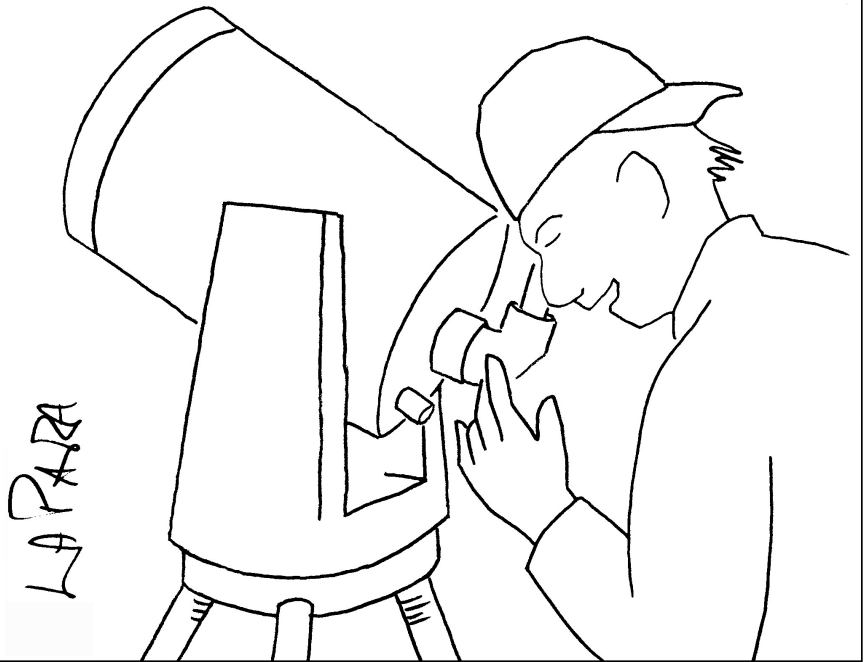
After the demonstration, we'll have some time for Q&A, and some coffee/soft drinks and light refreshments. Joyce has offered to get out the Armand Spitz antique for a photo opportunity.

Mark your calendars: this evening promises to be a fascinating event. We hope to see you all there!

Nicholas's Cartoon Corner

by Nicholas La Para

"AH, SPRING TIME - DAFFODILS, BREEZES, GALAXIES..."



CCAS Astrophotography: Comet Lulin by Pete LaFrance



Taken on Feb. 24th 2009. 20 RGB each x 5 sec. combined for color, processed with maxim/dl.ST-10xe camera. Go to www.plafrance.org to see more of Pete's work.

Software Review: PEMPro by CCDWare

by Dave Hockenberry

Most amateur astronomers at some point expand their interests beyond visual observing, and with the advent of the CCD camera revolution participation in astrophotography has skyrocketed. Many get frustrated very soon, however, when they want to get beyond bright objects that require 30 seconds or less of exposure. The Moon and planets come easy. Deep space objects are another task altogether. Many of us with fork-mounted optical tube assemblies discover quickly that in Alt/Azimuth mode, even with the most careful alignment, star trails, field rotation, and image drift are simply a fact of life. And those who employ Polar wedges or German equatorial mounts soon find that unless they hand over a lot of money for very expensive mounts and put them on permanent piers there is still lots of work to do before they can obtain 10-15 minute exposures. Consumer grade computer controlled telescopes *have* revolutionized our hobby, but all too often the path to very accurate alignment and minimal periodic error proves impossible with factory-installed tools.

To this end CCDWare has produced PEMPro, a software suite designed to minimize periodic error present in the gears of all mechanical drives and in the process make polar alignment, backlash correction, and other problems for the astrophotographer manageable. It is available through the Internet at

<http://www.CCDWare.com> as a downloadable program that is licensed for use in any and every computer and telescope the purchaser owns. It was first available about 5 years ago, and the newest version of the program became available last fall. PEMPro takes advantage of CCD cameras to accomplish the task of measuring error with mounts that are either German equatorial or wedge-mounted fork designs. PEMPro is *not* designed for periodic error correction in Alt/azimuth mode. You can employ just about any astronomical CCD camera to use PEMPro, and with the latest release you can even use an inexpensive webcam. It is highly recommended by CCDWare that the latest ASCOM drivers for a given telescope mount be installed in your computer (available for free over the Internet) and it is advisable to make sure that whatever software controls the telescope mount and your CCD camera drivers all be the latest versions available from their manufacturer.

What PEMPro does is take a given CCD camera, mounted on the telescope, and obtains the parameters it needs to fix on a star and measure drift. Using the Calibration Wizard, the software step by step asks you to set up the telescope and the camera, slew to the right part of the sky the software wants, then asks the user to turn off the Right Ascension Drive for a set period of time and take exposures. This

results in a picture with star trails. The software then asks the user to click on the beginning and end of the star trails with your computer's mouse. The program then measures the star trails and does internal calculations to determine the pixel size and density, roll and yaw angle of the camera, and the orientation of the camera image with respect to North, South, East and West. It can also calculate these dimensions for an off-axis guider if desired.

Once PEMPro has this information, it is ready to acquire periodic error measurements with the mount tracking at its usual sidereal rate. The program asks the user to find a field of magnitude 5-7 stars, picks the best target, then measures the periodic error and generates a periodic error graph in real time as you watch. After 2 or three cycles of the drive's worm gear, the raw data can then be turned into a Periodic Error Curve via a Fast Fourier transformation (in five available drift modes, including quadratic). This curve can then be programmed into the mount either by a "playback" method or, if you have the right mount, can be loaded directly in a matter of a second or two. Then the user can reacquire a periodic error measurement with the new correction in the mount. If further correction is desired, a modified Periodic Error curve can be created to further reduce the mount's error.

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Software Review

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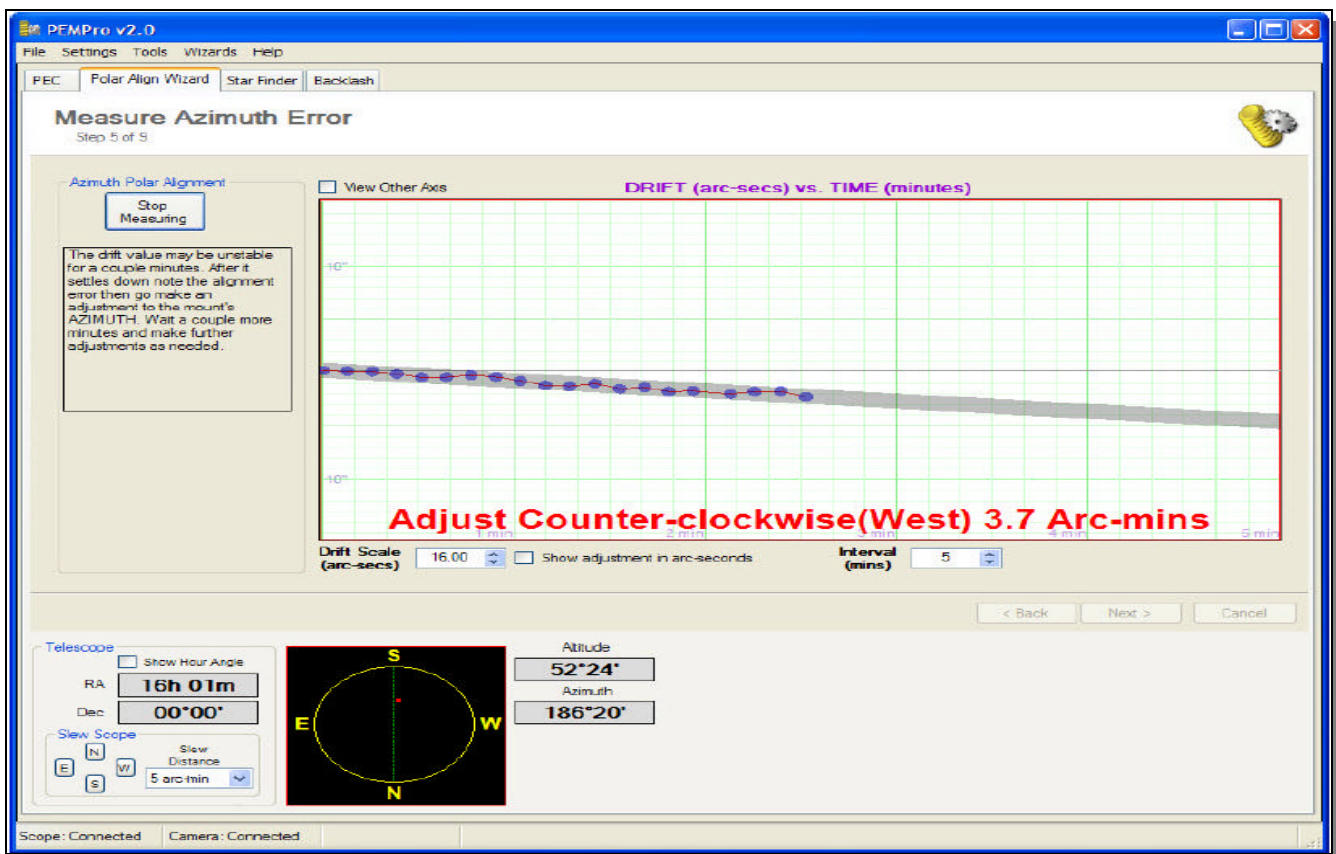
But that's not all PEMPro does. Using the same camera calibration techniques, the program can also measure star drift for Polar alignment! The program asks the user to set up their rig with a rough alignment (this can be as rough as putting Polaris in the field of view of a low power eyepiece or a finder scope). Then slap your CCD camera or webcam on, run the calibration wizard, and PEMPro will help you do a "drift" alignment. After going through the provided on-screen check list the program slews the scope to the South, acquires a target, then tracks the star and displays the drift in real time on a graph. After a period

of time you can correct the mounts Azimuth with the measured number provided by the graph. Or you can ask the program to take a picture of the star field it is using for measurements, and when the picture appears on your computer screen it asks the user to click on any star. Once you do, a graphic appears on the star field that shows an arrow starting at the star, and points to a circle a distance away from the chosen star and asks the user to adjust the mount so that the star moves as close to the end of the arrow (or the middle of the circle) as possible. It then repeats the process, just as with any drift alignment, to the East or West for altitude adjustment. If the original adjustments were

off by a degree or more, the user can repeat the process until no more drift, making Polar alignment very easy. A similar process will also measure how much backlash is present in a GOTO mount, and can help the user adjust this out.

At first blush PEMPro, like so many other complex software suites, is daunting. It has many sections to the program and the downloadable users manual requires a few read-throughs before starting. Thankfully, after a general introduction the instructions then go to the most popular GOTO mounts, so if you have a Celestron, a GEMINI-controlled Losmandy, Astrophysics mount,

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Real-time Polar Alignment Measurement

Software Review

(Continued from page 12)

et cetera, you can skip directly to your rig's manufacturer and get started. Once you start using the

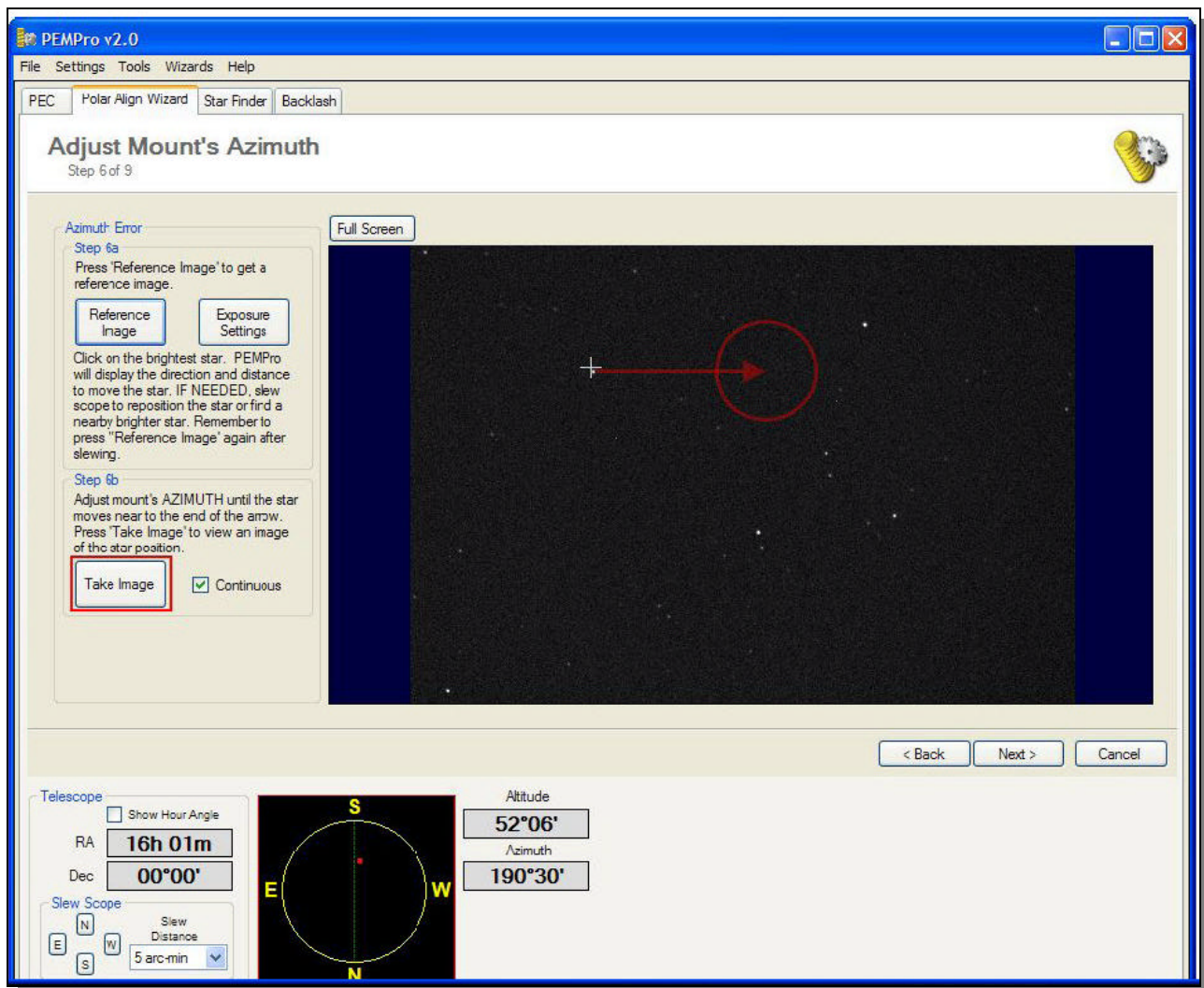
program, it is logically organized and does a good job at "helping" the user on to the next step. This doesn't mean that the whole process is easy, however.

I downloaded the free trial version from the CCDWare website and, I thought, read carefully over the instructions before even trying to use it. I quickly discovered I had to carefully re-read a

few times and take notes before it all made sense to me. I also ran into a problem right away, not with PEMPro but with the latest ASCOM driver version for my Meade LX200R. When trying to get PEMPro to connect to the mount I kept getting error messages about not being able to create an Active X object. I spent many hours trying to figure out what I was doing wrong before being smart enough to use the PEMPro support site. I went to the CCDWare website and on to the Support forums and posted my problem. In less than a day I

had a reply from Ray Gralak, the author of PEMPro. After trying several suggestions and nothing working, he provided me with an older ASCOM driver for the Meade that worked. He also guided me through the problems I was having importing the Meade DSI camera setting from Meade's Envisage software to the PEMPro program. It turns out that simply adjusting the settings for gain and offset solved the problem. I also found that the key to success with the PEMPro program was careful use of the

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Making Real-time Visual Corrections

Software Review

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Calibration Wizard before starting.

As it turns out, my LX200R had *a lot* of periodic error, even with the “factory” periodic error correction turned on. Previously I had used the Meade program and an illuminated reticle many times to try to get better results, and all I got for my efforts was a sore back and a measured periodic error of 55 arc-seconds. This result is simply unacceptable for deep space astrophotography, and allows perhaps 1-minute exposures at best without ending up with blurry images and elongated stars. Using PEMPro and a refinement curve (very nicely illustrated in the User manual text), I reduced my periodic error to about 8 arc-seconds. This is a substantial reduction, which allows me to take unguided frames of 4 minutes or longer. It also makes the job of off-axis guiding *much easier* on the guide camera and mount - the less correction they have to do, the better the photographic result.

But a real plus for me was the Polar Alignment Wizard. Let’s admit it - polar aligning a mount is a tedious chore, especially on a tripod on soft ground. And if you are trying for polar alignment suitable for 10-15 minute exposures at Cherry Springs or another dark sky site, you do not want to be spending time drift aligning when you can be shooting galaxies. The PEMPro wizard makes this both easy

and accurate. The first time I tried it took me about 40 minutes from start-up to finish, and after a few trials I can now do it in about 15-20 minutes. This is not approximate “rough” alignment; this is more than good enough for deep sky photography. This part of the program should have broad appeal for anyone with a fork-mounted Wedge base or a German equatorial.

I also discovered, after using the PEC and the polar alignment wizard, that some of the drift I was getting from my rig was due to a slow sidereal tracking rate in my mount. It was small, but I couldn’t sort it out until I had the polar alignment spot-on and periodic error corrected. With a small adjustment through my telescopes hand control I adjusted the sidereal tracking rate by 0.1 % and - glory be - *good-bye drift!!* Without correcting the other problems it would have been impossible for me to figure this out as I had so much periodic error “slop” in the rig. I also ran the Backlash wizard, which was very easy to use and straightforward. It turns out I needed no backlash adjustments at all, but it was nice to know I had one less thing to worry about.

Overall, I strongly recommend PEMPro as a tool for the serious amateur astronomer who wants



to do deep sky photography. It is also *very nice* for anyone who wants fast, easy and accurate polar alignment, especially on portable rigs. Like many computer software suites of its type it is challenging to learn how to use at first, and the problems with the ASCOM drivers, although not a PEMPro problem directly, did cause me several nights delay getting started. The difficulty with the Import Camera Settings was a minor problem, easily settled within PEMPro’s software without having to go back to Meade’s Envisage software. These difficulties aside, the Support Forum for PEMPro on the CCDWare site is outstanding in the speed and expertise of the help you get, even before you purchase the product. Indeed, it was the helpfulness and professionalism of Mr. Gralak that really sold me on PEMPro, and for these reasons I would recommend this program to anyone. For me, the \$150.00 cost was worth every penny for the Polar align wizard alone. The PEC correction has made it possible for this amateur astrophotographer to step up to a much higher level of deep sky photography that would have been unattainable on a consumer-grade GOTO telescope without it. And you can download a *free trial* version that is no different from the purchased version for a 90-day trial and if you can’t - or can! - get it to work for you, you are under no obligation to buy. Clearly, CCDWare has confidence in their product, and so does this reviewer.

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:

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 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:

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:

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!



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.

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www.starrynightlights.com



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.

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 620 Onion Creek Ranch Rd
 Driftwood, Texas 78619

Phone: **512-944-7354**

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

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52 Glocker Way
Pottstown, PA 19465

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 Fax: **610-327-3553**

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

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

Hours:

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

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, Linda Lurcott Fragale, 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. Linda's phone number is 610-269-1737.

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
500 W. Rosedale Ave.
Apt. A-3 Trinity Bldg.
West Chester, PA 19382

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:

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 (484-266-0699) 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 "star nights" for school, scout, and other civic groups.

CCAS Executive Committee

For further information on membership or society activities you may call:

President:	Kathy Buczynski 610-436-0821
Vice Pres:	Jim Anderson 610-857-4751
ALCor and Treasurer:	Bob Popovich 610-363-8242
Secretary:	Don Knabb 610-436-5702
Librarian:	Linda Lurcott Fragale 610-269-1737
Observing:	Don Knabb 610-436-5702
Education:	Kathy Buczynski 610-436-0821
Webmaster and Newsletter:	John Hepler 484-266-0699
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: 610-363-8242
e-mail: B2N2@verizon.net

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 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**.