Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 22, No. 7 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *July 2014*

In This Issue

Membership Renewals Due

07/2014	Hockenberry & Miller Hunsinger Piehl
08/2014	Knabb & Family Lurcott, Linda
09/2014	Catalano-Johnson & Family Lurcott, Edwin
10/2014	Rosenblatt & Family Toth Zandler

Along the Cygnus Wall

Image Credit & Copyright: Martin Pugh

Important July 2014 Dates

5th • First Quarter Moon, 7:59 a.m.

5th-6th • Vesta & Ceres are very close

12th • Full Moon, 7:25 a.m.

12th • Mars is near Spica

18th • Last Quarter Moon, 10:09 p.m.

26th • New Moon, 6:42 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.

☼ **Saturday, August 30, 2014**. Star Party at Bucktoe Creek Preserve, Kennett Square, PA. Preserve members & the general public pay a small fee; CCAS members participate for free. The event is scheduled for 8:00 PM to 9:30 PM.

☼ **Saturday, October 18, 2014**. CCAS special observing session at Anson Nixon Park, Kennett Square. The observing session is from 8:00 to 9:30 PM.

Summer 2014 Society Events

July 2014

2nd • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the PA Outdoor Lighting Council website.

18th • CCAS monthly observing session at BVA. The observation session starts at dusk.

19th-20th • The von Kármán Lecture Series: Revealing Saturn: Cassini's Tenth Year , at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the August 2014 edition of Observations.

26th • Deadline for newsletter submissions for the August 2014 edition of Observations.

28th-29th • Delta-Aquarid Meteor Shower Peaks - The Delta Aquarids can produce about 20 meteors per hour at their peak. The radiant point for this shower will be in the constellation Aquarius. The last quarter moon will be around for the show and may hide some of the fainter meteors. Best viewing is usually to the east after midnight.

August 2014

6th • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the PA Outdoor Lighting Council website.

14th-15th • The von Kármán Lecture Series: Curiosity 2—Year Anniversary, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the August 2014 edition of Observations.

22nd • CCAS monthly observing session at BVA. The observation session starts at dusk.

26th • Deadline for newsletter submissions for the August 2014 edition of Observations.

CCAS Original Astrophotography

by Dave Hockenberry, CCAS Program Chair

The Moon and Venus just before dawn shot 6/24/14, one day after the Conjunction of these two. Taken with a Canon EOS Rebel, 0.31 second exposure, through medium power lens. On a tripod, of course! Shot from the deck looking East in the back yard. Gorgeous finish to an excellent night.

Nicholas's Humor Corner

by Nicholas La Para

3, 2, 1, Blastoff! And Just 179 Miles Away

by Melanie D. G. Kaplan, Washington Post

An Orbital Sciences Corp. Antares rocket launching from the Mid-Atlantic Regional Spaceport (MARS) at the Wallops Flight Facility in Virginia in April 2013. (NASA)

In early January, on a field a couple of miles from a launch pad on Virginia's Wallops Island, I gazed eastward and listened to a countdown. The numbers descended, and then in the distance, a rocket lifted silently, gracefully, as if in slow motion. Ten seconds later, a wave of sound hit me square in the chest with such power that I felt as if a Harley-Davidson were rumbling through my body.

I tilted my head skyward, watching the rocket move at unfathomable speeds. But my eyes kept shifting to the ground - to the launch pad, the giant cloud of smoke, the void where the 13-story-tall rocket had stood. In the blue sky, it was now a fiery bulb. Then it was gone. My eyes watered. And I'm certain that it wasn't because of the wind.

For all the exquisite preparation and precision, all the gee-whiz science and engineering involved in sending a spacecraft into orbit, watching a launch is bizarrely emotional.

"I got choked up," said one of my fellow spectators, a lifetime space nut and tough-guy attorney who had driven four hours

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September 2014 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on September 9, 2014, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. Our guest speaker will be Jamie Holder, PhD, from the University of Delaware. He will speak on "Gamma Ray Bursts and High Energy Particle Astronomy."

Dr. Jamie Holder

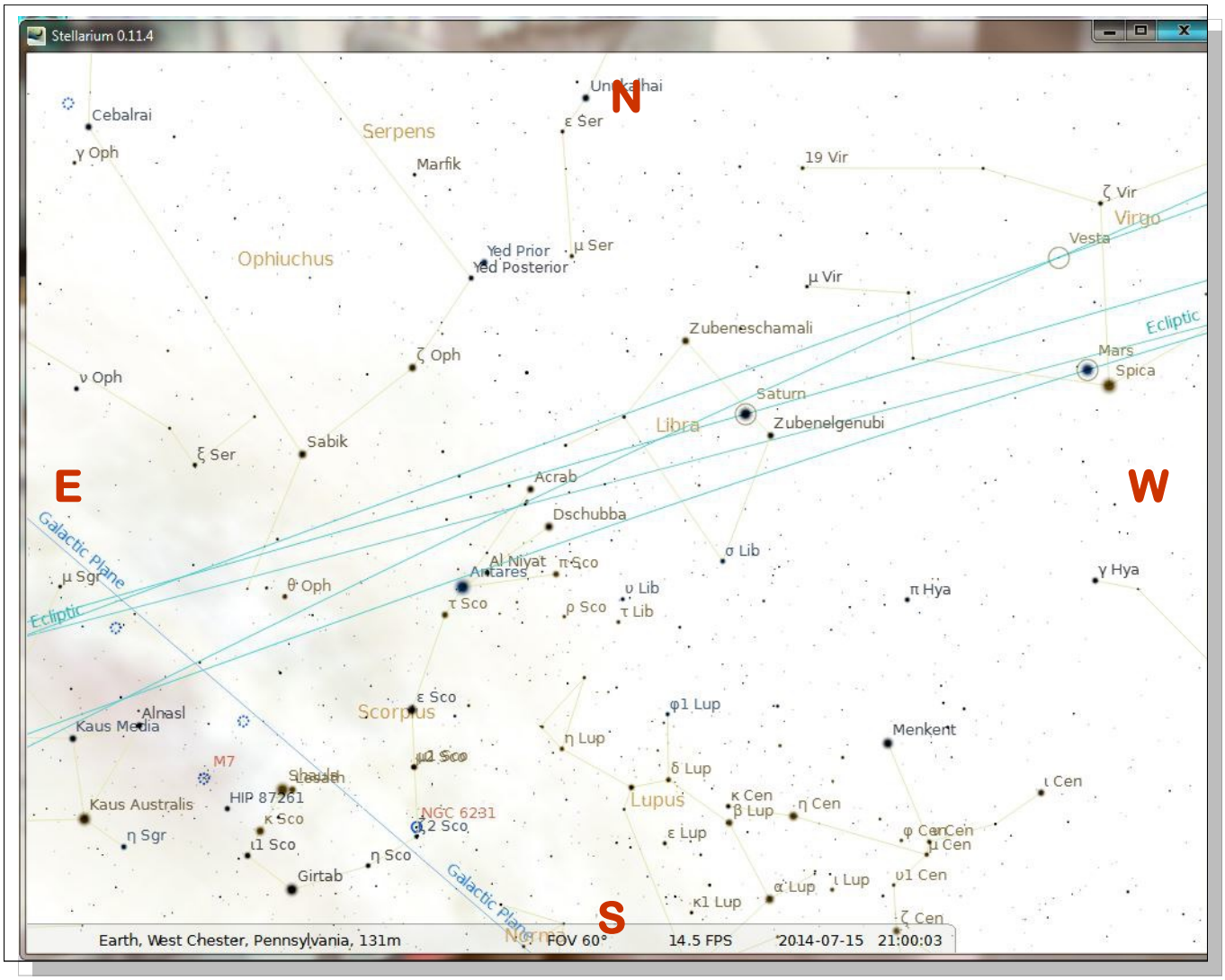
Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

We are looking for presenters for future meetings in our 2014-2015 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

The Sky Over Chester County

July 15, 2014 at 9:00 p.m. ET

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



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
07/01/2014	5:03 a.m. EDT	5:36 a.m. EST	8:33 p.m. EDT	9:06 p.m. EST	14h 57m 30s
07/15/2014	5:13 a.m. EDT	5:45 a.m. EDT	8:28 p.m. EDT	9:00 p.m. EDT	14h 43m 42s
07/31/2014	5:28 a.m. EDT	5:58 a.m. EDT	8:15 p.m. EDT	8:46 p.m. EDT	14h 17m 02s

Moon Phases					
First Quarter	07/05/2014	7:59 a.m. EDT	Full Moon	07/12/2014	7:25 a.m. EDT
Last Quarter	07/18/2014	10:09 p.m. EDT	New Moon	07/26/2014	6:42 p.m. EDT

July 2014 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

5	**First-quarter Moon, Mars is very close**
5/6	**Vesta and Ceres are very close**
7	**The Moon is close to Saturn**
12	**Full Moon**
12	**Mercury is at greatest western elongation**
12	**Mars is near Spica**
18	**Last Quarter Moon**
26	**New Moon**

The best sights this month: We say goodbye to Jupiter during July, but Saturn taking center stage makes up for the loss of Jupiter. And although they look just like stars, seeing the asteroids Vesta and Ceres very close in the sky is a thrill, and July is the month when these two minor planets are closest to each other in the eyepiece of a telescope or binoculars.

Mercury: Mercury is a pre-dawn object during July.

Venus: Venus continues to shine before dawn, rising as twilight just begins to fill the sky.

Mars: The red planet fades and shrinks somewhat during July and falls further toward the west. But it is still a bright red jewel in the sky, and on July 5th is very close to the Moon.

Jupiter: Jupiter is very low in the glow of the setting Sun early in July, then goes behind the Sun on July 24th. It will emerge as an early morning object is August.

Saturn: The ringed planet continues to be the main event of the evening throughout July, shining at magnitude +0.5. The rings are tilted at 21 degrees so the view in a telescope is stunning.

Watch the distance between Saturn and Mars shrink as the summer goes by, with a close encounter on August 25th.

Uranus and Neptune: If you want the best view of the outer gas giants during July you'll need to get up just before dawn.

The Moon: Full moon is on July 12th. Native Americans called this the Full Buck Moon because July is normally the month when the new antlers of buck deer push out of their foreheads with coatings of velvety fur. It was also often called the Full Thunder Moon, since thunderstorms are most frequent during this time of year.

On July 5th the Moon passes very close to Mars and on July 7th passes near Saturn.

Constellations: I love the warm July nights! Settle back in a lounge chair on a clear July night and enjoy the wonderful stars of summer! In the west is bright Arcturus in Boötes with the beautiful Corona Borealis, the Northern Crown, just to its east. Then we pass through Hercules to the Summer Triangle with the Milky Way filling the spaces within the triangle. Lean back with a pair of binoculars and gaze into the triangle and you will see hundreds of stars! It just doesn't get any better than this!

Messier/deep sky: Globular clusters and nebula rule the summer sky for anyone with a telescope or binoculars. Sagittarius is full of Messier objects such as the Trifid and the Lagoon nebula. In Scorpius is M4, a globular cluster that is easy to find using Antares as a guide. If you have a low western horizon look for NGC 6231 where the tail of Scorpius turns to the east. This open cluster is called the Northern Jewel Box. Then look high overhead with binoculars and find the coat hanger cluster between Vega and Altair. This is a great object to share with friends.

Comets/asteroids: During July we have an opportunity to see Comet PANSTARRS (C/2012 K1) early in the month. And it will not be too difficult to find if you look during the first few days of July

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Blastoff! (Cont'd)

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and was tweeting about the launch. "But don't quote me," he said. "I've got an image to keep."

If watching a launch is on your bucket list, and you live in the Mid-Atlantic region, checking it off has gotten a lot easier. One of Virginia's best-kept secrets is that you don't have to travel to Cape Canaveral in Florida or Vandenberg Air Force Base in California to see a launch. NASA's Wallops Flight Facility is less than 200 miles from a good many Eastern Seaboard population centers, including Philadelphia, Washington, Baltimore, Richmond, and Norfolk. And Virginia's two launch pads at the new commercial Mid-Atlantic Regional Spaceport (MARS) at Wallops are about to get busy.

"We've become a major player in space launches," said Dale Nash, executive director of Virginia Space, which owns and operates MARS. He said the port is now equipped for what space folks call "medium-class" missions, which can send 10,000 to 15,000 pounds into orbit. That's a big deal, according to Nash, who likened it to an airport's upgrading from commuter planes to Boeing 737s.

It's also an exciting time for commercial companies partnering with NASA. Dulles, Va.-based Orbital Sciences Corp. tested its Cygnus spacecraft from MARS last year, boosted into orbit on its new Antares rocket. And now the company has a $1.9 billion contract for eight International Space Station (ISS) resupply missions through 2016 - the first of which I watched in January.

Orbital Sciences Corp. launched its Cygnus cargo spacecraft aboard its Antares rocket on Jan. 9 at 's Wallops Flight Facility in Virginia, beginning a resupply mission to the International Space Station. The Wallops launch site is about to get even busier. NASA (NASA)

Originally scheduled for December, this Cygnus payload contained Christmas presents for the ISS crew, spare parts, and 23 student science experiments - testing, for example, the effectiveness of antibiotics in space and the behavior of ants in microgravity. But it didn't quite make it there in time for Christmas.

Launches can be delayed for countless reasons - days, hours, or even seconds before liftoff. There's a window of just a few minutes during which the launch can occur each day or night, depending on where Earth and the ISS are in orbit, so it isn't uncommon for spectators to hang out longer than expected when a launch is scrubbed.

But the good news is that there are plenty of ways to kill time in the Wallops area. Best known for their wild ponies, Chincoteague and Assateague Islands are a bridge away from the NASA Wallops Visitor Center. You can explore by bike or kayak, take a day trip to Smith Island, or hit the Delmarva Wine and Ale Trail.

Chincoteague's Main Street is lined with shops and restaurants,

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Blastoff! (cont'd)

An exhibit on NASA's ICESat program (Ice, Cloud, and land Elevation Satellite) at the Wallops Visitor Center.

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though many businesses still close for the off-season. For now, the area has a sweet, kitschy appeal, but growth is expected as the spaceport attracts more visitors. In September, an unmanned launch to the moon (visible in the night sky as far as New York) attracted 13,000 spectators, who then created a backup of a couple of hours on the bridge from Chincoteague to the mainland. Chances are, it won't be long before we see vendors setting up on launch days, selling T-shirts and ballcaps.

The December launch was delayed several times - once because of cooling problems on the ISS that required a spacewalk; once for the polar vortex; and once for high levels of space radiation. It finally went off Jan. 9 at 1:07 p.m.

The visitor center is about seven miles north of the launch pad, across the street from part of the facility where U.S. Navy pilots practice simulated aircraft carrier landings. I learned from the exhibits that Wallops became a test range for rockets and missiles by the end of World War II, and that today, the facility is NASA's most active launch range.

NASA suggests watching from the visitor center or from the beach on Assateague Island National Seashore/Chincoteague National Wildlife Refuge. Locals tend to scout out the best viewing spots, such as Arbuckle Neck Road or other streets off Atlantic Road. You're bound to get some good viewing tips if you stop by the lunch counter at T's Corner or one of the restaurants on Chincoteague.

Some of the kids with experiments headed to space watched the launch from a side street with a wireless PA system attached to a smartphone, blaring NASA TV to a few hundred spectators. One local I talked to, who had taken the day off from work, said every launch from the last three decades had a special place in his heart. "It's history-making," he said, "and it's a sense of patriotism."

Virginia Space's Nash watched from mission control. He has probably seen 150 launches, including working 64 shuttle launches. Still, he said, he gets butterflies every time. "It's hard to believe the sheer energy that rockets have," he said. "It rattles you. It shakes your entire body."

Launch experiences are different for everyone, but I can't imagine walking away feeling unmoved. I watched my first launch a decade ago from the Baikonur Cosmodrome, a Russian launch facility in Kazakhstan. In the middle of the night, shortly after I

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Through the Eyepiece: Asteroids Ceres and Vesta

by Don Knabb, CCAS Treasurer & Observing Chair

Throughout the spring and early summer asteroids Ceres and Vesta have been close to each other in the night sky in the constellation Virgo. They inhabit the same region of the sky as Mars, so we have lots to look at in a small area.

But come the evenings of July 4th and 5th this pair of minor planets are closer than anyone has ever seen. They will be only 0.17 degree apart, just 1/3 the apparent diameter of the Full Moon!

I observed both asteroids in mid-June and they were surprisingly easy to find, even from the light-polluted skies near West Chester. Sky maps are available in the July issue of Astronomy magazine or on the Sky and Telescope magazine web site. But I used the iPad planetarium software Sky Safari Pro. It showed me exactly where to look and made star-hopping to the asteroids fairly simple. Binoculars mounted on a tripod are ideal for seeing these small rocky worlds.

Above is a picture of Vesta taken by NASA's Dawn spacecraft on July 18th, 2011. It was taken from a distance of about 6,500 miles away from Vesta. The smallest detail visible is about 1.2 miles.

Asteroids are rocky, airless worlds that orbit our sun, but are too small to be called planets. Tens of thousands of these minor planets are gathered in the main asteroid belt, a vast doughnut-shaped ring between the orbits of Mars and Jupiter. Asteroids that pass close to Earth are called near-earth objects, or NEOs.

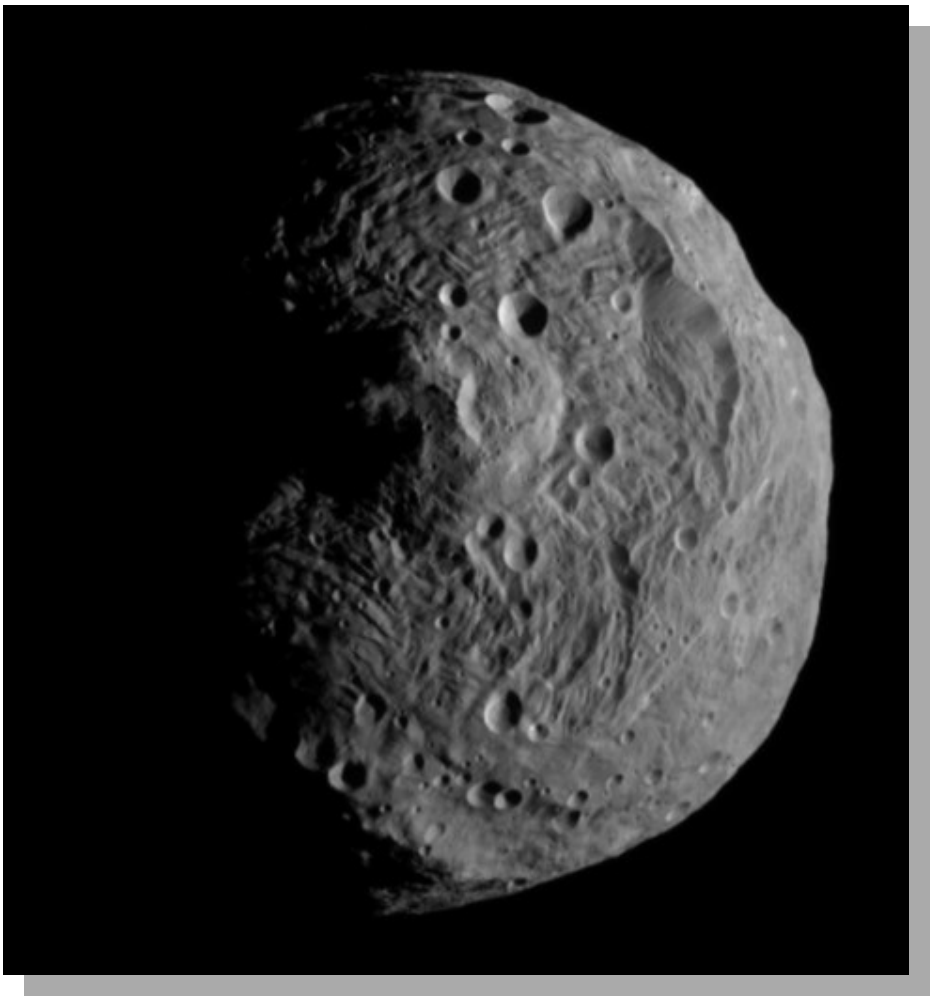

Photo credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

If all of the asteroids were combined into a ball, they would still be much smaller than Earth's moon. If the Sun was as tall as a typical front door, Earth would be the size of a nickel, the Moon would be about as big as a green pea and Ceres (the largest object in the main asteroid belt) would be as small as a sesame seed.

Asteroids do not have atmospheres, but more than 150 asteroids are known to have a small companion moon (some have two moons). One asteroid, named Chariklo, is known to have two dense and narrow rings.

More than 10 spacecraft have explored asteroids. NEAR Shoemaker even landed on asteroid Eros. The Dawn mission is the first mission to orbit a main belt asteroid, Vesta.

Ceres, the first and largest asteroid to be discovered (1801 by

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Blastoff! (Cont'd)

At NASA's Wallops Visitor Center, about seven miles from the launch pad , learn how Wallops became a test range for rockets and missiles by the end of World War II, and that today the facility is NASA's most active launch range. NASA

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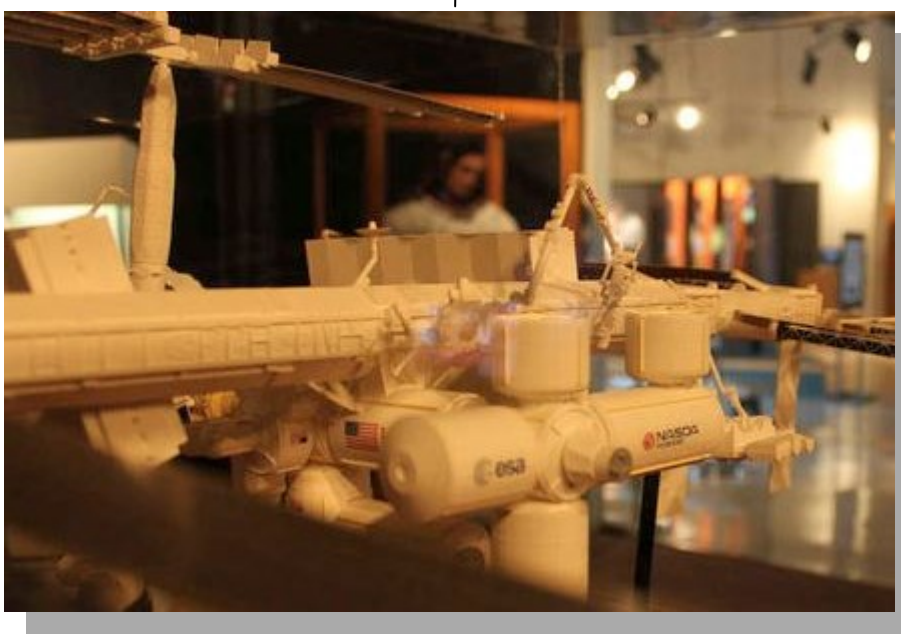
saw three humans behind glass in quarantine, I watched them shooting into space in a Soyuz. As the ground shook, tears streamed down my cheeks.

This time, I was much closer to home and, thanks to more stringent safety regulations, much farther from the launch pad.



A scale model of the International Space Station sits inside a glass case on display inside the Wallops Visitor Center at Wallops Island, Va. NASA (NASA)

During the countdown, I thought about the ants that would live out their lives in space, and the Christmas gifts finally en route. And once again, when it came time for liftoff, I was in awe.

Three days later, astronauts aboard the ISS used a robotic arm to capture the Cygnus (as both orbited at 17,500 m.p.h.). They unloaded 2,780 pounds of cargo, and they repacked the craft with 2,800 pounds of trash from the station. On Feb. 18, the capsule headed on a trajectory away from the ISS. Its mission then complete, the spacecraft reentered Earth's atmosphere and, in one last fiery display, burned up and disappeared over the South Pacific Ocean.

A Glorious Gravitational Lens

by Dr. Ethan Siegel

As we look at the universe on larger and larger scales, from stars to galaxies to groups to the largest galaxy clusters, we become able to perceive objects that are significantly farther away. But as we consider these larger classes of objects, they don't merely emit increased amounts of light, but they *also* contain increased amounts of **mass**. Under the best of circumstances, these gravitational clumps can open up a window to the distant universe well beyond what any astronomer could hope to see otherwise.

The oldest style of telescope is the refractor, where light from an arbitrarily distant source is passed through a converging lens. The incoming light rays—initially spread over a large area—are brought together at a point on the opposite side of the lens, with light rays from significantly closer sources bent in characteristic ways as well. While the universe doesn't consist of large optical lenses, **mass itself** is capable of bending light in accord with Einstein's theory of General Relativity, and acts as a *gravitational* lens!

The first prediction that real-life galaxy clusters would behave as such lenses came from Fritz Zwicky in 1937. These foreground masses would lead to multiple images and distorted arcs of the same lensed background object, all of which would be magnified as well. It wasn't until 1979, however, that this process was confirmed with the observation of the Twin Quasar: QSO 0957+561. Gravitational lensing requires a serendipitous alignment of a massive foreground galaxy cluster with a background galaxy (or cluster) in the right location to be seen by an observer at our location, but the universe is kind enough to provide us with many such examples of this good fortune, including one accessible to astrophotographers with 11" scopes and larger: Abell 2218.

Located in the Constellation of Draco at position (J2000): R.A. 16h 35m 54s, Dec. +66° 13' 00" (about 2° North of the star 18 Draconis), Abell 2218 is an extremely massive cluster of about 10,000 galaxies located 2 billion light years away, but it's *also* located quite close to the zenith for northern hemisphere observers, making it a great target for deep-sky astrophotography. Multiple images and sweeping arcs abound between magnitudes 17 and 20, and include galaxies at a variety of

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Abel 2218. Image credit: NASA, ESA, and Johan Richard (Caltech). Acknowledgement: Davide de Martin & James Long (ESA/Hubble).

Space Place (cont'd)

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redshifts ranging from z=0.7 all the way up to z=2.5, with farther ones at even fainter magnitudes unveiled by Hubble. For those looking for an astronomical challenge this summer, take a shot at Abell 2218, a cluster responsible for perhaps the most glorious gravitational lens visible from Earth!

Learn about current efforts to study gravitational lensing using NASA facilities: http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-a-gravitational-lens/

Kids can learn about gravity at NASA's Space Place: http://spaceplace.nasa.gov/what-is-gravity/

Observing (Cont'd)

(Continued from page 5)

when the Moon will not be too bright. Also, the comet is near the head of Leo the Lion, which is easy to find in the sky. Sky maps are available in the July issue of Astronomy magazine or on the Sky and Telescope magazine web site.

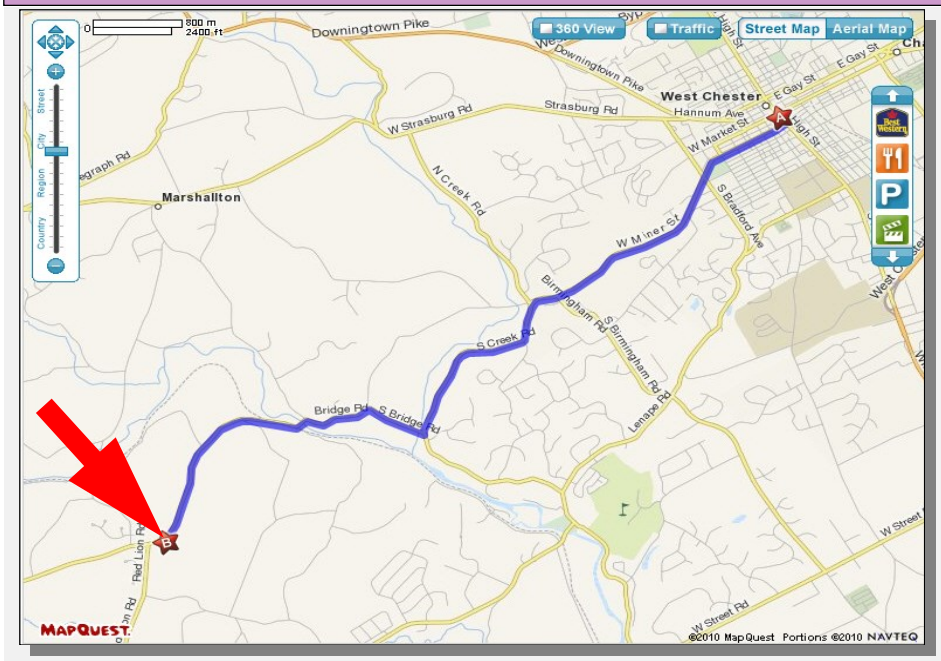
I observed Comet PANSTARRS in mid-June during a night near first quarter Moon and was still able to find this wispy fuzz ball from the outer solar system. A 4 inch telescope should be sufficient for this observing challenge.

July continues to present an excellent opportunity to see asteroids Ceres and Vesta, the two brightest asteroids of the main asteroid belt between Mars and Jupiter. On the night of July 5/6 they are extremely close in the sky and are in an ideal position for viewing. They are not far from Mars in the sky so you can see these minor planets just after the sky fully darkens.

You will find a sky map to locate Ceres and Vesta in the July issue of Sky and Telescope Magazine.

Meteor showers: The Delta Aquarid meteor shower peaks on July 30th. We won't have an impressive shower, but one might see 10 to 20 fast meteors per hour.

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 February through November) are held at the Myrick Conservation Center of the Brandywine Valley Association.

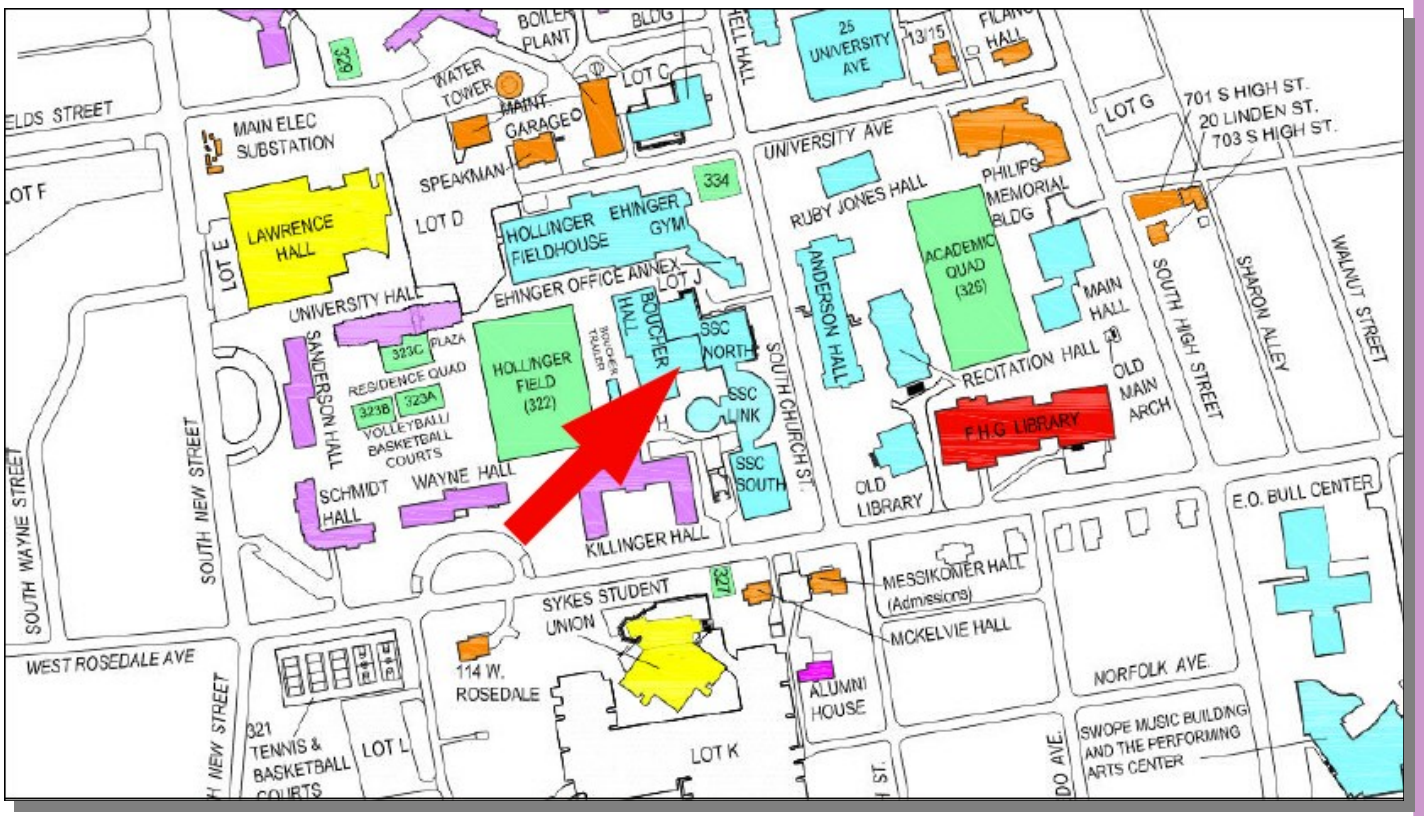
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 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 112 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



Eyepiece (cont'd)

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Giuseppe Piazzi) and the closest dwarf planet to the Sun, encompasses over one-third of the estimated total mass of all the asteroids in the asteroid belt.

Information credit: http://solarsystem.nasa.gov/planets/Asteroids

To learn more about viewing upcoming NASA launches at Wallops, visit www.nasa.gov/centers/wallops/home/index.html

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

June 2014 Financial Summary

Beginning Balance	$2,976
Deposits	$0
Disbursements	$255
Ending Balance	$1,941

New Member Welcome!

Welcome new CCAS member John P. Cunningham at Lincoln University. We're glad you decided to join us under the stars! Clear skies to you!

Membership Renewals

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

Don Knabb
988 Meadowview Lane
West Chester PA 19382

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

CCAS Information Directory

Join the Fight for Dark Skies!

You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at $30.00 for one year. Send to:

International Dark-Sky Association
3225 North First Avenue
Tucson, AZ 85719

Phone: **520-293-3198**
Fax: **520-293-3192**
E-mail: **ida@darksky.org**

For more information, including links to helpful information sheets, visit the IDA web site at:

http://www.darksky.org

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 organization. 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

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CCAS Information Directory

CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

CCAS Lending Library

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

Contributing to *Observations*

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

Or mail the contribution, typed or handwritten, to:

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 out our Website at:

http://www.ccas.us

John welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work; no copyrighted material! Give your contributions to John Hepler at (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 President:	Liz Smith 610-842-1719
ALCor, Observing, and Treasurer:	Don Knabb 610-436-5702
Secretary:	Ann Miller 610-558-4248
Librarian:	Barb Knabb 610-436-5702
Program:	Dave Hockenberry 610-558-4248
Education:	Kathy Buczynski 610-436-0821
Webmaster and Newsletter:	John Hepler 724-349-5981
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 Membership Renewals on the front of each issue of *Observations* to see if it is time to renew. If you need to renew, you can mail your check, made out to "Chester County Astronomical Society," to:

Don Knabb
988 Meadowview Lane
West Chester PA 19382-2178

Phone: **610-436-5702**
e-mail: **treasurer@ccas.us**

*Sky & Tele*scope Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **$32.95,** much less than the newsstand price of $66.00, and also cheaper than individual subscriptions ($42.95)! Buying a subscription this way also gets you a 10% discount on other Sky Publishing merchandise.

To **start** a **new** subscription, make **sure** you make out the check to the **Chester County Astronomical Society**, note that it's for *Sky & Telescope*, and mail it to Don Knabb.

To **renew** your "club subscription" contact Sky Publishing directly. Their phone number and address are in the magazine and on their renewal reminders. If you have **any** questions call Don first at 610-436-5702.

Astronomy Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **$34.00** which is much less than the individual subscription price of $42.95 (or $60.00 for two years). If you want to participate in this special Society discount offer, **contact our Treasurer Don Knabb.**