



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 23, No. 5

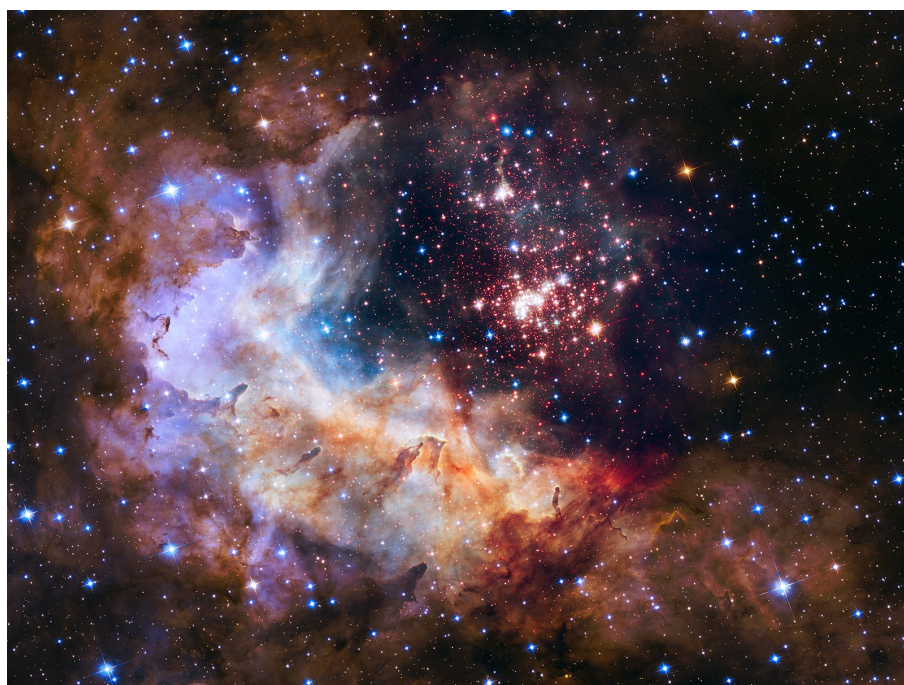
Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009

May 2015

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Westerlund 2 in Constellation Carina



See pg. 3. for details of this beautiful image.

Membership Renewals Due

05/2015	Cunningham Fletcher O'Hara
06/2015	Hebding Mazziotto & Calobrisi
07/2015	Hockenberry & Miller Hunsinger Piehl

Important May 2015 Dates

- 3rd** • Full Moon, 11:43 p.m.
- 6th** • Eta Aquariid Meteor Shower Peaks.
- 11th** • Last Quarter Moon, 6:36 a.m.
- 18th** • New Moon, 12:13 a.m.
- 25th** • First Quarter Moon, 11:18 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, May 23, 2015.** Cheslen multi-club star party in Coatesville, PA, with Chesmont, CCAS, DVAA, and BucksMont participating.

☼ **Saturday, June 6, 2015.** CCAS special observing session at Anson Nixon Park in Kennett Square, PA.

Spring/Summer 2015 Society Events

May 2015

1st • West Chester University Planetarium Live Show: "Pluto Demoted," in the Schmucker Science Building. The show starts at 7 p.m. and runs approximately one hour in length.

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.

9th • CCAS special observing session at Hoopes Park in West Chester, PA.

14th • CCAS monthly meeting in Room 112, Merion Science Center, WCU. Meet & Greet over coffee and refreshments from 7:10 to 7:30 p.m. The meeting starts at 7:30 p.m. CCAS Member Speaker: John Conrad, NASA Solar System Ambassador, "NEOs – and Other Dangers from Space."

21st-22nd • The von Kármán Lecture Series: [The Search for Planets, Habitability, and Life in Our Galaxy](#), 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 June 2015 edition of [Observations](#).

22nd • CCAS Monthly Observing Session, Myrick Conservancy Center, BVA. The observing session starts at sunset.

23rd • Cheslen multi-club star party in Coatesville, PA, with Chesmont, CCAS, DVAA, and BucksMont participating.

26th • Deadline for newsletter submissions for the June 2015 edition of [Observations](#).

June 2015

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

6th • CCAS special observing session at Anson Nixon in Kennett Square, PA.

18th-19th • The von Kármán Lecture Series: [On Sea Ice](#), at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

19th • CCAS Monthly Observing Session, Myrick Conservancy Center, BVA (rain date Saturday, June 20th). The observing session starts at sunset.

20th • Open call for articles and photographs for the July 2015 edition of [Observations](#).

21st • Summer Solstice. First day of summer.

26th • Deadline for newsletter submissions for the July 2015 edition of [Observations](#).

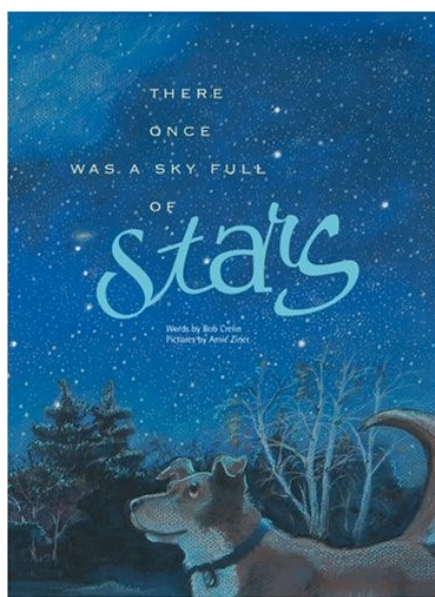
Minutes from April 2015 Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor welcomed 20 members and guests to the April 14, 2015 meeting of CCAS.
- Don Knabb reminded members that we will meet for arm chair observing at Four Dogs Tavern on Saturday, April 18, 2015 at 6:30pm in place of the rescheduled star party at Nottingham Park. BVA group observing is still scheduled for Friday, April 17th.
- Pete Kellerman informed the group about a sound rocket launch is scheduled to lift off from Wallop's Island on Saturday, April 18th.
- Pete also reminded the group that NEAF will occur on April 18 and 19 at SUNY Rockland Community College, in Suffern, NY.
- Don Knabb presented the monthly night sky tour with Stellarium.
- Paul Linville, a CCAS guest, presented his ideas on cosmology and universal expansion. Members and guests shared in a discussion of his ideas and we welcome him to return to continue in the exchange of ideas.
- David Hockenberry introduced our speaker for the evening. Dr. Paul Halpern, professor of Physics at University of the Sciences, returned to our group to share his newly released book, "Einstein's Dice and Schrodinger's Cat: How Two Great Mind's Battled Quantum Randomness to Create a Unified Theory of Physics." Dr. Halpern signed copies of his book at the conclusion of his talk.

Book Review: There Once Was a Sky Full of Stars

by Ann Miller, CCAS Secretary



Book Cover

(a telescope store) in Laurel, MD. It was hiding in a book rack behind a dense technical text on astrophotography. The beautiful cover illustration pulled me in.

The lyrically written text highlights many of the night sky features like planets, stars, and the Milky Way with beautiful companion illustrations of the night sky from a child's view point. Crelin also introduces children to the impact of light pollution on their night sky viewing experience as well as its impact on nature. He concludes with solutions to light pollution that are actable from a child's perspective like downward glowing

(Continued on page 10)

Hubble Telescope's Silver Anniversary

by T. Kelly Beatty, Senior Editor, Sky & Telescope Magazine



With a mass of 11 tons and 43 feet (13.2 m) long, the Hubble Space Telescope has been peering into the depths of the universe since 1990. Here it's seen in February 1997, during the second of five Space Shuttle servicing missions. NASA

It's been 25 years since the Space Shuttle Discovery lofted the Hubble Space Telescope into orbit. We sometimes forget how many astronomical discoveries were made before the advent of the Hubble Space Telescope, which left Earth on this date 25 years ago. Likewise, few now recall that the mission ended up costing some \$2 billion just to

get it to the launch pad, seven years behind schedule and roughly 100% over budget. And then there was the epic fail resulting from its misshapen primary mirror, now a distant memory thanks to the installation of corrective optics by visiting astronauts in late 1993.

As the Space Shuttle Discovery

and its crew of five rocketed skyward from Florida on April 24, 1990, we all had high hopes that this go-for-broke spacecraft would become "astronomy's discovery machine." Today, few would argue that the Hubble's observations, which continue unabated thanks to five servicing missions by astronaut crews and sustained funding that's nearing \$10 billion all told, have revolutionized astronomy.

Understandably, NASA and the European Space Agency (which shared in HST's development) have much to celebrate. Lots of Hubble highlights appear on the websites of [NASA](#) and [ESA](#). In fact, there's even a website devoted to [Hubble's silver anniversary](#).

With all that HST has accomplished, it's worth noting that astronomers were not unanimous in their approval of the project during its long, tortured development. Sky & Telescope magazine has posted on its website [two Focal Points editorials](#) favoring both sides of the argument that ran opposite each other in Sky & Telescope's April 1990 issue. These essays offer a window into the soaring hopes and some of the concerns they had — that we all had — at the dawn of the Hubble era. Enjoy!

Cover Image: The colorful nebula Gum 29, 20,000 light-years away in the constellation Carina, is the host for a giant cluster of 3,000 young stars named Westerlund 2. [Here's an animation](#) of an imaginary flight through Westerlund 2. NASA / ESA / Hubble Heritage Team / A. Nota / Westerlund 2 Science Team

May 2015 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on May 12, 2015, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. Our CCAS member speaker is John Conrad, NASA Ambassador, presenting "NEOs – and Other Dangers from Space."

Please note that inclement weather or changes in speakers'

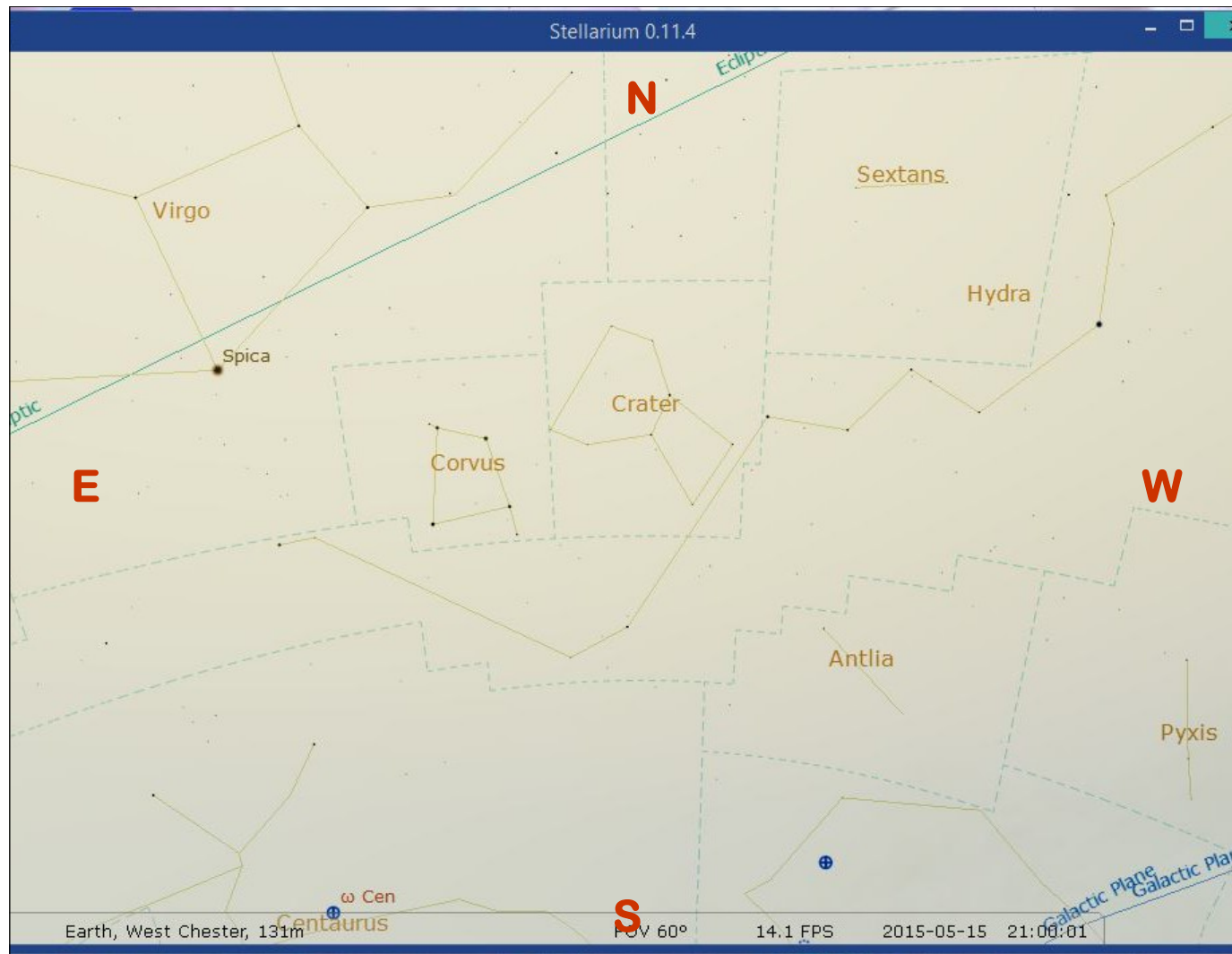
schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

We are looking for presenters for future meetings in our 2015-2016 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

May 15, 2015 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
5/01/2015	5:32 a.m. EDT	6:01 a.m. EDT	7:55 p.m. EDT	8:24 p.m. EDT	13h 53m 52s
5/15/2015	5:15 a.m. EDT	5:46 a.m. EDT	8:09 p.m. EDT	8:39 p.m. EDT	14h 22m 57s
5/31/2015	5:03 a.m. EDT	5:35 a.m. EDT	8:22 p.m. EDT	8:54 p.m. EDT	14h 47m 46s
Moon Phases					
Full Moon	5/03/2015	11:42 p.m. EDT	Last Quarter	5/11/2015	6:36 a.m. EDT
New Moon	5/18/2015	12:13 a.m. EDT	First Quarter	5/25/2015	11:18 p.m. EDT

May 2015 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

3	Full Moon, the Full Flower Moon
4/5	The Moon is near Saturn
6	The Eta Aquariid meteor shower peaks
6	Mercury is at greatest elongation
8 -10	Venus is near M35
11	Last Quarter Moon
18	New Moon
21	The Moon, Venus and Jupiter make a nice grouping
22	Saturn is at opposition
25	First Quarter Moon
26	The Lunar Straight Wall is visible

The Best Sights This Month: May is another excellent month for planetary observing with Mercury, Venus, Jupiter and Saturn visible. This month is when Mercury and Saturn put on their best show of 2015.

Mercury: At the start of the month Mercury is about 8 degrees above the horizon an hour after sunset. May 6th is when Mercury reaches its greatest elongation from the Sun and this is our best opportunity to view this elusive planet as the sky darkens.

Venus: Our sister planet reaches its highest altitude of 2015 on May 8th, shining at magnitude -4.4. Venus passes close to the open cluster M35 in Gemini on May 8th through the 10th. Then on the 21st it nearly lines up with Castor and Pollux.

Mars: Mars has fallen into the glow of the setting Sun and will not be visible for a few months.

Jupiter: The king of the planets continues to rule the evening sky shining at magnitude -2.0. It continues to move eastward against the background stars

toward a close encounter with Venus this summer.

Saturn: Saturn reaches opposition, the point in the sky opposite of the Sun from our vantage point, on May 22nd so it is visible all night. Although not nearly as bright as Venus and Jupiter it still glows strongly at magnitude 0, the brightest it has been in 8 years.

Uranus and Neptune: Neither gas giant is in good position for viewing for the next several months.

The Moon: Full Moon is on May 3rd. Native Americans called this the Full Flower Moon. In most areas, flowers are abundant everywhere during this time, thus, the name of this Moon. Other names include the Full Corn Planting Moon, or the Milk Moon. The Lunar Straight Wall, one of my favorite features on the Moon, is visible on May 26th.

Constellations: Spring is here, and with it the Big Dipper is high overhead. Follow the arc to bright Arcturus and find Boötes. Just to its left is the Northern Crown, Corona Borealis. Leo is easy to find just after sunset looking due south and bright Vega in Lyra is rising as the night gets a bit later. Stay out later still and watch Cygnus the Swan fly above the eastern horizon.

Messier/deep sky: It is once again globular cluster time! M3 is high overhead during May. Take a look at the glow of 500,000 stars in your eyepiece! Stay up a bit later as M13, the Great Globular Cluster in Hercules rises in the east. M13 contains several hundred thousand stars, perhaps a million!

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

Meteor showers: Comet Halley leaves a trail of debris as it passes through the solar system, and the Eta Aquariid meteors are that debris, as are the Orionids of October. Conditions for us are not optimum for this shower due to the bright waning gibbous Moon but it is worth taking a look in the pre-dawn sky at the peak of the shower on May 6th or a day before or after that peak.

Is the Most Massive Star Still Alive?

by Dr. Ethan Siegel

The brilliant specks of light twinkling in the night sky, with more and more visible under darker skies and with larger telescope apertures, each have their own story to tell. In general, a star's color correlates very well with its mass and its total lifetime, with the bluest stars representing the hottest, most massive and *shortest-lived* stars in the universe. Even though they contain the most fuel overall, their cores achieve incredibly high temperatures, meaning they burn through their fuel the fastest, in only a few million years instead of roughly ten billion like our sun.

Because of this, it's only the youngest of all star clusters that contain the hottest, bluest stars, and so if we want to find the most massive stars in the universe, we have to look to the largest regions of space that are actively forming them right now. In our local group of galaxies, that region doesn't belong

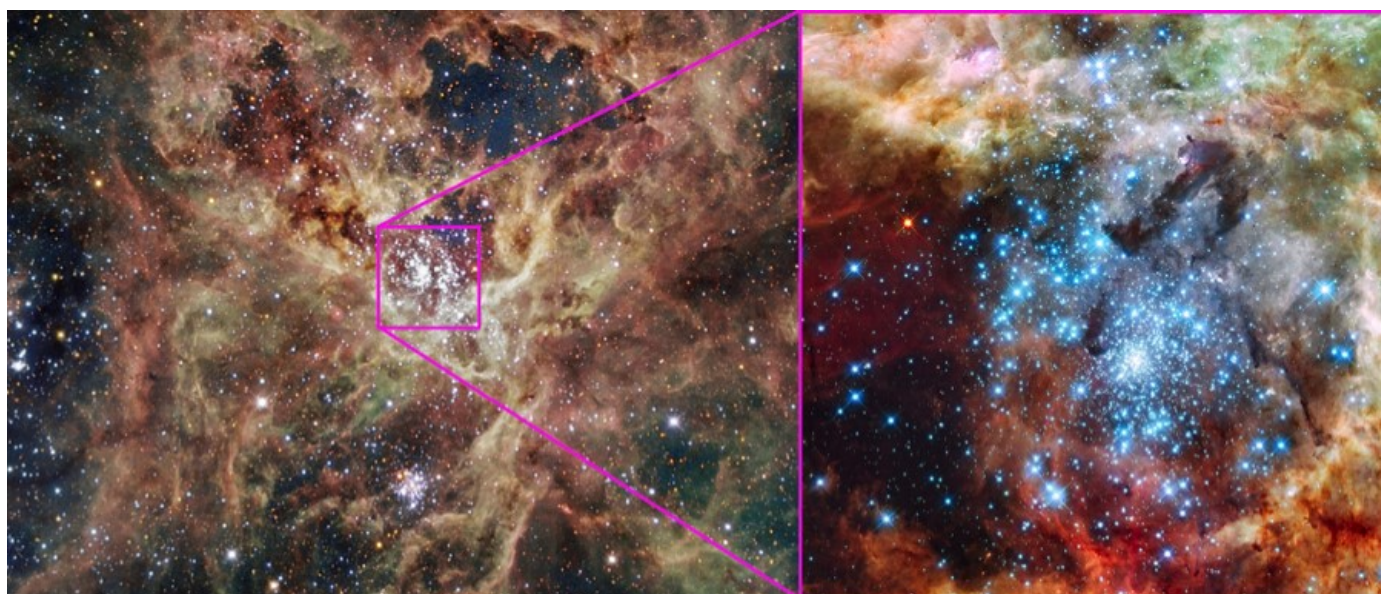


to the giants, the Milky Way or Andromeda, but to the Large Magellanic Cloud (LMC), a small, satellite galaxy (and fourth-largest in the local group) located 170,000 light years distant.

Despite containing only one percent of the mass of our galaxy, the LMC contains the Tarantula Nebula (30 Doradus), a star-forming nebula approximately 1,000 light years in size, or roughly seven percent of the galaxy itself. You'll have to be south of the Tropic of Cancer to observe it, but if you can locate it, its center contains the super star cluster NGC 2070, holding more than 500,000 unique stars,

including many hundreds of spectacular, bright blue ones. With a maximum age of two million years, the stars in this cluster are some of the youngest and most massive ever found.

At the center of NGC 2070 is a very compact concentration of stars known as R136, which is responsible for most of the light illuminating the entire Tarantula Nebula. Consisting of no less than 72 O-class and Wolf-Rayet stars within just 20 arc seconds of one another, the most massive is R136a1, with 260 times the sun's mass and a luminosity that outshines us by a factor of *seven million*. Since the light has to travel 170,000 light years to reach us, it's quite possible that this star has already died in a spectacular supernova, and might not even exist any longer! The next time you get a good glimpse of the southern skies, look for the most massive star in the universe, and ponder that it might not even still be alive.



Images credit: ESO/IDA/Danish 1.5 m/R. Gendler, C. C. Thöne, C. Féron, and J.-E. Ovaldsen (L), of the giant star-forming Tarantula Nebula in the Large Magellanic Cloud; NASA, ESA, and E. Sabbi (ESA/STScI), with acknowledgment to R. O'Connell (University of Virginia) and the Wide Field Camera 3 Science Oversight Committee (R), of the central merging star cluster NGC 2070, containing the enormous R136a1 at the center.

Hubble 25 (without title)

Courtesy of NASA/ESA Hubble Space Telescope



From planets to planetary nebula, and from star formation to supernova explosions, the NASA/ESA

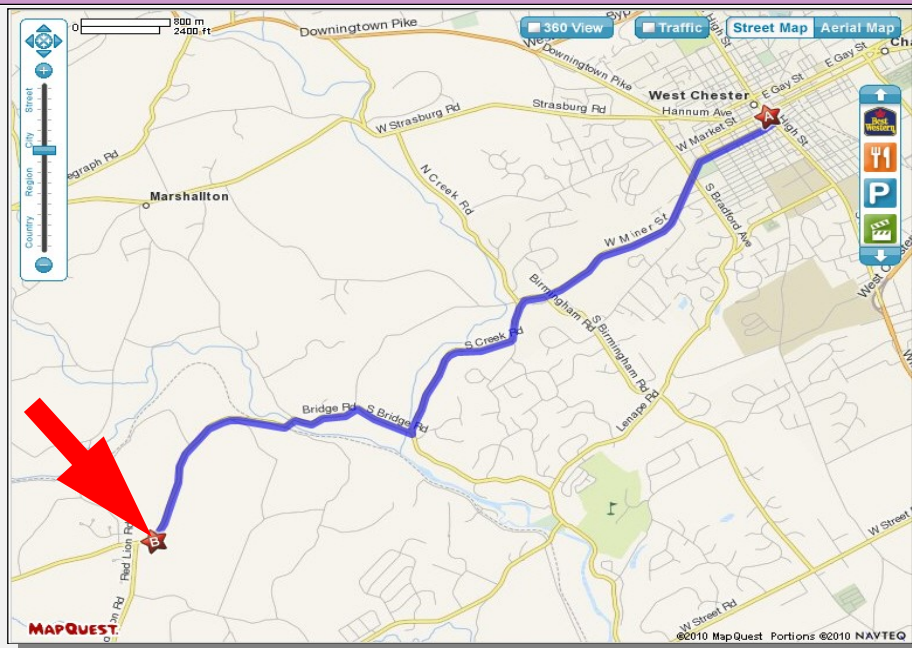
Hubble Space Telescope has captured a wealth of astronomical objects in its 25-year career. This

montage presents 25 images that sample the space telescope's rich contribution to our understanding of the Universe around us. At the center of the montage is star cluster Westerlund 2, the image released on April 23, 2015, on the occasion of Hubble's 25th anniversary. From left to right, top row:

Interacting galaxies; Abell 2218; Comet ISON; Jupiter; Green fila-

(Continued on page 9)

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).

Through the Eyepiece: Globular Cluster M3

by Don Knabb, CCAS Treasurer & Observing Chair



Image credit: Robert J. Vanderbei

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 Venat-

ici. 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 barely visible to the naked eye under ideal, very dark conditions.

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

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

(Continued on page 9)

Cluster (Cont'd)

(Continued from page 8)

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 might not have a clue of the dim galaxies and nebulae that lie outside our cluster.

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 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 ideal conditions and stays 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 as 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 8-inch telescope shows

stars throughout the cluster but not in the very core, which is resolved into stars only 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 Stellarium screen capture, if you find bright Arcturus and scan towards Canes Venatici 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



Hubble 25 (cont'd)

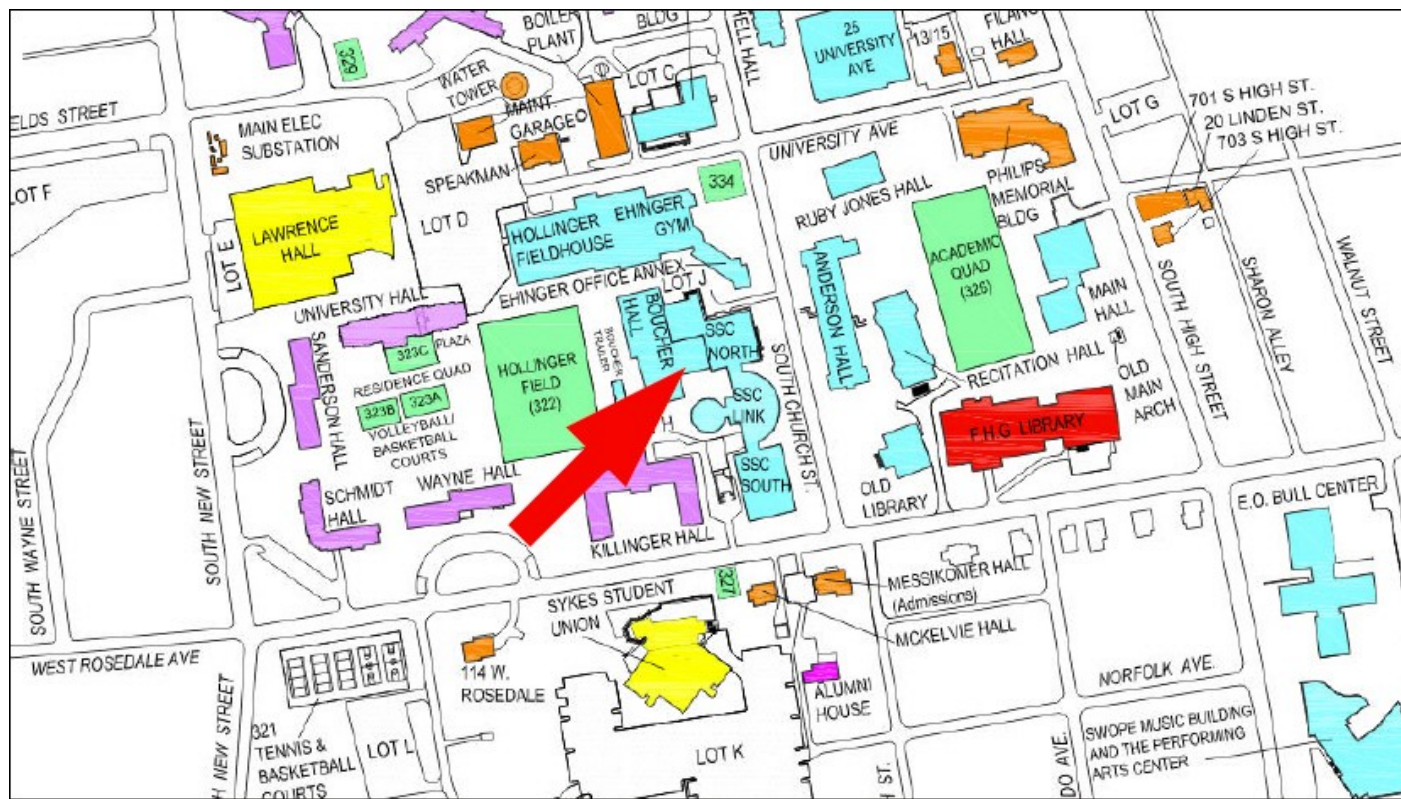
(Continued from page 7)

ment in the Teacup galaxy ; Star formation in 30 Doradus; Interacting galaxies Arp 273. Second row: Saturn; The Ring Nebula; “Mystic Mountain” in the Carina Nebula; Crab nebula. Third row: The horsehead nebula; Carina Nebula; Planetary nebula NGC 6302; Star formation in M17. Fourth row: Globular cluster NGC 121; “Pillars of creation”; Ring galaxy AM 0644-741. Fifth row: Colliding galaxies Arp 272; Star cluster NGC 602; Hubble Ultra Deep Field; Mars; Variable star RS Puppis; Orion Nebula.

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).



Double Star (Cont'd)

(Continued from page 2)

lights and turning off lights.

Points of Discussion are included at the end of the text for anyone who would want to include this book in educational curricula or for points of discussion for parents (or wonderful aunts) to share with their children.

Bob Crelin has been involved in astronomy education since 1996 and his love of the topic shines in this children's book. He has provided links to his website www.bobcrelin.com and the website of the [International Dark Sky Association](http://www.internationaldarksky.org) for more infor-

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

April 2015 Financial Summary

Beginning Balance	\$2,315
Deposits	\$105
Disbursements	\$0
Ending Balance	\$2,420

New Member Welcome!

Welcome new CCAS member Thomas Lapp from Chadds Ford, PA. We're glad you decided to join us under the stars! Clear skies to you!

Membership Renewals

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

Don Knabb
988 Meadowview Lane
West Chester PA 19382

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

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 Phone Number

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.

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

<http://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.

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

Phone: 512-944-7354

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

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

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

<http://www.skiesunlimited.net>



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

4403 Main Street
Philadelphia, PA 19127

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

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

<http://www.spectrum-scientifics.com>

CCAS Information Directory

CCAS Lending Telescopes

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

CCAS Lending Library

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

Contributing to *Observations*

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

Or mail the contribution, typed or handwritten, to:

John Hepler
313 S. Queen St.
Chestertown, MD 21620

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 (443) 282-0619 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 443-282-0619
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 & Telescope Magazine Group Rates

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

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

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