Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 23, No. 12 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *December 2015*

In This Issue

Membership Renewals Due

12/2015	Bogard Bogusch O'Leary
01/2016	Golub Kellerman Kovacs Linskens Loeliger McElwee
02/2016	La Para Macaleer

Important December 2015 Dates

3rd • Last Quarter Moon, 2:40 a.m.

11th • New Moon, 5:29 a.m.

13th-14th • Geminid Meteor Shower peaks.

18th • First Quarter Moon, 10:14 a.m.

21st • Winter Solstice: first day of winter, 11:48 p.m..

25th • Full Moon, 6:11 a.m.

CCAS Annual Holiday Party

Barb and Don Knabb have graciously offered to host the annual CCAS holiday party at their home on Saturday, December 5th, at 6:00 p.m. Their address is 988 Meadowview Lane and their phone number is 610-436-5702. A Google Maps search will provide good directions to their house. Their home is at the end of a cul-de-sac and 988 is on the mailbox. They have a long driveway and the house has a garage facing the street. Please RSVP to dknabb00@comcast.net if you plan to attend.

Autumn/Winter 2015 Society Events

December 2015

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.

3rd-4th • The von Kármán Lecture Series: The InSight Mission: Journey to the Center of Mars at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

5th • CCAS Holiday Party at Don & Barb Knabb's home. See pg. 1 for details.

11th • West Chester University Planetarium Show: "So You Want to Buy a Star..." The show starts at 7 p.m. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

13th-14th • Geminid meteor shower peaks.

20th • Open call for articles and photographs for the January 2016 edition of Observations.

21st • Winter Solstice: first day of winter at 11:48 PM EST.

26th • Deadline for newsletter submissions for the January 2016 edition of Observations.

January 2016

4th • Quadrantid meteor shower peaks.

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.

12h • CCAS Monthly Meeting, Merion Science Center, Rm 112, West Chester University. The meeting starts at 7:30 p.m. Guest Speaker: TBA.

14th-15th • The von Kármán Lecture Series: Deep Space Atomic Clock, 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 February 2016 edition of Observations.

26th • Deadline for newsletter submissions for the February 2016 edition of Observations.

Minutes from the November 10, 2015, Society Meeting

by Ann Miller, CCAS Secretary

- On November 10, 2015, CCAS membership and guests were welcomed by Roger Taylor. 18 were in attendance.
- Roger reminded everyone that our Annual Holiday Party will be held at the home of Don and Barb Knabb on Saturday, December 5, 2015 in place of our usual monthly meeting. All are welcome.
- Pete Kellerman will be setting up a Yahoo site for club members. Members will be encouraged to share observations as well as to be able to announce impromptu observing gatherings for club members. Pete will be the site Mediator.
- Don Knabb shared the night sky highlights for the month of November using the Stellarium program. Of particular note, Aldebaran, the bright red giant star that is the eye of Taurus, will be occulted by the moon on November 26, 2015 at 5:50am (Thanksgiving morning). Entertainment while you stuff your turkey. On the morning of December 5, 2015, Venus, Mars, the crescent Moon, and Jupiter will all line up. In the evening sky, Uranus will appear in Pisces and Neptune in Aquarius throughout the month.
- Don also reminded members that Friday, November 13 will be the last club observing session for the year at BVA (now renamed BRC-Brandywine Red Clay Alliance.) Don will be out of town and is requesting a volunteer to open the gate for the group.
- Roger informed members about an app called Pluto Safari that is a free down load. The app includes an interactive guide to the first

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January 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

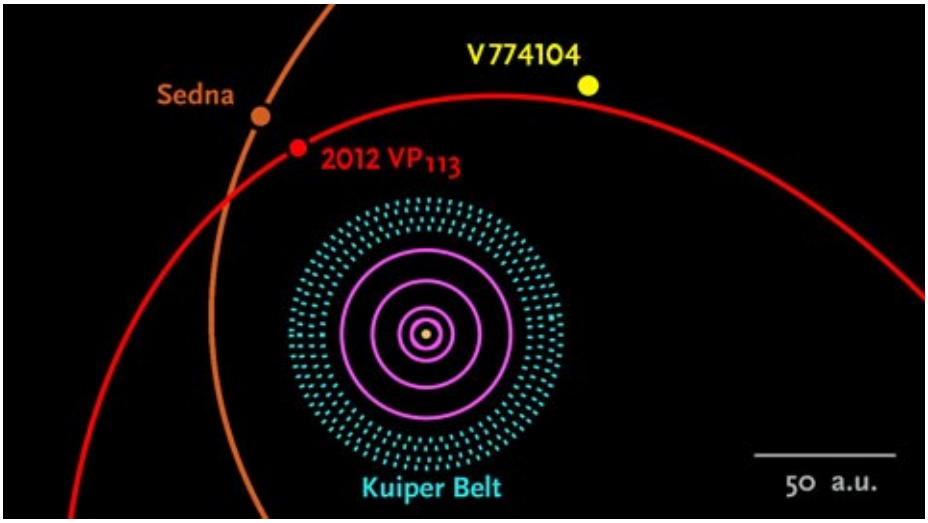
Our next meeting will be held on January 12, 2016, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. The agenda for this evening is still being finalized. Updates will be communicated through member e-mail and in the next edition of the newsletter.

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 spring and fall 2016 seasons. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

V774104: Solar System's Most Distant Object

courtesy Kelly Beatty, Sky & Telescope Magazine



Beyond its distance and estimated size, astronomers know little about the distant object V774104. Within a year, they hope to determine the characteristics of its orbit around the Sun (small yellow dot at center). The outermost pink circle denotes Neptune's orbit. *Source: Scott Sheppard / Carnegie Inst. for Science*

Prowling the outer Kuiper Belt for large, distant members of our solar system has turned up a zoo of remarkable finds in recent years. There's Eris, for example which triggered a divisive debate about Pluto's planetary status; Sedna, whose orbit carries it out to more than 900 astronomical units (1 a.u. is the mean Earth-Sun separation); and 2007 OR10, both very distant (87 a.u.) and one of the reddest objects in the solar system.

But at last week's meeting of the American Astronomical Society's Division for Planetary Sciences, Scott Sheppard (Carnegie Institution for Science) announced that he, Chad Trujillo (Gemini Observatory), and David Tholen (University of Hawai'i) have spotted something even farther from the Sun. This body, designated V774104 for now, lies 103 a.u. away in the direction of west-central Pisces — that's 9.6 billion miles or 15.4 billion km.

V774104 is so distant that it will take another year of study to determine its orbit. "All we really know is the distance," Sheppard admits, along with a guess as to its size. Given its brightness — just 24th magnitude — and assuming that its surface is 15% reflective, the object might be 500 km across. The researchers will make follow-up observations in early December with one of the 6.5-m Magellan telescopes in Chile.

Dynamicists will be eager to learn what kind of orbit

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CCAS Original Astrophotography: M42

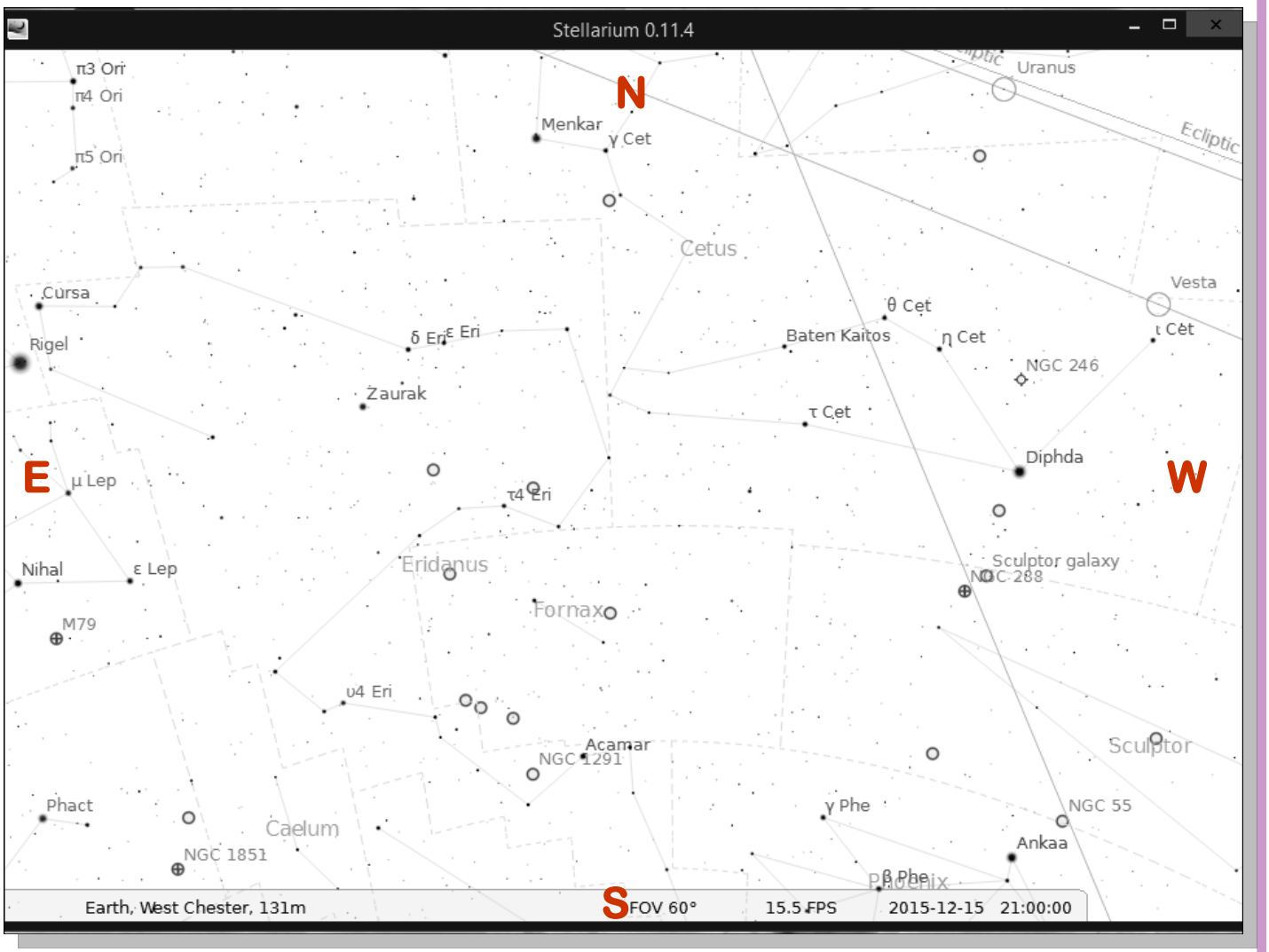
by Don Knabb, CCAS Treasurer & Observing Chair

M42, the Orion Nebula. Data captured 11/21/2015 through a TeleVue NP 127-is telescope on a Losmandy G11 mount, and a Canon EOS 2 DSLR camera. Autoguided with Starlight Xpress Lodestar camera, Stellarvue 80 ED telescope and MaxIm DL. Image capture, observatory and mount control with MaxIm DL. Images calibrated, Bayer array deconstruction and resizing/RGB creation, stacked and RGB merge, "false" Lum creation and Lum deconvolution in CCDStack. Further image processing, LRGB merge and adjustments in Photoshop CS5. Stack of 10 X 60-second images (that's it, just 10 minutes total exposures!!). Image processing by Dave Hockenberry.

The Sky Over Chester County

December 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
12/01/2015	6:33 a.m. EST	7:03 a.m. EST	4:36 p.m. EST	5:06 p.m. EST	9h 33m 15s
12/15/2015	6:45 a.m. EST	7:15 a.m. EST	4:36 p.m. EST	5:07 p.m. EST	9h 21m 20s
12/31/2015	6:52 a.m. EST	7:22 a.m. EST	4:45 p.m. EST	5:16 p.m. EST	9h 22m 55s

Moon Phases					
Last Quarter	12/03/2015	2:40 a.m. EST	New Moon	12/11/2015	5:29 a.m. EST
First Quarter	12/18/2015	10:14 a.m. EST	Full Moon	12/25/2015	6:11 a.m. EST

December 2015 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

3	**Last Quarter Moon**
5	**Venus, Mars, the crescent Moon and Jupiter line up at dawn**
7	**The crescent Moon occults Venus just after noon – an observing challenge**
11	**New Moon**
13/14	**The Geminid meteors peak**
18	**First Quarter Moon**
21	**Winter Solstice**
25	**Full Moon, the Long Night's Moon**

The best sights this month: The best day to see some amazing sights will be December 7th. Before dawn use binoculars to seek out Comet Catalina not far from the thin crescent Moon, then around 12:30 p.m. find the Moon again, higher in the sky of course, and watch as it occults Venus! And don't forget the Geminid meteor shower on the night of December 13/14. This is a great year for the Geminids because they peak only three days after New Moon.

Mercury: December is a good month to seek out the planet nearest the Sun. Look for Mercury low in the west near the end of the month.

Venus: Venus continues to light up the pre-dawn sky throughout December. For an observing challenge, look for the crescent Moon to occult Venus on December 7th. Use binoculars or a telescope to find the dim Moon around 12:30 p.m. and watch as it covers Venus. Then about an hour and a quarter later Venus will appear on the other side of the Moon!

Mars: The red planet is rising around 2 a.m. during December. Look for the orange color of Mars to contrast with the bright blue-white of the star Spica.

Jupiter: Jupiter is rising around midnight during December and shines bright compared to the stars of the constellation Leo the Lion.

Saturn: Saturn passed behind the Sun on November 30th, so in late December it emerges as a morning planet just before the glow of the Sun fills the sky.

Uranus and Neptune: The outer gas giants continue to be in good viewing position just after the sky darkens. Finder charts for both planets are available at skypub.com/urnep, provided by Sky and Telescope magazine.

The Moon: Full moon occurs on December 25th – Merry Christmas! This is the Full Long Night's Moon; or the Full Cold Moon. It is also sometimes called the Moon before Yule. The term Long Night's Moon is appropriate because the midwinter night is indeed long, and because the Moon is above the horizon for a long time. The midwinter full Moon has a high trajectory across the sky because it is opposite a low Sun.

Constellations: Although the temperatures are dropping, December is a wonderful time of the year for naked eye star gazing and constellation viewing. You can make great progress on the Astronomical League Constellation Hunters Club pin because as early as 6:00 several of the summer constellations are still visible such as Hercules, Lyre, Cygnus and Aquila. Then go out again at 9:00 to catch some winter constellations such as Auriga, Taurus and Orion, then take one more trip around midnight and you will see the early spring constellations such as Cancer, Gemini and even Leo the Lion leaping up from the eastern horizon.

Messier/deep sky: The Orion Nebula leads the list for first light with any new equipment you get for Christmas, but don't forget the three open clusters in Auriga, M35 in Gemini and M44, the Beehive in Cancer, if you stay out late. Also, with Cassiopeia high in the sky this is a great time of year to see the open cluster NGC 457, also called the Owl Cluster or the ET Cluster. It really does look like the ET with bright eyes and his arms outstretched.

Comets: Comet Catalina should be visible in the pre-dawn sky during the middle two weeks of December when the Moon is absent from the sky. It is possible this early morning comet could reach 4th magnitude, although keep in mind that this is the

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Through the Eyepiece: The Blue Snowball Nebula, NGC 7662

by Don Knabb, CCAS Treasurer & Observing Chair

With winter approaching it seems appropriate to write about The Blue Snowball Nebula. Also known as NGC 7662, the Blue Snowball Nebula or Caldwell 22 is a planetary nebula located in the constellation Andromeda.

NGC 7662 is a popular planetary nebula for casual observers. A small telescope will reveal a star-like object with slight nebulosity. A 6" telescope with a magnification around 100x will reveal a slightly bluish disk, while telescopes with a primary mirror at least 16" in diameter may reveal slight color and brightness variations in the interior.

I observed the Blue Snowball Nebula with a 12 inch Dobsonian telescope. This is a small nebula, no more than half the size of the famous Ring Nebula in Lyra. I could barely perceive a hint of blue color in the nebula, and although it is a relatively bright object for a nebula, I still found it best observed with adverted vision. I could clearly see why this nebula was nicknamed a snowball.

A planetary nebula is an emission nebula consisting of an expanding glowing shell of ionized gas ejected by stars late in their life. This name originated with their first discovery in the 18th century because of their similarity in appearance to giant planets when viewed through small optical telescopes, and is otherwise unrelated to the planets of the solar system.

Whereas diffuse nebula give birth to stars in the gravitational condensation of gas clouds in interstellar space, planetary nebula, such as the Blue Snowball Nebula, signal instead the death of stars. Rather than disperse widely across many light-years, the gases of planetary nebula are concentrated around the dying star that throws them off, with a more tightly-packed, ball-like appearance.

Image by Josef Pöpsel and Dr. Stefan Binnewies of the Capella Observatory, taken with the telescope "Ganymed". Used with permission.

NGC 7662 is often referred to as the Blue Snowball Nebula because astronomers are often whimsical, if not lacking in creativity. The Blue Snowball is a very bright (comparatively) magnitude 9 and is well-placed for viewing and imaging in the Northern hemisphere in the fall and winter months. It makes an excellent visual target for small scopes, since this small nebula measures just 32″ x 28″, so its small size and high actual magnitude couple to create a very high apparent magnitude, which is a very good measure of how bright an object will appear to a visual observer.

One source I found made this comment in regards to visual observation vs. imaging of deep sky objects: "Targets of this size are a mere speck to astrophotographers who sing praise to their tiny apertures with short focal lengths and "starscape" like fields of view. To a large aperture scope, it's a chance for a little redemption."

The Blue Snowball Nebula is not hard to find using the star

(Continued on page 7)

Distant Object (cont'd)

(Continued from page 3)

V774104 occupies. A highly eccentric track would mean that it periodically swings much closer to the Sun. That's the case with Eris, which likely got flung into its 558-year-long orbit after a gravitational encounter with Neptune eons ago.

But if the orbit is more circular, or if V774104 was found near perihelion, then it's completely decoupled from the massive planets — and that will cause dynamicists to question how it got out there. Two other distant objects, Sedna and 2012 VP113, are also in this kind of orbital limbo. There's no consensus on why they're out there; possible causes run the gamut from gravitational stirring of the even more distant Oort Cloud by a close-passing star to the presence of an undiscovered massive planet far beyond the orbit of Neptune. Or they might be the first-found members of the inner Oort Cloud.

Meanwhile, the search goes on for Sheppard, Trujillo, and Tholen. They're using the Subaru Telescope and the 4-m Blanco Telescope at Cerro Tololo Inter-American Observatory to conduct the largest, deepest survey to date for distant solar-system objects. They hope to find more Sedna-like objects — and Sheppard tells me they've spotted several more objects lying 80 to 90 a.u. away that are being tracked. Should all of these turn out to share orbital characteristics, it would imply that a massive planet awaits discovery in the distant solar system.

See more at: http://www.skyandtelescope.com/astronomy-news/v774104-most-distant-solar-system-object-11212015/

Eyepiece (Cont'd)

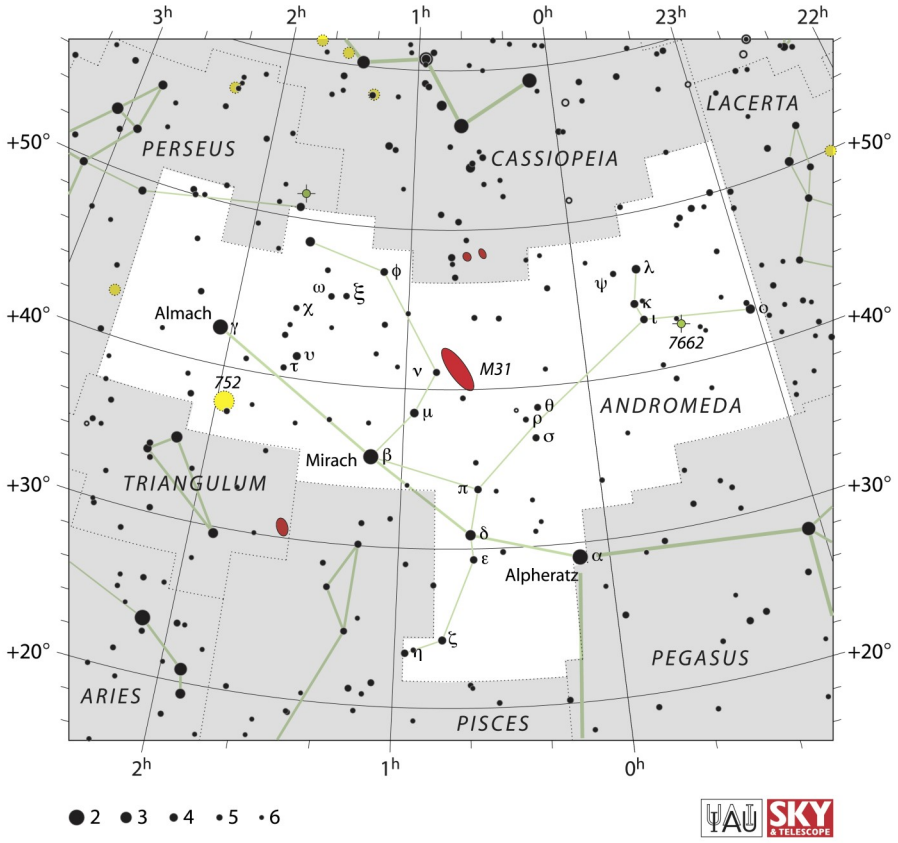


Image credit: International Astronomical Union and Sky d Telescope Magazine

(Continued from page 6)

chart of the constellation Andromeda. It is about half way between the Great Square of Pegasus and Cassiopeia.

So when you are looking through the eyepiece of a telescope, seek out the first snowball of the winter, The Blue Snowball Nebula!

Information sources:

http://en.wikipedia.org/wiki/NGC_7662
http://en.wikipedia.org/wiki/Planetary_nebulae
http://exosky.net/exosky/?p=592
http://www.calvin.edu/academic/phys/observatory/images/Astr111.Fall2009/Morse.html
http://apod.nasa.gov/apod/ap961121.html
http://www.capella-observatory.com/

Our Solar System Is *Almost* Normal, But Not Quite

by Dr. Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less.

The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

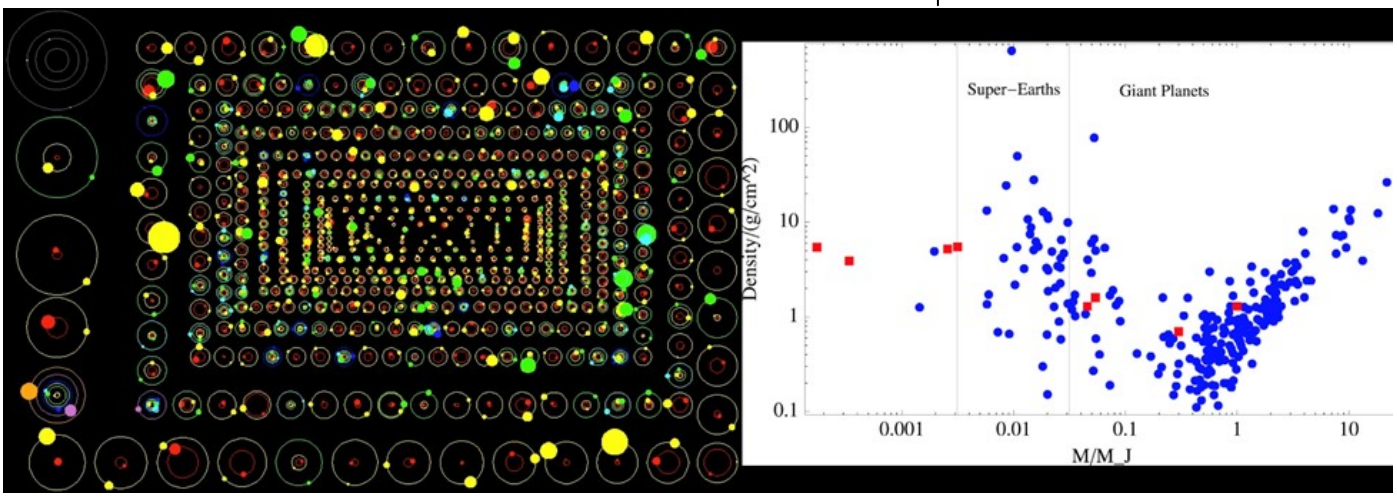
But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.

All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.

And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!



Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) ApJ 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets.

CCAS Original Astrophotography: M16, the Eagle Nebula

by Dave Hockenberry

Shot 8/13, 8/14, and 8/23/15 with Hyperion 12.5" astrograph, QSI 583 wsg camera, guided with SXAOLF and SX Lodestar X2 off axis. 60 minutes Lum (4 X 15 minute subexposures), 70 minutes Red filter (7 X 10 minute subs), 90 minutes Green filter (9 X 10 minute subs) and 70 minutes Blue filter (7 X 10 minute subs). Processed in CCDStack and Photoshop CS5. Image capture with MaxIm DL Pro. Open star cluster with associated nebulosity and star forming regions, dark Bock globules and Pillars of Creation at the image center.

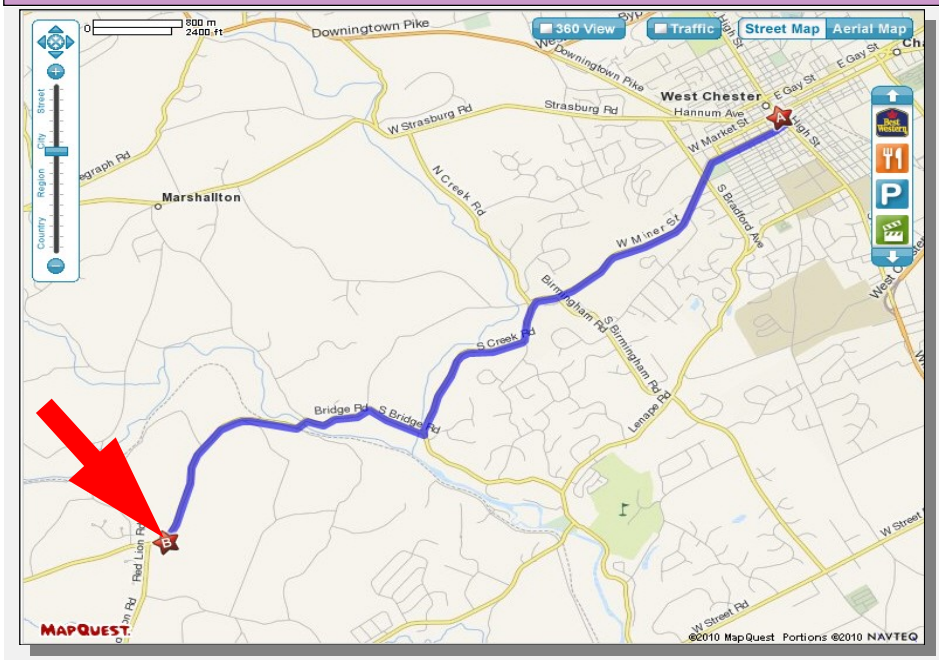
Minutes (Cont'd)

(Continued from page 2)

mission to Pluto. app.plutosafari.com may be accessed through the Apple App store or Google Play for Android.

- David Hockenberry introduced our movie for movie night. With popcorn in hand we enjoyed "400 Years of the Telescope, A Journey of Science, Technology, and Thought" narrated by Neil Degrasse Tyson. Hockenberry led a post film discussion including a debate on refractor, reflector, and "go to" set ups. General consensus of the group concluded that the best scope is "the one that gets used".

CCAS Directions



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

BRC was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

Brandywine Red Clay Alliance

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

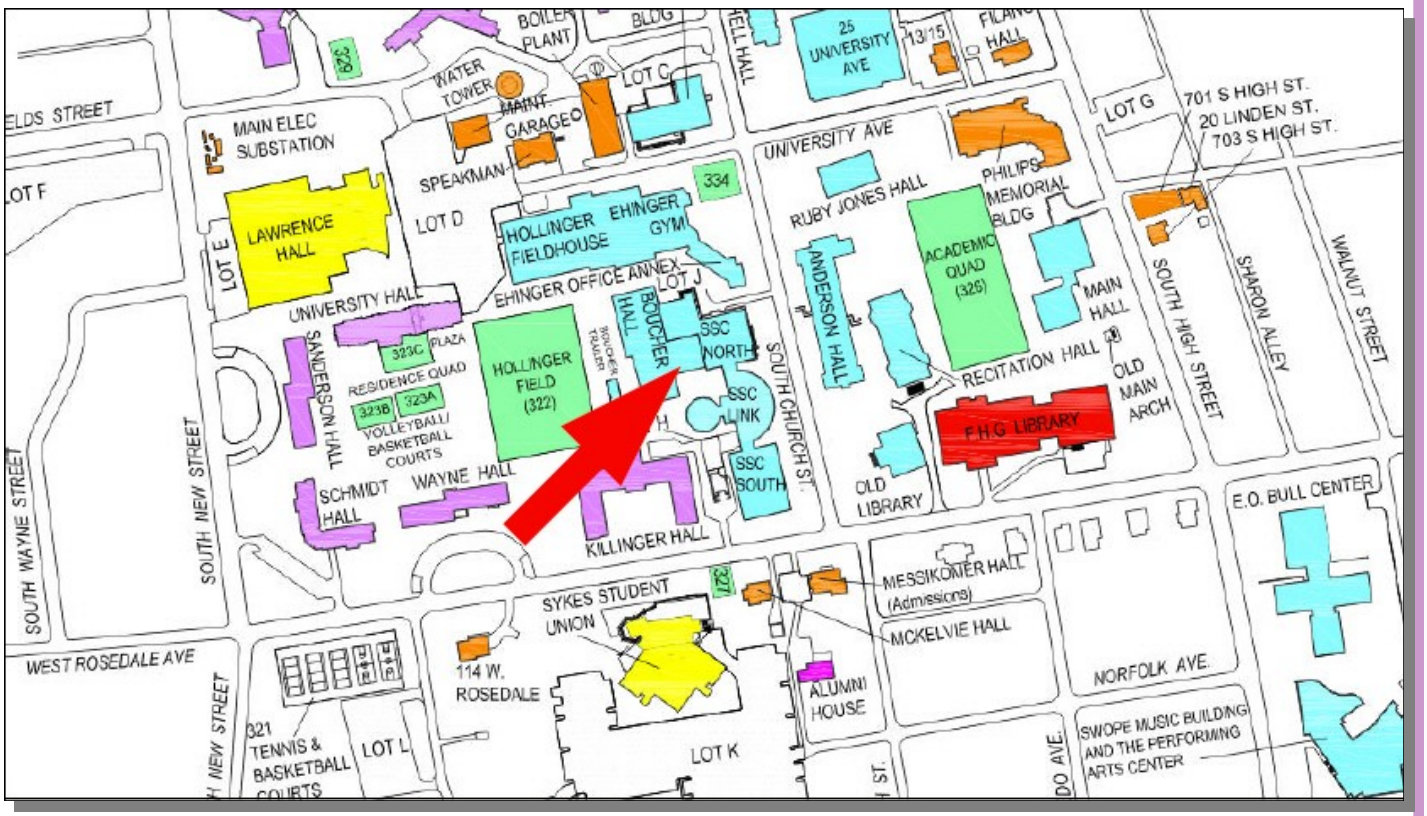
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route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



Observing (Cont'd)

(Continued from page 5)

total light from the comet, not the pinpoint light that we see from a 4th magnitude star. A finder chart is available in Astronomy magazine. On December 7th the comet will be reasonably close to Venus and a thin crescent Moon.

Meteor showers: This is a great year to see the Geminid meteor shower, one of the most reliable meteor showers of the year. The peak is on the night of December 13/14, just three days after New Moon. Up to 120 "shooting stars" per hour are possible from this shower.

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

Nov. 2015 Financial Summary

Beginning Balance	$2,224
Deposits	$70
Disbursements	$0
Ending Balance	$2,294

New Member Welcome!

Welcome new CCAS member Andy Moynihan from West Chester. 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

Dark-Sky Website for PA

The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

http://www.POLCouncil.org

Find out about Lyme Disease!

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

http://www.LymePA.org

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

Good Outdoor Lighting Websites

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

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

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

http://www.starrynightlights.com

★ ★ ★ ★ ★

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

Phone: **484-291-1084**

https://www.lighthouse-lights.com/landscape-lighting-design/pa-west-chester/

Local Astronomy-Related Stores

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

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

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

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

http://www.skiesunlimited.net

★ ★ ★ ★ ★

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

4403 Main Street
Philadelphia, PA 19127

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

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

http://www.spectrum-scientifics.com

CCAS Information Directory

CCAS Lending Telescopes

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

CCAS Lending Library

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

Contributing to *Observations*

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

Or mail the contribution, typed or handwritten, to:

John Hepler
21103 Striper Run
Rock Hall, MD 21661

CCAS Newsletters via E-mail

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

CCAS Website

John Hepler is the Society's Webmaster. You can check out our Website at:
http://www.ccas.us

John welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work; no copyrighted material! Give your contributions to John Hepler at (410) 639-4329 or e-mail to webmaster@ccas.us

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 410-639-4329
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.**