Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 22, No. 5 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *May 2014*

In This Issue

Membership Renewals Due

05/2014	Cline Fletcher Long O'Hara
06/2014	Hebding Kovacs Mazziotta & Calobrisi
07/2014	Hockenberry & Miller Hunsinger Piehl

Lunar Eclipse

Image credit: Brent Crabb

Important May 2014 Dates

6th • First Quarter Moon, 11:15 p.m.

6th • Eta Aquarid Meteor Show peaks.

14th • Full Moon, 3:16 p.m.

22nd • Lyrid Meteor Shower peaks.

24th • Possible new meteor shower.

28th • New Moon, 2:40 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 10, 2014** .Spring Star Party at Hoopes Park, West Chester, PA. Co-sponsored with the West Chester Department of Recreation. The free public event is scheduled for 7:30 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.

Spring/Summer 2014 Society Events

May 2014

2nd • West Chester University Planetarium Show: "Black Holes Don't Suck," in the Schmucker Science Building. The show starts at 7 p.m. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

2nd • CCAS monthly observing session at BVA. The observation session starts at dusk.

7th • 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.

10th • CCAS Special Night Out at Hoopes Park, West Chester, PA. The free public event starts at sunset.

13th • CCAS Monthly Meeting, Room 112, Merion Science Center (former Boucher Building), West Chester University. The meeting starts at 7:30 p.m. John Conrad, CCAS member and NASA Solar System Ambassador. .

22nd-23rd • The von Kármán Lecture Series: Putting the 'P' in 'JPL'--The Past, Present, and Future of Propulsion 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 2014 edition of Observations.

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

June 2014

4th • 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 monthly observing session at BVA. The observation session starts at dusk.

19th-20th • The von Kármán Lecture Series: Europa: The Challenges of Exploring a Cold, Distant World, 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 July 2014 edition of Observations.

21st • Summer Solstice (6:51 A.M EDT): First day of summer.

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

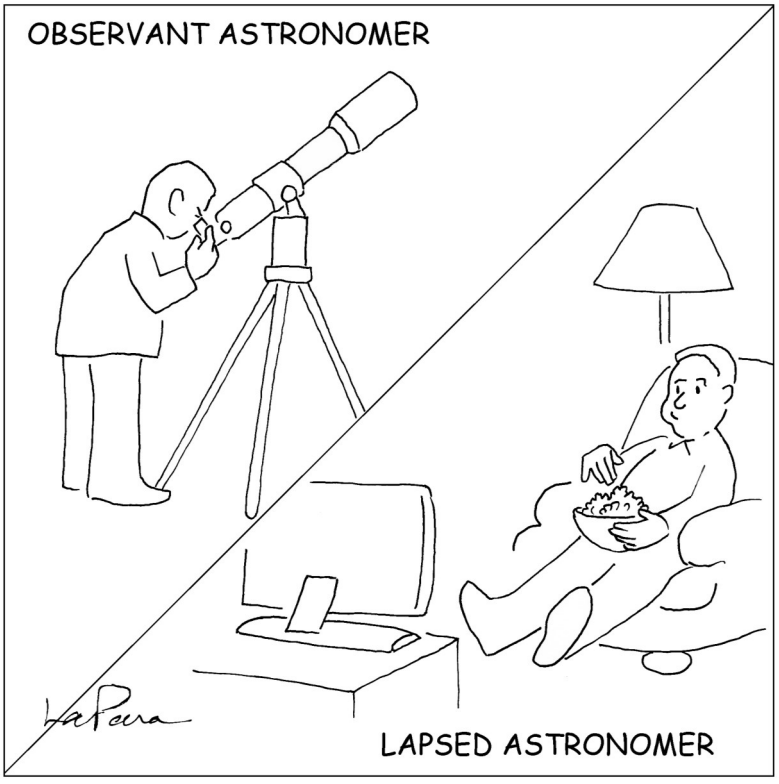
Minutes of the April 8, 2014 Meeting

by Ann Miller, CCAS Secretary

- Roger Taylor welcomed 13 guests and members to the April 8, 2014 meeting of CCAS.
- Don Knabb, our observing chair, recapped our Anson Nixon star party observations on the Stellarium software. He thanked club members who braved the cold evening. Don also reminded the club of the April 15th total lunar eclipse.
- Roger Taylor introduced our speaker for the evening, Dr. Tim Lawlor from PennState Brandywine Campus.
- Dr. Lawlor presented "The Early Universe Stars." His work is theoretical and with the launch of the James Webb Space Telescope projected for 2018, he is hoping to observationally confirm his theoretical work.

Nicholas's Humor Corner

by Nicholas La Para



Up Close & Personal with the Space Shuttle Endeavor

by Don Knabb, CCAS Treasurer & Observing Chair

Barb and I had the great pleasure of visiting some dear friends in Orange County, California during April. These friends are Mary and Brent Crabb. Brent's astrophotography has been featured in Observations several times during recent years. He images the sky from the light polluted skies of Southern California and gets amazing results.

We try to visit every year and we always put a day on the agenda for visiting a science or astronomy exhibit in the area. Previous visits included traveling to the Griffith Observatory north of Hollywood and visiting the Mount Palomar Observatory south of Orange County.

For this trip we chose to see Space Shuttle Endeavour at the California Science Center in downtown Los Angeles.

Image courtesy NASA

Endeavour is the youngest member of NASA's now-retired space shuttle fleet. The orbiter was built as a replacement for the shuttle Challenger, which was lost in the January 1986 accident that also killed its seven-astronaut crew.

Endeavour first flew in May of 1992 and ended its time in space 19 years later in May of 2011. It flew 25 missions with a total of 154 crew members and spent nearly 300 days in space.

Shortly after NASA's Hubble Space Telescope launched in April 1990, scientists noticed that the instrument's images were a bit blurry. In 1993, Endeavour launched on its STS-61 flight — the first Hubble servicing mission — to fix the problem.

Endeavour's second flight, the STS-47 mission back in 1992, broke new ground sociologically. Its crew featured the first African-American woman to fly in space (Mae Jemison), the shuttle's first Japanese astronaut (Mamoru Mohri) and the first married couple to fly on the same space mission (Mark Lee and Jan Davis).

The International Space Station can date its birth to Endeavour's STS-88 mission in December 1998. That flight took the first American component of the station — the Unity node, the passageway that connects the working and living modules — to space and joined it to the Russian Zarya module, which was already in orbit.

On its final STS-134 mission, Endeavour made another signifi-

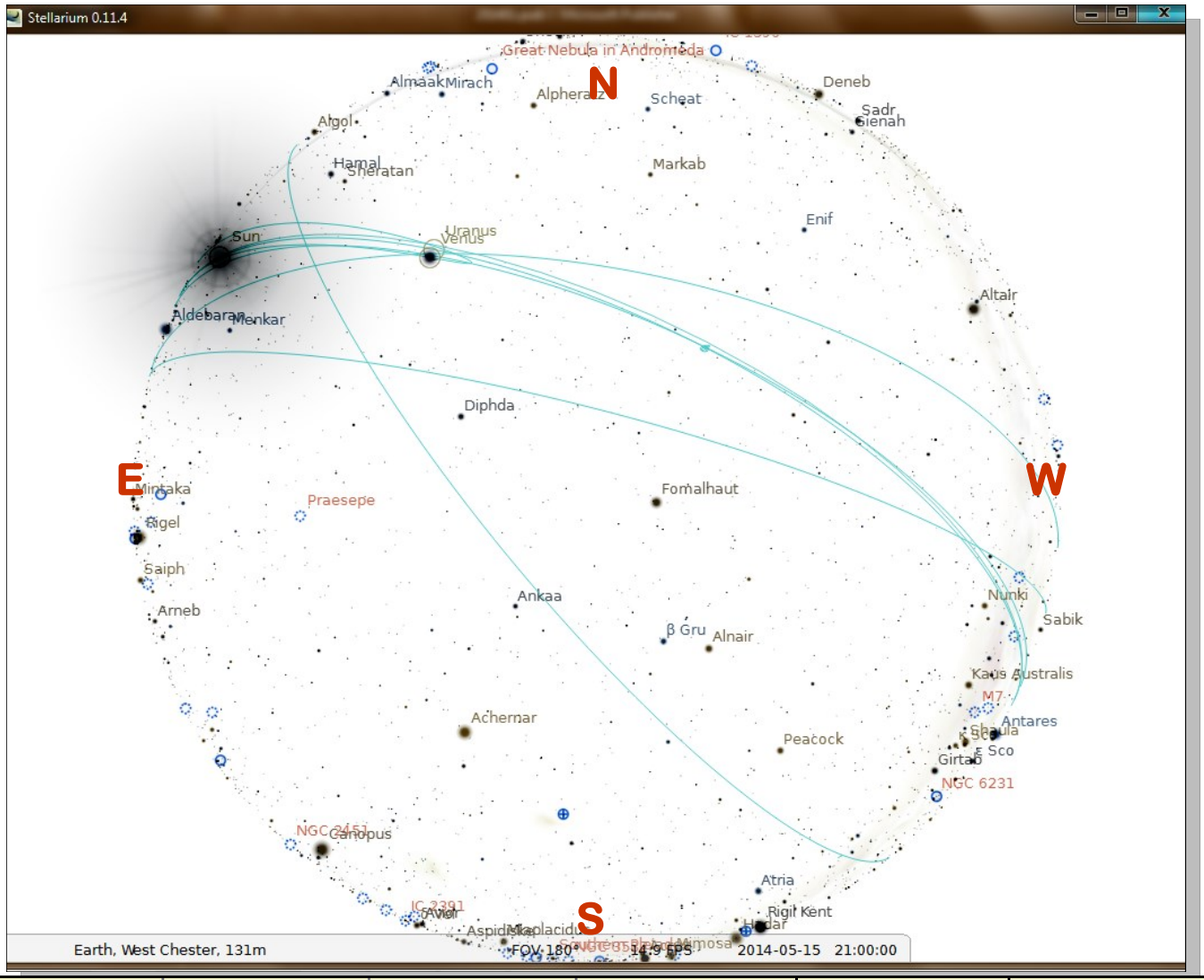
(Continued on page 14)

Endeavour on display at the California Science Center

The Sky Over Chester County

May 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
05/01/2014	5:32 a.m. EDT	6:01 a.m. EST	7:55 p.m. EDT	8:25 p.m. EST	13h 54m 25s
05/15/2014	5:15 a.m. EDT	5:46 a.m. EDT	8:09 p.m. EDT	8:40 p.m. EDT	14h 23m 25s
05/30/2014	5:02 a.m. EDT	5:35 a.m. EDT	8:23 p.m. EDT	8:55 p.m. EDT	14h 48m 04s

Moon Phases					
First Quarter	05/06/2014	11:15 p.m. EDT	Full Moon	05/14/2014	3:16 p.m. EDT
Last Quarter	05/21/2014	8:59 a.m. EDT	New Moon	05/28/2014	2:40 p.m. EDT

May 2014 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

3, 4	**The crescent Moon is near Jupiter**
6	**The Eta Aquarid meteor shower peaks**
6	**First-quarter Moon**
10	**Saturn is at opposition, Mars is near the Moon**
14	**The Full Moon passes very close to Saturn**
14	**Full Moon**
21	**Last Quarter Moon**
24	**Possible new meteor shower**
25	**Mercury is at greatest eastern elongation**
28	**New Moon**

The best sights this month: During May we can see Mercury, Jupiter, Mars and Saturn during the evening hours. It doesn't get much better than that! And we might be entertained by a new meteor shower late in the month.

Mercury: May is the best opportunity of 2014 to see elusive Mercury. On May 22nd Mercury sets nearly 2 hours after sunset.

Venus: The "morning star" rises just a bit before morning twilight begins, shining bright at magnitude -4.0.

Mars: The red planet was opposite the Sun on April 8th, so it will be in excellent viewing position during May evenings. Look at Mars around 11:00 p.m. when it is high in the sky during early May. It will still be fairly close to Earth and large in the eyepiece of a telescope. I observed the red planet in mid-April and was easily able to discern surface detail at 140X.

Jupiter: The king of the planets is slowly sinking into the sunset, but is still the brightest object in the evening sky. Look at Jupiter as soon as it gets dark while it is still reasonably high in the sky. At high magnification you will see multiple bands of color on the surface of the planet, and if you are lucky you might see the Great Red Spot, a storm twice the side of Earth, that has raged for centuries.

Saturn: The ringed beauty is at opposition on May 10th so it will be visible all night and in good viewing position for several months to come. Saturn is best viewed toward midnight when it is high in the sky. Saturn will be quite bright because the rings are tilted at 22 degrees from edge-on.

Uranus and Neptune: Neither gas giant is in favorable position for viewing during May.

The Moon: Full moon is on May 14th, when it will be very close to Saturn. 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.

Constellations: Spring is here, and with it the Big Dipper is high overhead. Follow the arc to bright Arcturus and find the constellation 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! And 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: A new comet, Comet PanSTARRS C/2012 K1, is predicted to glow at 7th or 8th magnitude when it passes beneath the handle of the Big Dipper during May. The best time to look for this new visitor from deep space is May 17th through June 3rd when there will not be interference from bright moonlight. A sky map of the comet's path through the sky is in the May issue of Sky & Telescope

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Attending the 2014 Northeast Astronomy Forum (NEAF)

by Dave Hockenberry, CCAS Program Chair

It's May. And that means that at least a few of us from the CCAS went to the Northeast Astronomy Forum & Telescope Show (NEAF). After all, with all the new toys and equipment on display, the odds are that at least SOME of our number will succumb to curiosity. This year it was me. I have never been to NEAF before, and after listening to our club members who have attended before gush glowingly about the experience I knew I was overdue.

NEAF always follows the Northeast AstroImaging Conference (NEAIC), which I had never attended either. Anyone who attends NEAIC also gets tickets to NEAF, so I decided to go to both and update my image processing techniques. Both events are put on by the Rockland Astronomy Club, and are the largest of their kind on this side of the Mississippi. For those of us who live locally here, Suffern, NY is a comfortable 2 ½ hour drive from the greater Philadelphia area. It is an easy drive for anyone who wants to make a "day trip" on Saturday or Sunday, or both. There are plenty of reasonably priced hotels in the area, even for New York prices.
On looking at the schedule for NEAIC, I realized that I would be spending at least two nights there. The program started at 08:00 in the morning, and workshops/presentations would go on past 22:30 at night. Indeed, a long and busy day. For this reason I stayed at the hotel where the conference was being held, simply for convenience. For both days there would be at least two presentations during each hour, and concurrently with the presentations astroimaging workshops were taking place from 9 to 4 on both days. This means one has to "pick and choose" which programs you want to attend, and with some of the speakers scheduled this wasn't always an easy choice. At first I went to the imaging workshops, but didn't stay long. These are great for people who are getting started or who haven't mastered the basics. They seemed to me well organized and did include plenty of information for those astroimagers who want to work with DSLR cameras. Often these workshops are slanted towards CCD astro cameras, so it was nice to see that NEAIC was teaching the basics for everybody.

There was still plenty for me to attend, especially the presentations on narrowband imaging, near earth orbit asteroid imaging, and new CCD chip architecture. The NEO asteroid imaging presentations were especially interesting, as a group from the University of Arizona is actively recruiting amateur help. They are asking advanced imagers with larger gear to help with photometry, orbital tracking, and other information that will go into a database. Those interested in helping with near Earth asteroids can look up this project at www.osiris-rex.lpl.arizona.edu/?q=target_asteroids

Dave & Al Nagler from TeleVue

After dinner, optional workshops went from 7:30 until after 11. These cost some extra, and there were two concurrent sessions each night. Again, choices! I was especially happy with the group led by Ken Crawford. This one was definitely geared towards advanced imagers, and Ken kept going until almost midnight. I definitely got my money's worth! The other night session I attended was on setting up and programming remote observatories, also an excellent presentation for the technical hounds.

Perhaps the best part about attending NEAIC, which is always held 2 days before NEAF, is that many of the key vendors are already there and set up their booths at the hotel NEAIC is held. So the upshot is that NEAIC attendees get a "sneak peak"

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NEAF (Cont'd)

(Continued from page 6)

at some of the new gear before the NEAF attendees. It is a great chance to hobknob and chat with legends like Al Nagler of TeleVue, Roland Christiensen of Astro Physics, the lead software developers (who were there as a team!) for MaxIm….. the list goes on and on. I actually skipped a couple of meals just to schmooze with the industry giants.

All of us that stuck it out for the entire NEAIC were pretty tired at the end, but the hotel lounge and bar was still busy until after 2 in the morning. The vendors had cleared out by that time, moving over to the Rockland Community College where NEAF is held the next morning. I slept in…until 9 AM Saturday. Then it was a quick cup of coffee and over to NEAF. Despite the vendors who were present for the prior two days at NEAIC, I was not prepared for the enormity of NEAF.

When you enter the gym where NEAF is held, you enter to a balcony/observation deck that overlooks the show. It is mind boggling, and everybody who hasn't seen it before just stops and stares. There are easily 10 times more vendors present at NEAF than NEAIC. This event is billed as the largest gathering of astronomy vendors, and having attended AIC three years ago in California I can attest that the statement about NEAF is true. The industry is represented not only my manufacturers, but also

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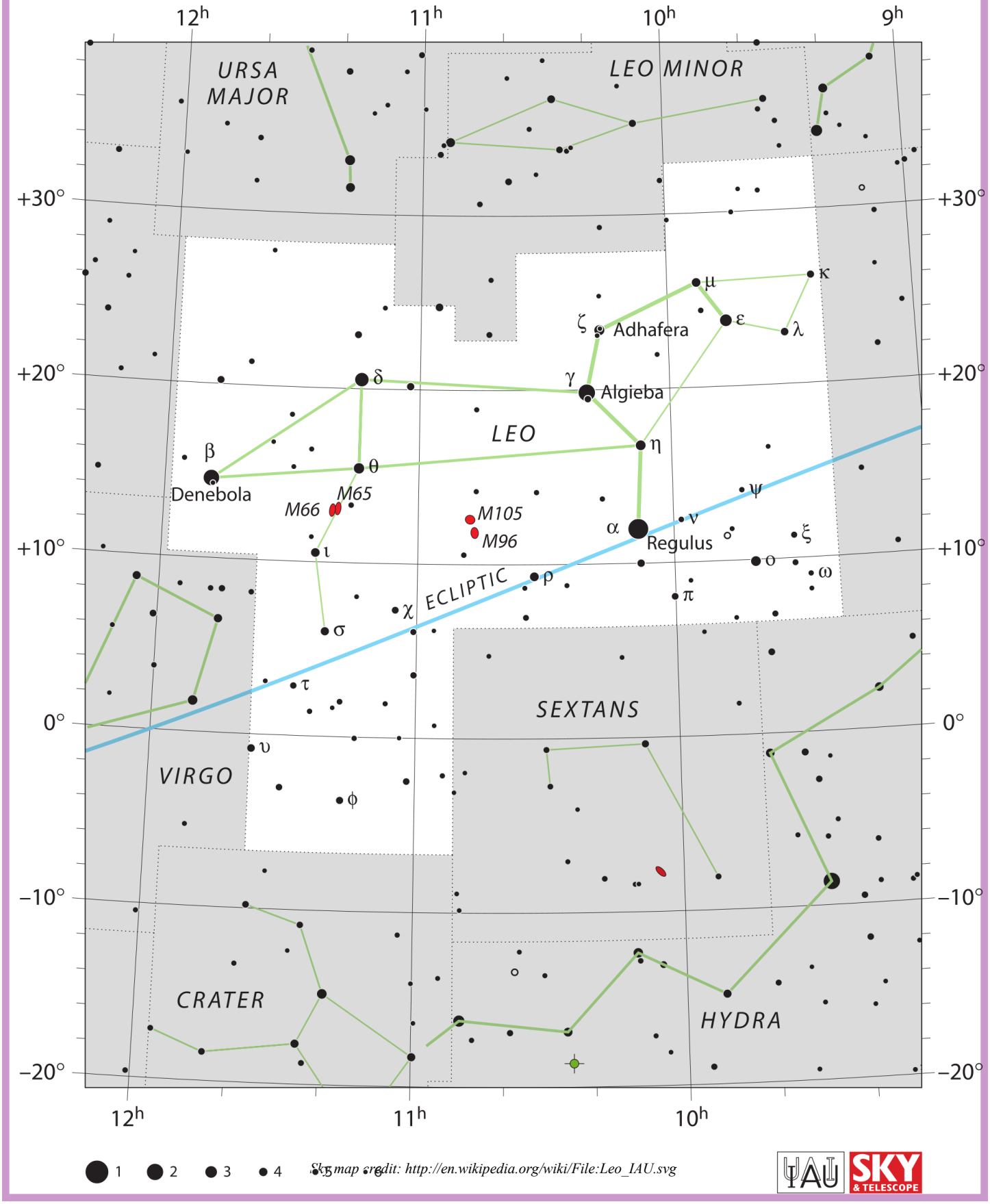
A Packed Convention Space at the Northeast Astronomy Forum

Through the Eyepiece: The Leo Triplet of Galaxies

by Don Knabb, CCAS Treasurer & Observing Chair



Sky map credit: http://en.wikipedia.org/wiki/File:Leo_IAU.svg

Eyepiece (Cont'd)

Photo credit: Hunter Wilson, http://en.wikipedia.org/wiki/File:LeoTripletHunterWilson.jpg

The Leo Triplet, also known as the M66 group, is a small group of galaxies in the constellation Leo the Lion. The galaxies are estimated to be about 35 million light years away.

The group consists of two Messier objects M65 and M66, along with NGC 3628. All three galaxies are spiral galaxies, similar in structure to our own Milky Way.

One needs a telescope to see this group of galaxies from our Chester County skies, although at a dark sky site you should be able to just pick them out with a pair of large binoculars.

You can use the star chart below to find the Leo Triplet. NGC 3628 is not shown on the chart, but it will be in the same field of view with a low power eyepiece.

Further east of the Leo Triplet is a group known as the M96 group. This group contains between 8 and 24 galaxies! With a telescope you should be able to see the Messier objects shown on the chart, M96 and M105. Although it is not noted on the sky map, M95 is also just to the east of M96.

The photo upper left shows the three galaxies of the Leo Triplet. M65 is at the top right, M66 at the bottom right, and NGC 3628 is on the left. They all have a unique appearance because their galactic disks are tilted at different angles to our line of sight.
Leo the Lion and the Leo Triplet are ideally located in the spring sky for evening viewing. Let's put this unique telescopic sight on our list for our next observing session at Brandywine Valley Association.

Information credits:

http://www.seds.org/messier/more/m066gr.html
http://en.wikipedia.org/wiki/Leo_Triplet

May 2014 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on May 13, 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 speaker is John Conrad, CCAS member and NASA Solar System Ambassador will be our speaker.

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 Power of the Sun's Engines

by Dr. Ethan Siegel

Here on Earth, the sun provides us with the vast majority of our energy, striking the top of the atmosphere with up to 1,000 Watts of power per square meter, albeit highly dependent on the sunlight's angle-of-incidence. But remember that the sun is a whopping 150 million kilometers away, and sends an equal amount of radiation in all directions; the Earth-facing direction is nothing special.

Even considering sunspots, solar flares, and long-and-short term variations in solar irradiance, the sun's energy output is always constant to about one-part-in-1,000. All told, our parent star consistently outputs an estimated 4×10^{26} Watts of power; one *second* of the sun's emissions could power all the world's energy needs for over 700,000 years.

That's a literally astronomical amount of energy, and it comes about thanks to the hugeness of

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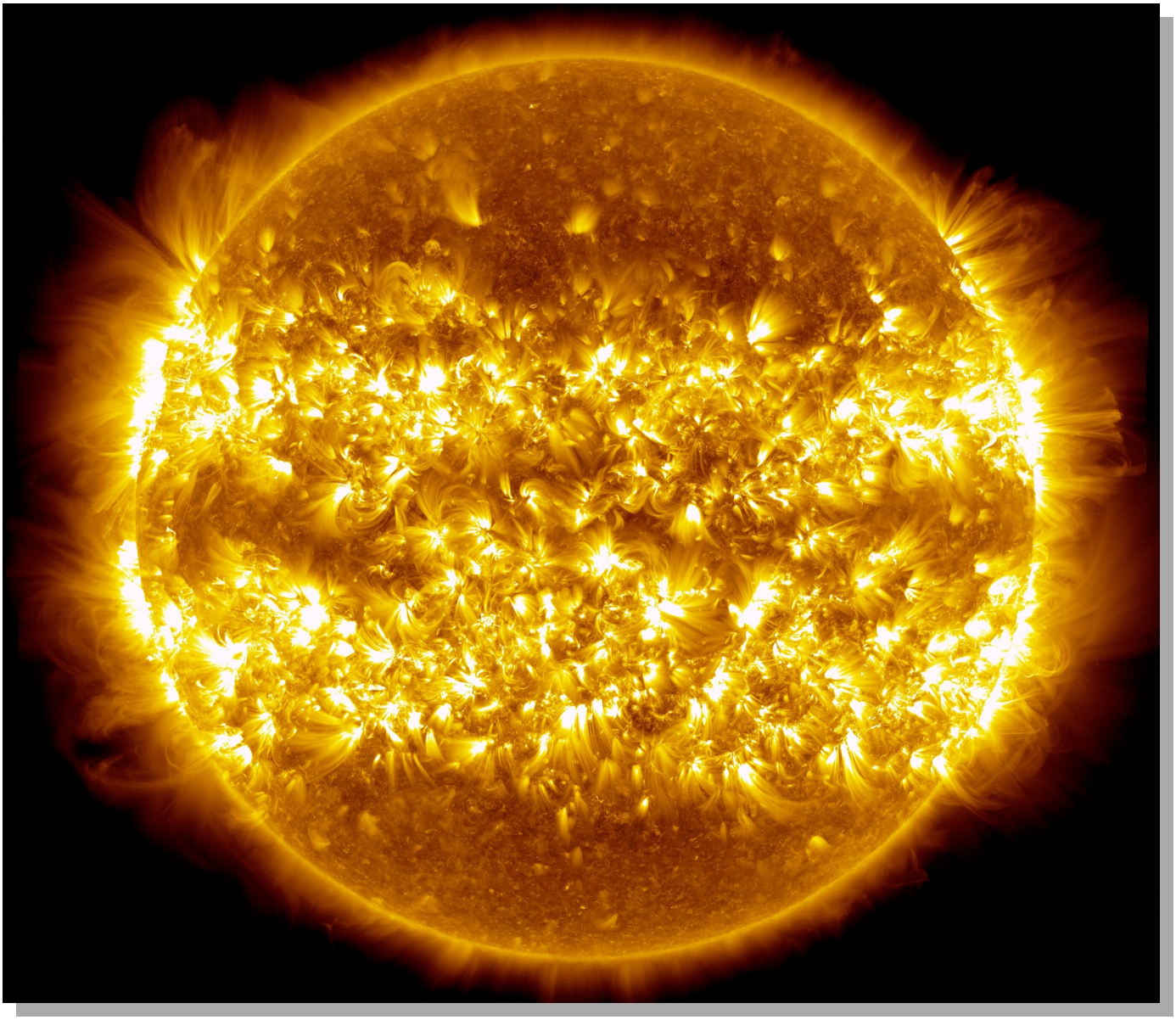


Image credit: composite of 25 images of the sun, showing solar outburst/activity over a 365 day period;
NASA / Solar Dynamics Observatory / Atmospheric Imaging Assembly / S. Wiessinger; post-processing by E. Siegel.

Space Place (cont'd)

(Continued from page 10)

the sun. With a radius of 700,000 kilometers, it would take 109 Earths, lined up from end-to-end, just to go across the diameter of the sun once. Unlike our Earth, however, the sun is made up of around 70% hydrogen by mass, and it's the individual protons -— or the nuclei of hydrogen atoms — that fuse together, eventually becoming helium-4 and releasing a tremendous amount of energy. All told, for every four protons that wind up becoming helium-4, a tiny bit of mass — just 0.7% of the original amount — gets converted into energy by $E=mc^2$, and that's where the sun's power originates.

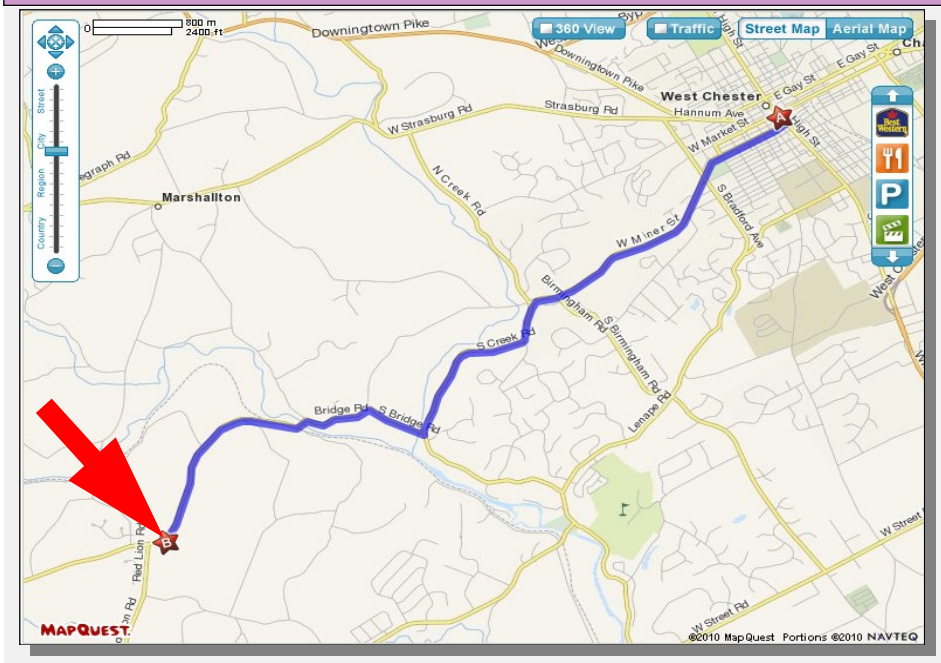
You'd be correct in thinking that fusing ~4×10^{38} protons-per-second gives off a tremendous amount of energy, but remember that nuclear fusion occurs in a *huge* region of the sun: about the innermost quarter (in radius) is where 99% of it is actively taking place. So there might be 4×10^{26} Watts of power put out, but that's spread out over 2.2×10^{25} cubic meters, meaning the sun's energy output *per-unit-volume* is just 18 W / m^3. Compare this to the average human being, whose basal metabolic rate is equivalent to around 100 Watts, yet takes up just 0.06 cubic meters of space. In other words, **you emit 100 times as much energy-per-unit-volume as the sun**! It's only because the sun is so large and massive that its power is so great.

It's this slow process, releasing huge amounts of energy *per reaction* over an incredibly large volume, that has powered life on our world throughout its entire history. It may not appear so impressive if you look at just a tiny region, but — at least for our sun — that huge size really adds up!

Check out these "10 Need-to-Know Things About the Sun": http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun.

Kids can learn more about an intriguing solar mystery at NASA's Space Place: http://spaceplace.nasa.gov/sun-corona.

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).

NEAF (Cont'd)

(Continued from page 7)

retailers, publishers, antique telescope restorers, clothing producers, specialty accessory vendors, you name it and it is probably there. Of course, it is always good to run into people that you know. This didn't take long – fellow CCAS member and admitted astro shopaholic Gary Calobrisi ran into me early on, and we spent much of the morning cruising the booths.

One of the downsides to NEAF has to do with TEMPTATION. With so many choices, many of which are at a substantial discount during the show, well, I wasn't immune. I had been looking to upgrade/replace my Lodestar guiding camera to the newer, sensitive Lodestar X2. And at $100 off the price, I couldn't say no. There were many offers like this, especially from the OPT booth. Not all vendors were offering steep discounts, but enough do to make it worthwhile for thrifty astronomers to show up for this one.

Perhaps the booth that most impressed me was the Classic Telescopes Society. They were selling nothing. They were there to show the public their accomplishments, and they were indeed impressive. They had five – count 'em, five – restored vintage Unitron refractors, all the way up to 5" objective. I think most of us would be astounded at seeing two of these together, much less five. The man who restored the 5" also restored a 10" Cave reflector to museum quality, and he was very happy to talk about the restoration process and his techniques.

5-Inch Restored Unitron on Display

Five Vintage Unitrons on Display

Restored Cave on Display

For me, it was worth the trip just to see these telescopes so lovingly brought back to life by some truly dedicated restorers. They said they don't always come to NEAF, and hadn't been there in 3 years, so for those of us who got to attend this was a real treat.

Overall, it was a great experience getting to NEAIC and NEAF for the first time this year. I would especially recommend NEAIC to beginning or novice astrophotographers who want to get "the basics" the right way instead of having to figure everything out for themselves. And NEAF is simply irresistible. But a word of caution – your wallet may end up considerably lighter while attending this one.

Editor's Note: The 234d Annual Northeast Astronomy Forum was held April 12-13, 2014, at Rockland Community College in Suffern, New York. To learn more about the event, billed as the largest event of its kind, visit the official NEAF website.

Photographs from the Anson Nixon Star Party
submitted by Don Knabb

CCAS hosted a public star party the evening of April 5, 2014, in Anson Nixon Park in Kennett Springs.

A small but enthusiastic crowd braved the weather conditions (low 40's but a strong wind that seemed to draw the warmth out of everything.

The Moon and Jupiter caused many "oohhs and ahhhs", especially when Dave Hockenberry had Jupiter in his Questar!

Space Shuttle (cont'd)

(Continued from page 3)

cant contribution to the ISS, delivering the final big piece to be added to the station from the American side — the $1.5 billion Alpha Magnetic Spectrometer physics experiment.

Endeavour is the only shuttle to have been named by children. In 1988, NASA staged a national competition among elementary and secondary school students to hang a name on the new shuttle. The students were given some guidance; the name had to be based on a historic oceangoing research or exploration vessel. The competition resulted in the name Endeavour; after a ship chartered to traverse the South Pacific in 1768 and captained by 18th century British explorer James Cook, an experienced seaman, navigator and amateur astronomer.

Endeavour was transported from its final landing at Kennedy Space Center in Florida to California on the back of a specially modified Boeing 747 and it made many interesting photo opportunities during its flight.

The California Science Center is housing Endeavour at the temporary Samuel Oschin Space Shuttle Endeavour Display Pavilion of the museum. A new addition to the Science Center, called the Samuel Oschin Air and Space Center, is under construction as Endeavour's permanent home. Planned for a 2017 opening, the Endeavour will be mounted vertically with an external tank and a pair of solid rocket boosters in the shuttle stack configuration. One payload door will be open to reveal a demonstration payload inside. That is a display I want to see!

Here's a View of Hollywood We don't Often See!

The only part of Endeavour that you can actually touch is a set of used landing gear tires. And yes, I touched them!

After passing through a series of displays we exited the main California Science Center and entered the pavilion that contains Endeavour. I must admit, that when I walked into the pavilion and saw Endeavour, I was overcome with emotion and was a bit choked up for a few minutes. It was partly because I was

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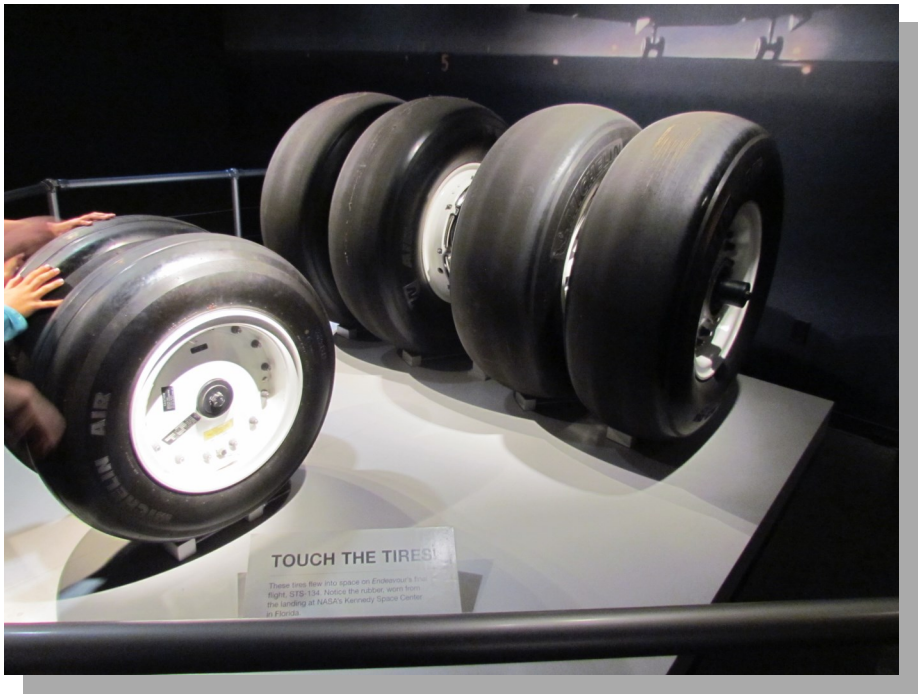
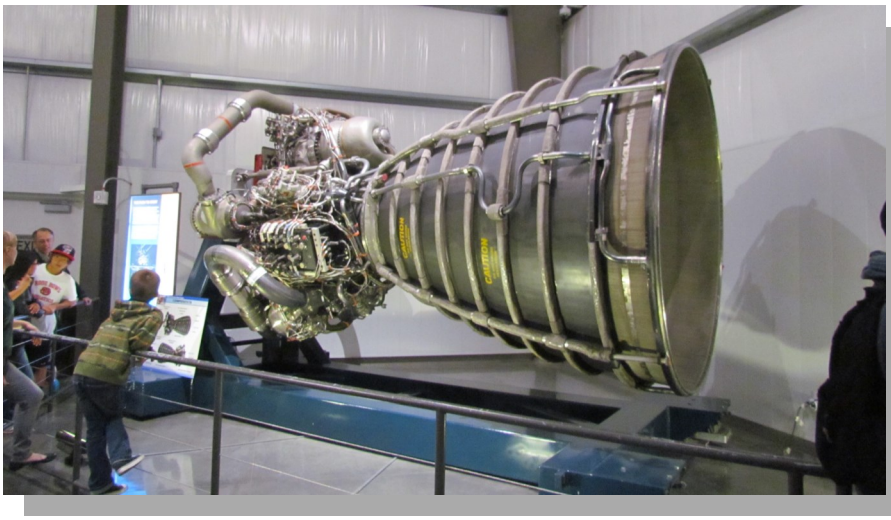
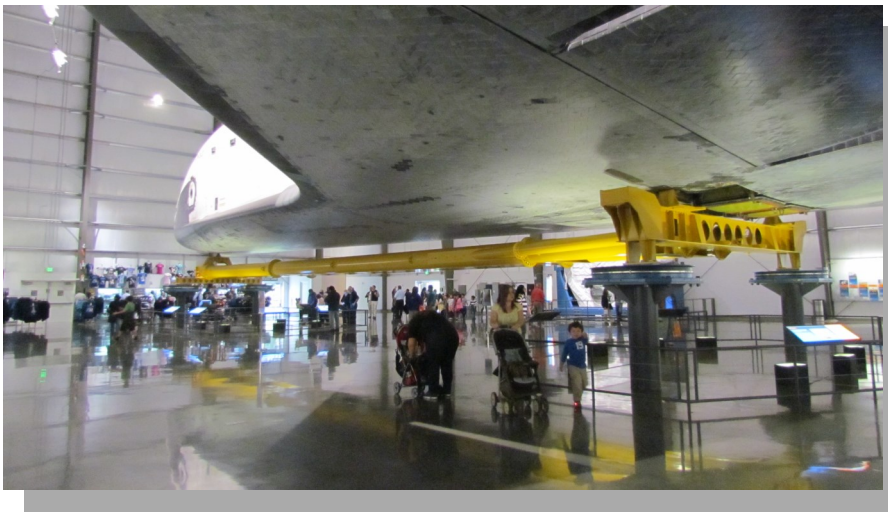


Used Landing Gear Tires on Display

Space Shuttle (cont'd)



Spare Engine on Display



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simply in awe, to be in the presence of this incredible technological wonder with which we have hurled human beings into low Earth orbit. I have followed the space program since the launch of Sputnik, and other than a trip to the Kennedy Space Center in Florida; this is the closest I have ever been to the actual hardware of our space program. Or maybe it was because I was saddened to see this wonderful space ship, retired and setting under cover instead of on a launch pad with two solid fuel boosters and a liquid fuel tank strapped to it. Or maybe it was pride in the accomplishments of our space program, using this incredibly complex machine to further our understanding of our universe. I guess it was all those things and more that I was feeling.

Barb w/Brent & Mary beneath Endeavor

But from there on I was more like a kid in a candy shop, wandering around with Barb and our friends and looking at all the displays and simply enjoying just being near this most amazing flying machine.

One of the spare main engines was on display, along with a great deal of other hardware.

You can wander under Endeavour, but you cannot touch it. And although you cannot see it in the photos I took, the entire shuttle is supported on just a few points that are designed to allow Endeavour to survive a major earthquake.

And here is our little tour group enjoying our visit with Endeavour. I certainly plan to return to see the permanent exhibit when it is completed in 2017. There was a display of the plans for the exhibit, and it will include many other pieces of space hardware and airplanes.

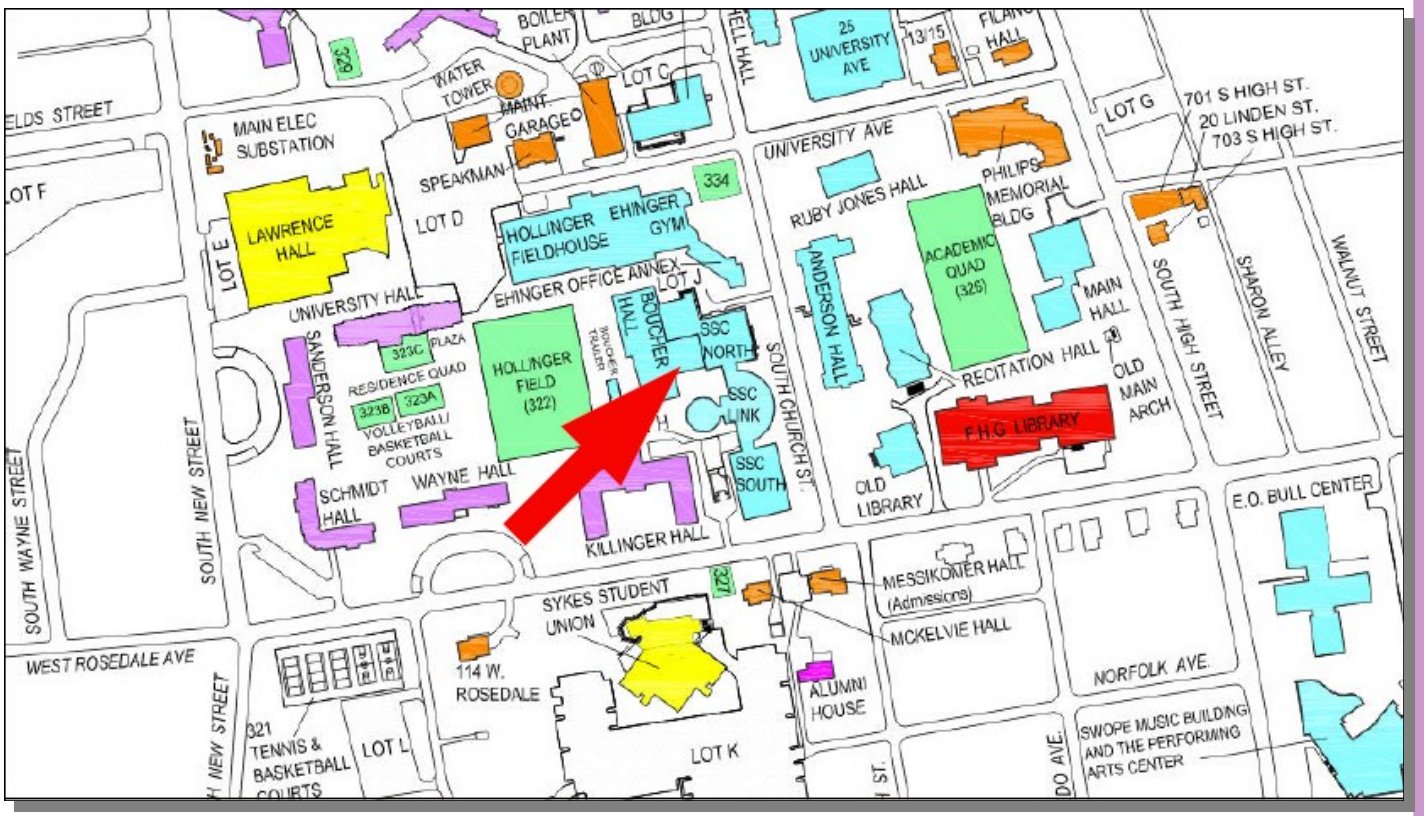
Photo credits: Endeavour on the launch pad and flying over the Hollywood sign are from NASA. All other photographs are by the author.

Information credits:
http://www.nasa.gov/centers/kennedy/shuttleoperations/orbiters/endeavour-info.html
http://www.californiasciencecenter.org/GenInfo/MediaRoom/PressReleases/Endeavour/docs/Fact-Sheet-Endeavour-Facts.pdf
http://www.space.com/11513-nasa-space-shuttle-endeavour-history.html

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)

(Continued from page 5)

magazine.

Meteor showers: The Eta Aquarid meteor shower peaks on May 6th. Comet 1P/Halley is the source of these "shooting stars". You'll need to get up just before dawn for the best viewing of this shower. But more exciting is the possibility of a new meteor shower that is predicted to peak on May 24th. A tiny periodic comet named 209P/LINEAR will pass very close to Earth, one of the closest comet approaches in history. If we are lucky we'll see some nice shooting stars from the debris of the comet.

CCAS Membership Information and Society Financials

Treasurer's Report

by Don Knabb

April 2014 Financial Summary

Beginning Balance	$2,076
Deposits	$100
Disbursements	$0
Ending Balance	$2,176

New Member Welcome!

Welcome new CCAS members 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

★ ★ ★ ★ ★

Spectrum Scientifics
Quality Science Products for All Ages

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

4403 Main Street
Philadelphia, PA 19127

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

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

http://www.spectrum-scientifics.com

CCAS Information Directory

CCAS Lending Telescopes

Contact 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.**