



Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 28, No. 4 **Three-Time Winner of the Astronomical League's Mabel Sterns Award** ☼ 2006, 2009 & 2016

April 2020

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Triangulum Galaxy (M33)



Whirling Away: The Triangulum Galaxy (M33) is a gorgeous spiral in the constellation Triangulum the Triangle. It lies 2.73 million light-years away and is the third-largest member of the Local Group, a system of some 55 galaxies that includes the Milky Way. Currently visible (but difficult to see unless under dark sky conditions) in the north-northwest for about an hour after sunset. Image Credit: Robert Fields from Howell Township, Michigan

Membership Renewals Due

04/2020	Hepler Imburgia Miller Rossomando
05/2020	Aylam & Martin-Aylam Fletcher Klapholz O'Hara Quinn Toth
06/2020	Crabb Hebding

April 2020 Dates

- 1st** • First Quarter Moon, 6:21 a.m. EDT; the Lunar Straight Wall is visible.
- 3rd** • Venus passes through the edge of the Pleiades cluster.
- 7th** • Full Moon, the Full Pink Moon or the Bullhead Moon, 10:53 p.m. EDT.
- 14th** • Last Quarter Moon, 6:56 p.m. EDT.
- 22th** • New Moon, 10:25 p.m. EDT; The Lyrid meteor shower peaks.
- 30th** • First Quarter Moon, 4:30 p.m. EDT; the Lunar Straight Wall is visible.



CCAS Upcoming Nights Out

In addition to our monthly observing sessions at the Myrick Conservancy Center, BVA, and special observing dates have been cancelled until further notice as part of the national effort to limit the spread of the coronavirus. For more information about future observing opportunities, contact our Observing Chair, [Don Knabb](#).

☼ *Monthly observing sessions at Myrick Conservancy Center, BVA, and special observing dates have been cancelled until further notice as part of the national effort to limit the spread of the coronavirus. For more information about future observing opportunities, contact our Observing Chair, [Don Knabb](#).*

Spring Society Events

April 2020

13th • Beginner Astronomy Class: Other Kids on the Block. 7-8 p.m. EDT. Chester County Night School ONLINE via [Zoom.us](https://www.zoom.us).

14th • CCAS Monthly Meeting, CCAS Monthly Meeting, **ONLINE via [Zoom.us](https://www.zoom.us)**. Meet & greet online from 7:00 to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. Guest Speaker: Edward Guinan, PhD, Dept. of Astronomy and Planetary Science, Villanova University – "Martian Greenhouse Project – Growing Plants in Simulated Martian Regolith and its Implications."

16th-17th • The von Kármán Lecture Series: [How NASA Observes Earth from Air & Orbit](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Beginner Astronomy Class: Star Charts and Planetarium Software. 7-8 p.m. EDT. Chester County Night School ONLINE via [Zoom.us](https://www.zoom.us).

20th • Open call for articles and photographs for the May 2020 edition of [Observations](#).

26th • Deadline for newsletter submissions for the May 2020 edition of [Observations](#).

27th • Beginner Astronomy Class: Using a Telescope. 7-8 p.m. EDT. Chester County Night School ONLINE via [Zoom.us](https://www.zoom.us).

May 2020

4th • Beginner Astronomy Class: Beyond Naked-Eye Observing. 7-8 p.m. EDT. Chester County Night School ONLINE via [Zoom.us](https://www.zoom.us).

7th • The von Kármán Lecture Series: [Becoming a NASA Engineer](#), Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

12th • CCAS Monthly Meeting, **ONLINE via [Zoom.us](https://www.zoom.us)**. Meet & greet online from 7:00 to 7:30 p.m. The meeting starts at 7:30 p.m. Guest Speaker: Scott Engle, PhD, Dept. of Astronomy and Planetary Science, Villanova University, "Revisiting the Drake Equation - New Insights and Revelations. "

20th • Open call for articles and photographs for the June 2020 edition of [Observations](#).

26th • Deadline for newsletter submissions for the June 2020 edition of [Observations](#).

Minutes from the March 10, 2020, CCAS Monthly Meeting

by Bea Mazziotti, CCAS Secretary

- Dave Hockenberry welcomed approximately 30 members and guests.
- He announced that he would present the results of the 3/6/20 executive committee meeting at the April meeting.
- The monthly night sky tour was shelved to allow Pete Kellerman to inform members about a new CCAS online group he formed on the site [groups.io](https://www.groups.io). This will be in lieu of the Yahoo group. He outlined the procedure for joining. He noted that when members sign up, he will send a confirmation/acceptance email to finalize the process.
- Don shared a list of upcoming scheduled spring observing sessions, events and night school. Go to <http://www.ccas.us/> for more information and any changes.
- Donations to the new goodwill snack fund were generous. Thank you members and guests!
- Bruce Ruggeri, program chair, introduced the evening's speaker, Dr. Marco Raveri. He is a postdoctoral fellow at the Center for Particle Cosmology at the University of Pennsylvania. Previously he was a postdoctoral researcher at the Kavli Institute for Cosmological Physics at the University of Chicago. His research is focused on advancing our theoretical understanding and our modeling capabilities to enable us to fully use present and future measurements. He researches dark energy, dark matter, cosmological neutrinos and gravity.
- His presentation was titled "The Universe Sounds Out of Tune." He discussed the debate over the Hubble Constant - the measurement of how fast the universe is expanding. Today's ever more precise measurements of both the early and later universe are finding discrepancies and calling the heretofore accepted Constant into question.

April 2020 CCAS Meeting Agenda

by Bruce Ruggeri, CCAS Program Chair

Our next meeting will be held on January 10, 2020, starting at 7:30 p.m. The meeting will be held ONLINE via [Zoom.us](https://www.zoom.us). Guest Speaker: Edward Guinan, PhD, Dept. of Astronomy and Planetary Science, Villanova University will present "Martian Greenhouse Project – Growing Plants in Simulated Martian Regolith and its Implications."

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.

As for future meetings, we are looking for presenters for our Fall 2020 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Equipment Review: QHY PoleMaster

by CCAS Member Frank J. Angelini

Last autumn, I made some major modifications to the German Equatorial Mount (GEM) in my observatory. I originally had the 7" APO refractor and C-11 SCT mounted in a side by side setup. I was never satisfied with the rigidity of this arrangement or the level of security of the dovetails and saddles I was using. I found out the hard way when the C-11 dovetail loosened allowing the scope to fall to the observatory floor. The rubber floor "tiles" saved the optics, but the tube was banged up pretty badly. Fortunately the refractor was not damaged at all, but I decided another, more secure arrangement was needed. I remounted the refractor on its original rings and a very sturdy dovetail system. (More on this in another article) I continued with the single scope (refractor) and used this setup to resume my Astronomical League double-star program. When the weather was not conducive to observing I worked on a complete rebuild and upgrade of the C-11. This was covered in a multi-part article appearing in this newsletter in 2016.

The new side by side arrangement required a partial disassembly of the equatorial head and reinforcement of the pier. All of this work was completed by the end of October 2019.

POLAR ALIGNMENT

Because the pier was disturbed it was necessary to perform a new polar alignment. I wanted this to be as precise as possible. I had no interest in repeating this process again.

Polar alignment is required for



My Original Side by Side Mounting - 2013



New Side by Side Mounting - 2019

equatorially mounted telescopes. In its simplest rough form you can simply line up the polar axis of your scope with the North Celestial Pole. The polar axis is an imaginary line drawn through the center of your mount, at a 90-degree angle to the counterweight shaft and passing through the main metal body of

the mount.

The North Celestial Pole (NCP) is the point in the sky directly above the Earth's North Pole. It is the point in the sky that does not move — all the stars in the sky appear to rotate around this point. The NCP is very close to the star Polaris, otherwise known as the North Star. For field purposes where a precise alignment isn't required, you can consider the NCP to be exactly equal to Polaris.

Most amateur astronomers know how to visually find Polaris. Now, in order to line up the polar axis of your scope you will be using two adjustments, altitude and azimuth. Both altitude and azimuth are measured in degrees. The altitude angle is equal to your latitude, e.g. 40 degrees North latitude. The azimuth angle is the direction of a celestial object, measured clockwise around the observer's horizon from north. So an object due north has an azimuth of 0°, one due east 90°, south 180° and west 270°.

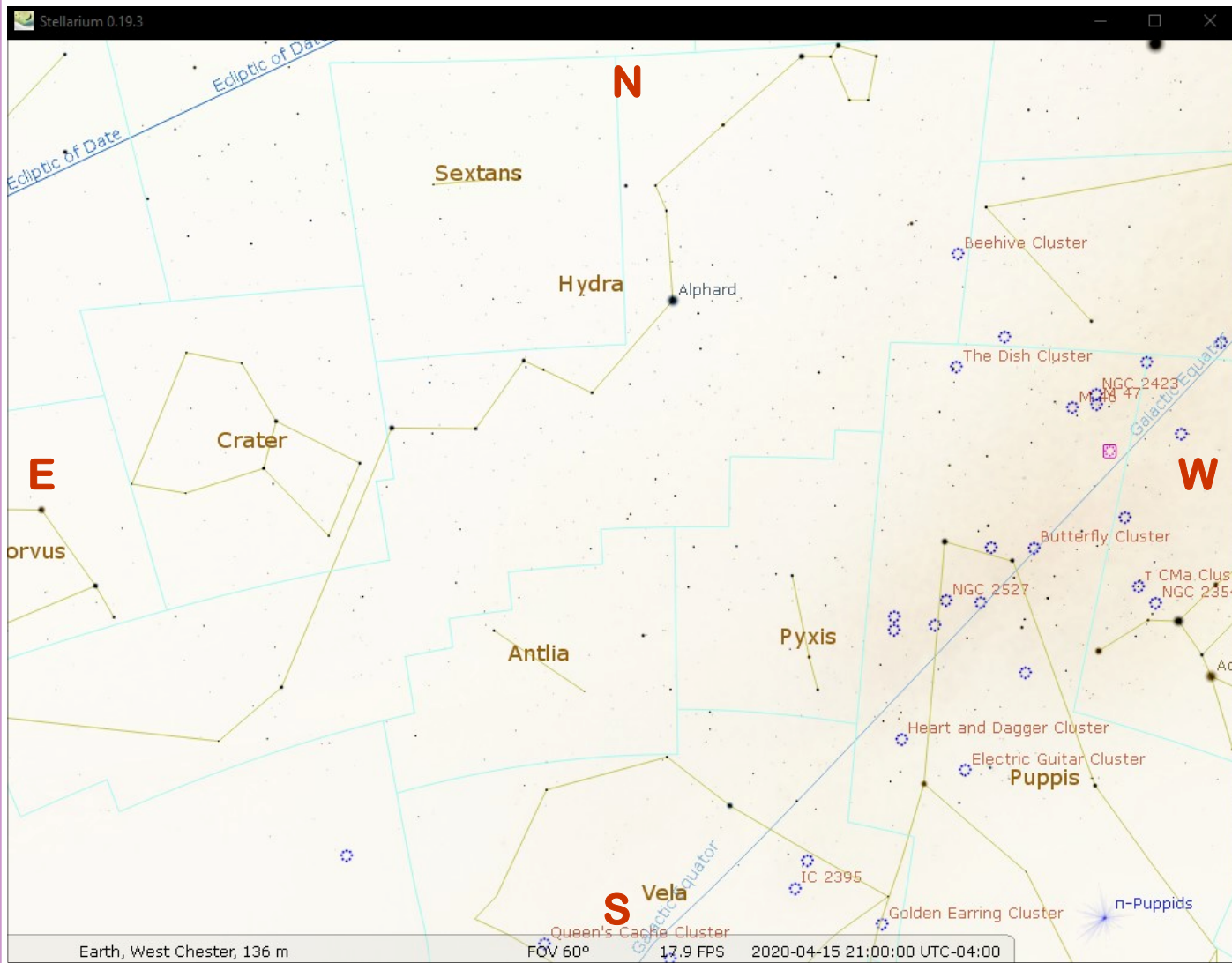
So, to roughly polar align, set your latitude angle, level the head of the mount, then pick up the mount, tripod (or pier) and all, and rotate it so the polar axis is pointing as close toward North as you can manage. Now, wait until dark and find Polaris, the North Star. Crouch down behind the mount and look upward along the polar axis, or through a 1X finder like a Telrad, and adjust the altitude and azimuth until Polaris is centered in the finder. You can improve accuracy by using an eyepiece with a

(Continued on page 6)

The Sky Over Chester County

April 15, 2020 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
04/01/2020	6:18 a.m. EDT	6:45 a.m. EDT	7:27 p.m. EDT	7:54 p.m. EDT	12h 41m 36s
04/15/2020	5:55 a.m. EDT	6:23 a.m. EDT	7:41 p.m. EDT	8:09 p.m. EDT	13h 17m 29s
04/30/2020	5:33 a.m. EDT	6:03 a.m. EDT	7:56 p.m. EDT	8:25 p.m. EDT	13h 53m 24s

Moon Phases					
First Quarter	04/01/2020	6:21 a.m. EDT	Full Moon	04/07/2020	10:53 p.m. EDT
Last Quarter	04/14/2020	6:56 p.m. EDT	New Moon	04/22/2020	10:25 p.m. EDT
First Quarter	04/30/2020	4:38 p.m. EDT			

April 2020 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	First Quarter Moon and the Lunar Straight Wall is visible
3	Venus passes through the edge of the Pleiades cluster
7	Full Moon, the Full Pink Moon or the Bullhead Moon, 10:53 p.m. EDT
13	The 50 th anniversary of “Houston, we have a problem” on Apollo 13
14	Last Quarter Moon, 6:56 p.m. EDT
22	New Moon and the Lyrid meteor shower peaks
23	Look for a very thin crescent Moon around 8:00 p.m.
26	Venus is near the Moon in the evening sky
29	The Lunar X is visible around 10:00 p.m.
30	First Quarter Moon and the Lunar Straight Wall is visible

The best sights this month: A great photo opportunity is on April 3rd when Venus brushes the edge of the Pleiades star cluster. This is the closest Venus will be to the Pleiades until 2028! Then at the end of the month we have another photo opportunity when the elusive Lunar X is visible around 10:00 p.m.

Mercury: Mercury is in the pre-dawn sky during April.

Venus: Venus reaches an incredible magnitude -4.7 at the end of April, as bright as it gets for 2020. And what fun it will be on April 3rd when Venus passes very close to the Pleiades. Our sister planet will be only ¼ degree from Alcyone, the brightest Pleiad. This close pass happens “every eighth April” as the famous astronomy writer Guy Ottewell stated.

Mars: Mars is dim and low in the east during the hours before dawn dancing with Jupiter and Saturn before the Sun comes up to spoil the show.

Jupiter: The king of the planets shines brightly in the east, rising about 3 1/2 hours before the Sun. It is a nice sight through the bare trees when I wake up in the morning and gaze out the window, still warm and cozy in bed.

Saturn: Saturn follows Jupiter into the morning sky by about a half an hour. Throughout April, Mars, Jupiter and Saturn line up with Mars lower left, Saturn in the middle and Jupiter upper right in the morning sky.

Uranus and Neptune: Both gas giants are too close to the Sun to be observed during April.

The Moon: The Moon is full on April 7th. Native Americans called this the Full Pink Moon. This name came from the herb moss pink, or wild ground phlox, which is one of the earliest flowers of the spring. Other names for this full Moon are the Full Sprouting Grass Moon and among coastal tribes the Full Fish Moon because this was the time that the shad swam upstream to spawn. Native Canadians called this The Full Bullhead Moon.

Constellations: Goodbye Orion, hello Hercules! Ah, spring is here and this is a great time of the year to stare at the bright points of light in the sky and wonder what early humans thought as they gazed into the night. It’s not so cold now and the humidity of summer is not affecting our view of the sky. It takes some careful looking with binoculars, but it is worth the effort to find the dim constellation Cancer the Crab with its beautiful Beehive Cluster. Leo the Lion fills our gaze around 9 p.m. and if you stay out a bit you’ll see the Northern Crown, the constellation Corona Borealis rising with Hercules the Hunter not far behind.

Messier/deep sky: April’s binocular highlights include open clusters M36, M37 and M38 in Auriga, M35 in Gemini and M44, the Beehive, in Cancer. Telescopic highlights are globular clusters M13 and M92 in Hercules, galaxy M94 in Canes Venatici, galaxy M51 between Canes Venatici and the handle of the Big Dipper, and of course the Leo Triplet of galaxies in Leo. Also look for nu Draconis, a beautiful double star in Draco the Dragon. And a new double star I recently became aware of is Iota Cancrī, a yellow and blue double star that to me looks very similar to Albireo in Cygnus. Iota Cancrī, also called Decapoda, is due north of the Beehive Cluster.

Comets: There are no bright comets visible during April. But for an observing challenge seek out Comet PanSTARRS (C/2017 T2) as it cruises through Camelopardalis. A sky chart is in the April issue of [Astronomy magazine](#).

(Continued on page 13)

Equipment Review (Cont'd)

(Continued from page 3)

reticle (crosshairs), to get Polaris centered. Then, you have achieved a rough polar alignment. Now you can find all of your favorite objects by using your RA and DEC setting circles.

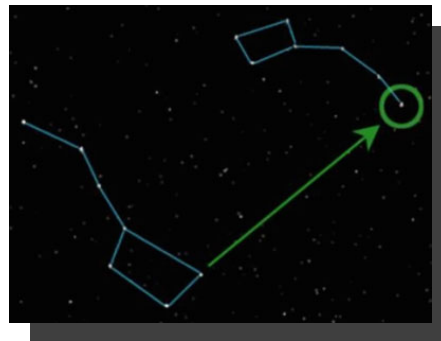
PRECISE POLAR ALIGNMENT

If you plan to observe objects for long periods of time or delve into astrophotography, you most likely have invested in an equatorial mount with a synchronous motor drive. Or, perhaps you own a GOTO mount. You will need a more accurate polar alignment if you hope to benefit from these more sophisticated scopes.¹ Higher accuracy can be achieved if your mount includes a Polar Alignment Scope. This is a permanently mounted small telescope inside the hole bored through the polar axis. This scope is used to magnify the view around Polaris. It includes a special etched reticle to help you point your mount to the North Celestial Pole, including the appropriate offset from Polaris.

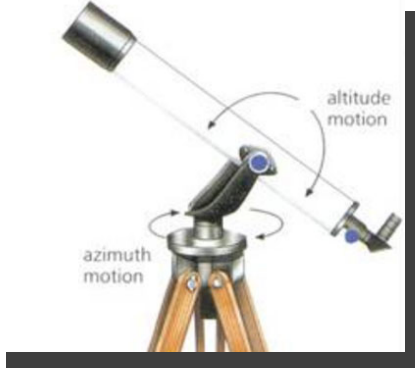
The polar alignment described in this section is also good enough for “casual astrophotography”, meaning photography with video cameras or with short exposure times (several seconds but not several minutes).

The Polar Alignment Scope is one tool to help you get to this level of accuracy and it will correct for the fact that the North Celestial Pole is not *precisely* the same place as Polaris but is offset slightly (about 1 degree). If you look through a polar align-

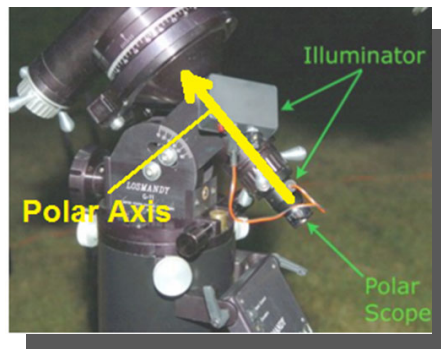
1. Many of the latest GOTO scope have Alt-Az mounts. Unless mounted on an equatorial wedge, they do not require polar alignment.



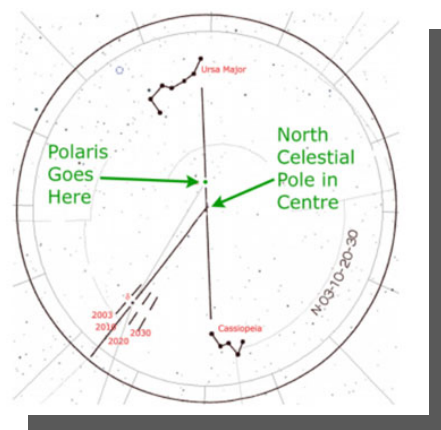
Finding Polaris



What is Azimuth and Altitude?



Stellarvue M4 mount with the polar alignment telescope



View through a Polar Scope

ment scope, you will see some kind of pattern displayed on top of the view.

Looking through a Polar Scope will reveal several lines and labels, some that are for use by both Northern and Southern Hemisphere astronomers. You need to be careful to use only those that apply for your location and ignore the others.

Now you can position Polaris where indicated on the reticle as overlaid on your local sky. This can be a lot of work, even though it looks easy. If you notice where the polar scope eyepiece is located, and considering where your tripod legs are positioned, it can be very awkward and even painful to maintain this position for very long. I have owned a few mounts that came equipped with Polar Scopes. I found them too difficult to use.

A NEW INNOVATION IN POLAR ALIGNMENT

A new product called PoleMaster, was introduced by QHYCCD Company, of China, in 2015. QHYCCD, was founded by Qiu Hongyun, Ph.D. They produced China's first CCD cameras for astronomical observations in 2003.

PoleMaster was designed to achieve polar axis alignment following a simple idea: Find the position of the pole and then make it coincide with the center of rotation of the equatorial mount's RA axis, so that the right ascension axis of the equatorial mount is aligned with the axis of the Earth's rotation.

(Continued on page 7)

Equipment Review (Cont'd)



What's in the Box (actually that's a metal can



PoleMaster on my Parallax GEM mount.

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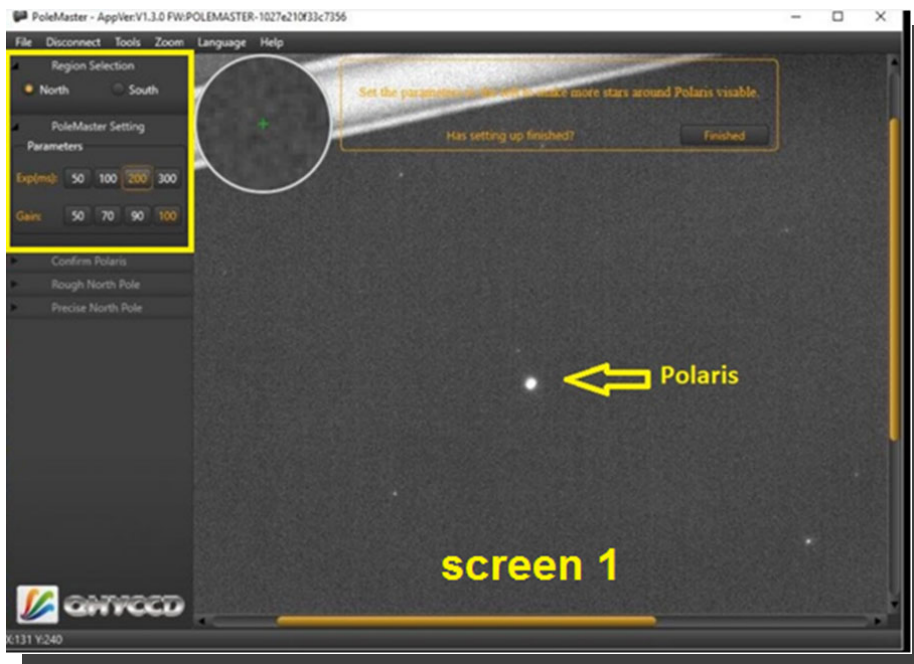
PoleMaster can be mounted in front of the Equatorial Mount's RA axis. It contains a CCD camera that captures star images near the North celestial pole in real time. Its sensitivity is high, so you can see a few dim stars near Polaris. Based on the location of these stars, the software calculates the true north pole position points on the screen. At the same time, PoleMaster detects the position of the center of rotation of the right ascension axis and then marks the position of the two points on the screen. All you have to do is adjust the equatorial mount so that the two points overlap, and the polar axis is aligned.

Since PoleMaster can be mounted many ways, you need to order a mounting adapter for your specific scope separately. I ordered the "universal base" which I attached to my polar axis via a small piece of aluminum channel. Once the unit is secured, you connect it via the included USB cable to a computer. My PoleMaster is connected to a Microsoft Surface PRO Tablet, running Windows 10.

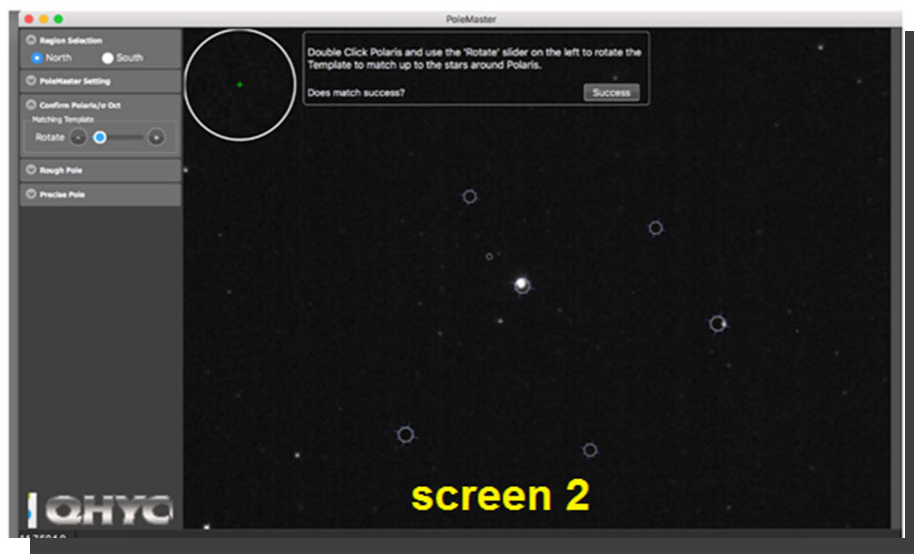
Although QHY adjusts and locks the focus at the factory, I had to adjust my unit before proceeding. This is easily accomplished by:

- Pointing the PoleMaster to a bright star
- Loosening the focus locking screw
- Rotating the lens until the star is in focus
- Retightening the set screw

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Centering on Polaris



Lining up the field stars

Equipment Review (Cont'd)

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POLEMASTER SETUP

To begin the setup, you adjust the altitude and azimuth of your mount to the local latitude and north. Since the field of view of the PoleMaster is a quite wide, 11 x 6 degrees, once the above adjustments are made, you should see Polaris, as well as the local star field on your screen.

Once you can see stars on the screen you can adjust Exposure and Gain to optimize the image. Then you double click on Polaris (Screen 1). You will see a small cross hair +. Try to center that + on the star. The more accurate you are the better your alignment will be.

You now will see five circles on the screen (Screen 2). You want to use the left and right arrows to move the five circles until you have the appropriate field stars centered. If you don't have all the circles filled with stars, then you aren't centered on Polaris.

When you have aligned the circles, click "Success." You will be asked to double click on one of the circled stars. You then rotate you FOV clockwise² until the star moves approximately 30 degrees (Screen 3). The West button typically rotates the FOV Clockwise. After the first move you click "OK." You will be asked to double click on that same star and move that star again for an additional 30 degrees. Then click "Finished."

Once you move the star a second time you will be asked to return the star to the "home posi-

2. You can do this manually using your mount's RA adjustment, through your telescope control software or GOTO control paddle.

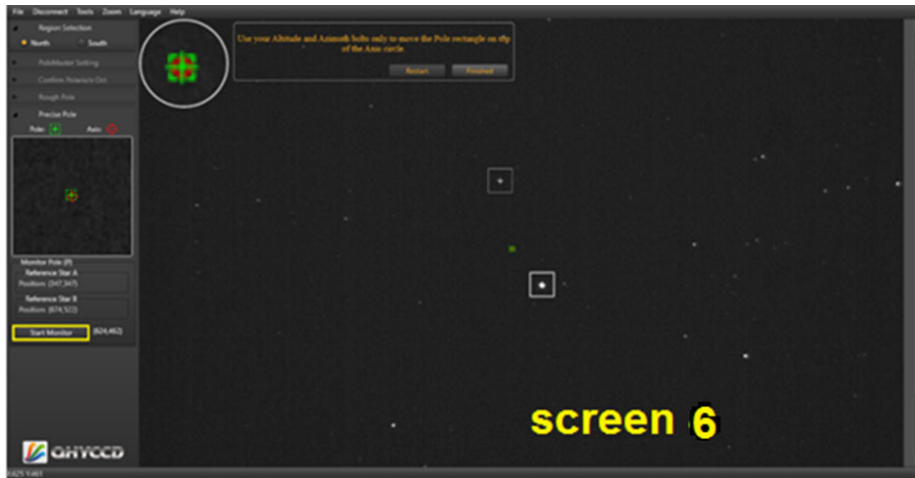


tion." You will need to park your scope to the home position or move the star manually to the original position with the hand paddle or control software and click "Correct" once finished.

Make sure to unpark the scope after parking has finished. If you see the star going off the green line the most likely issue is that your PoleMaster is not seated

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Equipment Review (Cont'd)



screen 6

(Continued from page 8)

properly and needs to be adjusted. Then you will be instructed to double click on Polaris and rotate the slider, so the outer stars are centered within the circles and then click success. You will then be asked to move Polaris using the Alt/AZ knobs, into the broken circle with the cross-

hair. Make sure to center Polaris as best as possible and click "Finished." After you move Polaris on the cross hair you will again be asked to double click Polaris and rotate the circles to center the stars and click success. After that is complete you will be asked to start the Monitor. When you start the monitor you

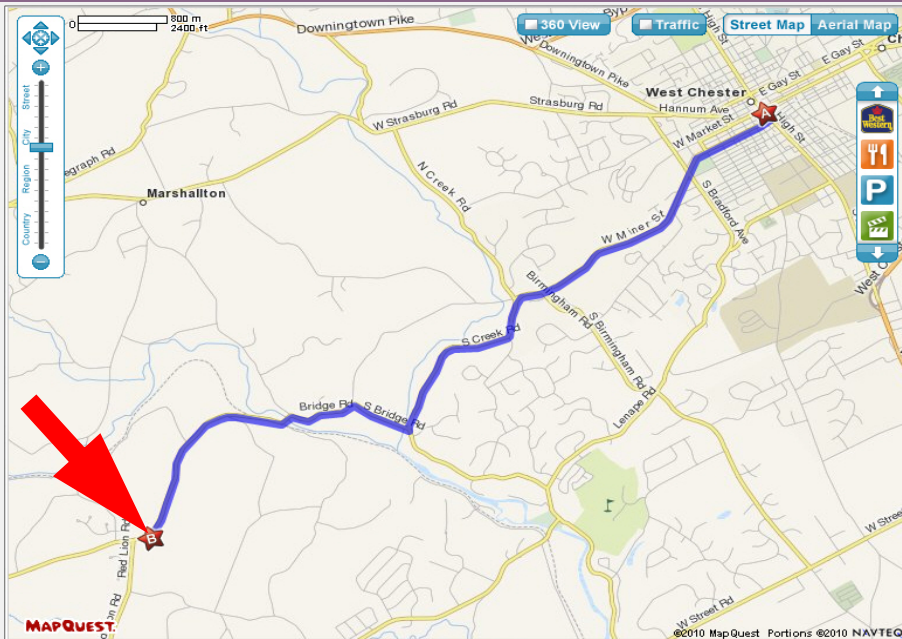
will see a red circle cross hair (Axis) and a green square cross hair (Pole) (Screen 6). The green will be moving around the red circle.

Again you want to move the Alt/AZ knobs until the green square is mostly fixed on the red circle. Be as precise as possible and click finished. Once you have done this you have completed the PoleMaster Routine.

My experience with the Pole Master has been very good. The hardware is well designed, rugged package with simple self powered USB connection. The application software, as described above, is simple and straight forward. For anyone who desires a precise polar alignment, and wants to avoid

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CCAS Directions



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 BRC 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).

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.

Through the Eyepiece: Double star Decapoda, Iota Cancri

by Don Knabb, CCAS Treasurer & Observing Chair

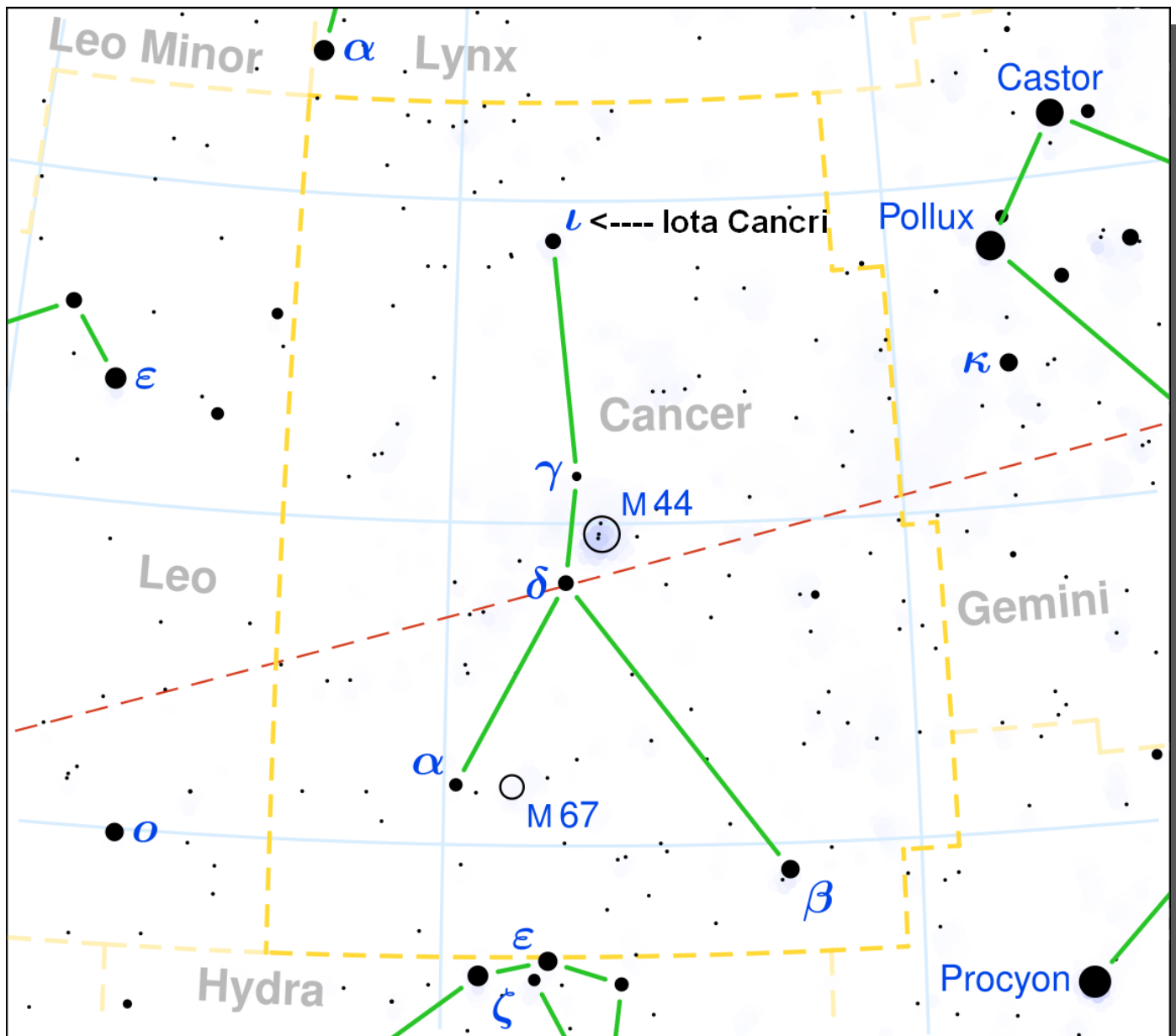


Image credit: Copyright © 2003 Torsten Bronger, GFDL,
Creative Commons file from https://commons.wikimedia.org/wiki/File:Cancer_constellation_map.svg

While working on the Astronomical League Universal Sampler observing program, I observed a beautiful double star that I had not heard of previously. This star is Iota Cancri in the constellation Cancer the Crab. The star is called Decapoda.

The name Decapoda is derived from decapods (literally "ten-footed") which are an order of

crustaceans including many familiar groups, such as crayfish, crabs, lobsters, prawns, and shrimp. In classic drawings Decapoda is on the claw of Cancer the Crab.

It is fairly easy to find Decapoda, but Cancer the Crab is a faint constellation in Chester County skies, so binoculars will be a big

help to find this double star. When you find the Beehive Cluster, just scan due north to find Decapoda. Above is a sky map to aid your quest.

Iota Cancri is a great target for any size scope because of the wide separation and the star's colors. Some 30" lies between

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Eyepiece (Cont'd)

(Continued from page 10)

the two luminaries. The primary shines yellow/orange, and its companion is blue. To me, Decapoda is similar to Albireo, the famous double star in Cygnus, although Decapoda and its companion are both about one magnitude fainter than Albireo and its companion. Decapoda and its companion shine at magnitude 4 and 6 while Albireo and its companion shine at magnitude 3 and 5. Most observers describe the stars as “clear blue and pale orange” according to Jim Kaler, astronomy author and Professor Emeritus of Astronomy at the University of Illinois.

Decapoda is not well studied, but it is believed that the two stars are gravitationally related and are a true double star, not just a chance alignment of a foreground and background star. That the stars are moving through space together and have not changed their separation in a century show them to be a true pair. The two are separated by at least 2,800 astronomical units, and take at least 65,000 years to orbit each other, so it is not surprising that their separation has not changed.

From a planet orbiting Decapoda, its companion would shine with the light of our full Moon, while from a planet orbiting the blue star, Decapoda would appear 10 times brighter. Odds are that gravitational encounters with other stars will gradually separate them, leaving them as lonely singles.

So step outside the next clear evening with your binoculars in

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Classic La Para

by Nicholas La Para

DRIVE-THRU ASTRONOMY



[Editor's Note: I thought this classic from Nicholas was especially fitting as we adjust to drive thru and curbside service during the Coronavirus pandemic. JCH]

Spring 2020 Sponsored Introduction to Astronomy Classes

by Don Knabb & Dennis O'Leary, CCAS Education Chairs

CCAS has partnered with [Chester County Night School](#) to offer a six-week program meeting Monday nights from 7:00 to 8:00 PM. The classes run from March 16, 2020 through May 4, 2020, with both face-to-face and online sessions.

- March 16th: Spaceship Earth (Bayard Ruston High School)
- March 23th: Our Moon—Phases and Faces (Bayard Ruston High School)
- April 13th: Other Kids on the Block (Zoom Session)
- April 20th: Star Charts and Planetarium Software (Zoom Session)
- April 27th: Using a Telescope (Zoom Session)
- May 4th: Beyond Naked-Eye Observing (Zoom Session)

The cost for the courses is \$59.00 per person. Bayard Rustin High School (first two sessions) is located at 1100 Shiloh Road, West Chester, PA 19382.

NASA Night Sky Notes: Hubble at 30—Three Decades of Cosmic Discovery

by David Prosper

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

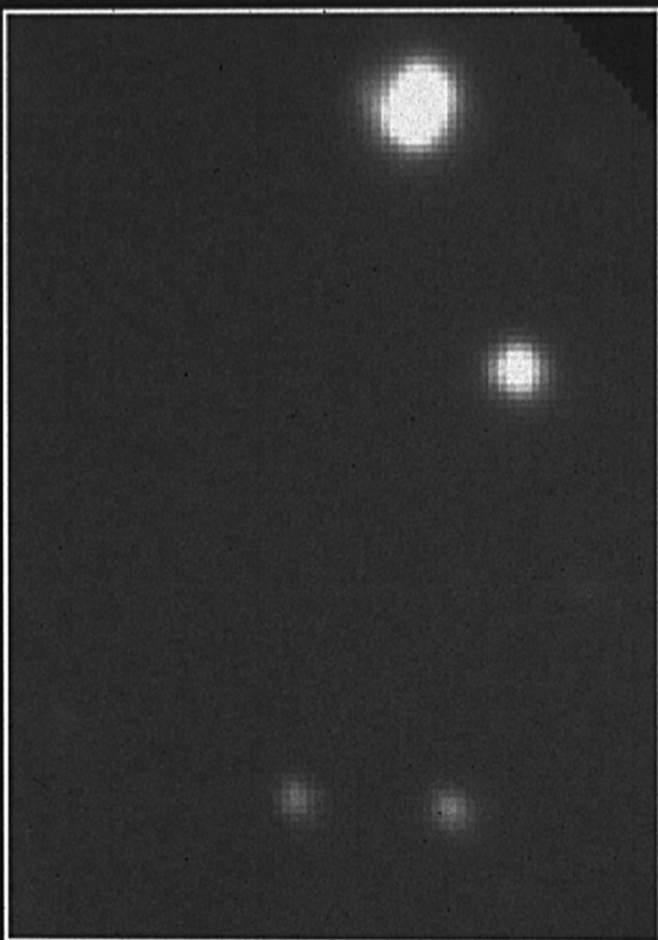
The **Hubble Space Telescope** celebrates its 30th birthday in orbit around Earth this month! It's hard to believe how much this telescope has changed the face of astronomy in just three decades. It had a rough start -- an 8-foot mirror just slightly out of focus in the most famous case of



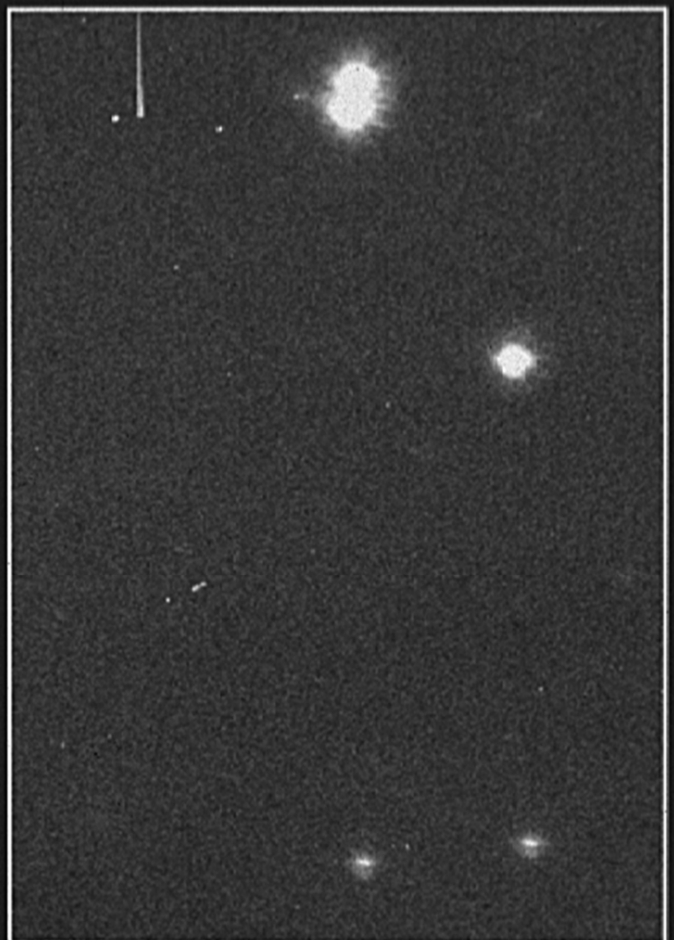
spherical aberration of all time.

But subsequent repairs and upgrades by space shuttle astronauts made Hubble a symbol of the ingenuity of human space-flight and one of the most important scientific instruments ever created. Beginning as a twinkle in the eye of the late Nancy Grace Roman, the Hubble Space Telescope's work over the past thirty years changed the way we view the universe, and more is yet to come!

(Continued on page 13)



GROUND BASED IMAGE
LAS CAMPANAS OBSERVATORY
CARNEGIE INST. OF WASHINGTON



HUBBLE SPACE TELESCOPE
WIDE FIELD/PLANETARY CAMERA

NASA

Hubble's "first light" image. Even with the not-yet-corrected imperfections in its mirror, its images were generally sharper compared to photos taken by ground-based telescopes at the time. Image Credit: NASA

Night Sky Notes (Cont'd)

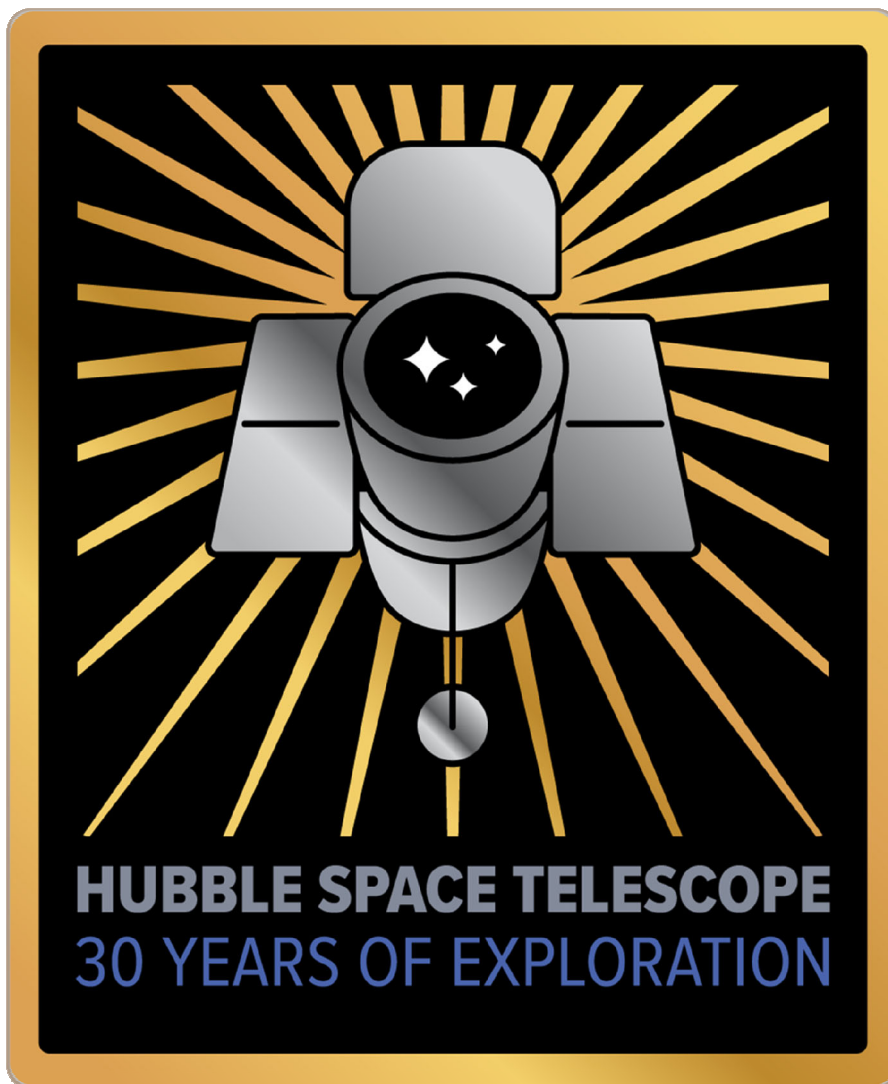


Image Credit: NASA

(Continued from page 12)

We've all seen the amazing images created by Hubble and its team of scientists, but have you seen Hubble yourself? You actually can! Hubble's orbit – around 330 miles overhead -- is close enough to Earth that you can see it at night. The best times are within an hour after sunset or before sunrise, when its solar panels are angled best to reflect the light of the Sun back down to Earth. You can't see the structure of the telescope, but you can identify it as a bright

star-like point, moving silently across the night sky. It's not as bright as the Space Station, which is much larger and whose orbit is closer to Earth (about 220 miles), but it's still very noticeable as a single steady dot of light, speeding across the sky. Hubble's orbit brings it directly overhead for observers located near tropical latitudes; observers further north and south can see it closer to the horizon. You can find sighting opportunities using satellite tracking apps for your smartphone or tablet, and dedi-

cated satellite tracking websites. These resources can also help you identify other satellites that you may see passing overhead during your stargazing sessions.

NASA has a dedicated site for Hubble's 30th's anniversary at bit.ly/NASAHubble30. The Night Sky Network's "Why Do We Put Telescopes in Space?" activity can help you and your audiences discover why we launch telescopes into orbit, high above the interference of Earth's atmosphere, at bit.ly/TelescopesInSpace. Amateur astronomers may especially enjoy Hubble's images of the beautiful objects found in both the Caldwell and Messier catalogs, at bit.ly/HubbleCaldwell and bit.ly/HubbleMessier. As we celebrate Hubble's legacy, we look forward to the future, as there is another telescope ramping up that promises to further revolutionize our understanding of the early universe: the James Webb Space Telescope!

Discover more about the history and future of Hubble and space telescopes at nasa.gov.

Observing (Cont'd)

(Continued from page 5)

Meteor showers: The Lyrid meteor shower occurs on the night of April 21/22. Expect up to 20 meteors per hour at the peak of the shower in the hours before dawn. This is a great time to see some "shooting stars" since the shower peaks on the night of New Moon.

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 11)
hand and take a look at this little known but very interesting double star.

Information credits:

- Jim Kaler, <http://stars.astro.illinois.edu/sow/iotacnc.html>
- https://en.wikipedia.org/wiki/Iota_Cancri
- <https://www.universeguide.com/star/iotacancri>

Equipment (Cont'd)

(Continued from page 9)
the awkward use of a polar scope, or has a mount without a polar scope, this is a handy accessory. At \$269, plus \$30 for the mounting adapter, I found it had very good utility at a reasonable price.

CCAS Membership Information and Society Financials

Treasurer's Report by Don Knabb

March 2020 Financial Summary

Beginning Balance	\$831
Deposits	\$160
Disbursements	-\$0
Ending Balance	\$991

New Member Welcome!

Welcome new CCAS members Dexter Chisholm and Joan Odell from Unionville, 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.

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:

Dr. John C. 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 Dr. John Hepler, the newsletter editor, at: newsletter@ccas.us.

CCAS Website

Dr. John Hepler is the Society's Webmaster. You can check out our Website at:

<http://www.ccas.us>

Dr. Hepler 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 Dr. 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: Dave Hockenberry
610-558-4248

Vice President: Pete Kellerman
610-873-0162

ALCor, Observing, & Treasurer: Don Knabb
610-436-5702

Secretary: Beatrice Mazziotta
610-933-2128

Librarian: Barb Knabb
610-436-5702

Program: Bruce Ruggeri
484-883-5092

Education: Don Knabb
610-436-5702

Dennis O'Leary
610-701-8042

Webmaster & Newsletter: John Hepler
410-639-4329

Public Relations: Ann Miller
610-558-4248



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.

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**.