

The Observer

The Official Publication of the Lehigh Valley Amateur Astronomical Society

<http://www.lvaas.org>

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<http://www.facebook.com/lvaas.astro>

March, 2018

Volume 58 Issue 3



ad astra*****

I leave the country for ten days and look what happens: one day there is a massive snow storm, and then a couple of days later, temperatures soar to the high 70's. Somebody in our society must have really offended the astronomy gods, and I think it is one of the Board Members, because on the evening of the Board Meeting the fog was so dense you could hardly see ten feet in front of you. As I drove along East Rock Road, I missed the turn off to South Mountain and had to do a three point turn in the middle of the road - luckily no one was coming the other way. Since then, the weather seems to have improved and there have been two nights without a cloud in the sky, so it's time to dust the cobwebs off your scope and do some star gazing. You won't be disappointed!

There is so much to see this month, especially if you like the Moon and the planets. For most of the month you should be able to see Venus and Mercury just after sunset in the western sky. Mercury will reach its greatest eastern elongation, i.e. from our viewpoint at its furthest point from the Sun, on March 15th, and then on March 18th, there will be a lovely view of a very thin crescent moon close by, if the sky is clear, of course. Remember, both of these planets have phases that depend on their relative positions to the Earth and the Sun - you should check them out. If, however, the larger planets are more to your liking, then just before dawn you should be able to see Saturn, Mars and Jupiter in the southern sky.

At home, I often set up my scope on our front doorstep because there is a great view of the northern sky. One of the first things I found out when I joined LVAAS was that Polaris is not one star but three, two of which can be seen through a telescope. The largest, Polaris A, is a supergiant but until a few days before the last general meeting, I did not know that it was also a Cepheid variable. In fact, it is the closest known Cepheid variable to Earth. But you can be forgiven for not having noticed, as its brightness changes only by 2% every four days. A century ago, this fluctuation was much larger, around 15%. It is much easier to notice the variation in brightness of Delta Cephei - the most famous Cepheid variable - as this star is close to two other stars with magnitudes at both ends of its range.

Cepheid variables are only one of the many different types of variable stars. I am now really looking forward to Terry Benner's talk at our next General Meeting,

"Observing Variable Stars, and the AAVSO"

**Sunday, March 11th at 2 p.m. in the Trumbower Science Building,
Muhlenburg College**

Terry has been measuring magnitude fluctuations of variable stars for many years, so he should have some very interesting stories to tell. Like last month, Judy Parker has kindly invited everyone to join her for dinner in the Muhlenburg dining hall after the meeting (at around 4 p.m.) The cost is \$9 each if we go as a group, however, if you wander over by yourself, you'll be charged \$18.

Please note: this will be the last time this year that our general meeting will be held at Muhlenburg. In April, we will be back at South Mountain.

One really good thing happened while I was in the UK. On February 14th, Tilden Township supervisors unanimously rejected an ordinance to establish a Logistics Park Overlay District that would have cleared the way for a 1.2 million square foot warehouse to be built on a farm below Blue Mountain, only a few miles from our Pulpit Rock site. In my opinion, this is great news, however, a lengthy legal challenge is undoubtedly on the horizon. Minimizing light pollution should be dear to every astronomer's heart. So I have been taking a closer look at the street lamps in the local area around South Mountain and comparing them to those recommended by the Pennsylvania Outdoor Lighting Council's (POLC.) I discovered that there are many different types even on the same street. Replacing a damaged unshielded light with a shielded version (see below) could make quite a difference in the amount of light pollution in the area. For further information visit the POLC website:

www.polcouncil.org .



Unshielded - Sag Lens



Shielded - Flat Lens



A Call for Star Party Speakers

Blaine Easterwood has kindly offered to give a talk at the September star party- THANK YOU BLAINE! However, I am still looking for someone to give a talk all about the Sun at June's Star Party. If you would like to give it a try, just let me know.

Visit the Night Sky Network (NSN) website: https://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=496 to give you some ideas. At that time of year the sun doesn't set until 8.30 p.m. so our star party visitors may get a chance to do some solar observing.

Just a reminder: the first star party of the year will be held on Saturday March 24th, so why not come along and join in the fun!

ad astra,

Carol Kiely, Director

P.S. Written before the nor'easter hit.



LVAAS General Meeting

Sunday, Mar. 11, 2:00 p.m.

Trumbower Science Building

Muhlenburg College, Allentown, PA

"Observing Variable Stars, and the AAVSO"

presented by

Terry Benner



Terry Benner has been an amateur astronomer since the very early seventies. Over the past 45+ years his interests have encompassed nearly all aspects of amateur astronomy. Terry was a member of IOTA (International Occultation Timing Association) and joined the AAVSO (American Association of Variable Star Observers) in 1980. Since then, Terry has reported 17,588 visual magnitude estimates to the AAVSO, focusing mainly on cataclysmic variables, old novae and R Coronae Borealis stars while still reporting on a numerous array of Long Period Variables.

Minutes for the LVAAS General Meeting - 11 February 2018

The February 2018 LVAAS General Meeting was held on February 11, 2018 in Trumbower Hall at Muhlenburg College, Allentown. The meeting was opened by Director, Carol Kiely at about 2:00 p.m. Carol began by recalling last month's talk on cosmological modeling and also an article in the most recent CAP Journal on the subject. She demonstrated an app on the website Galaxy Makers, where users can specify criteria for a universe (e.g. fractions of heavy and light stars, amount of dark matter, etc.) and the app would render, in 3D animation, a model of the specified universe.

The speaker for the event was Krittanon "Pond" Sirorattanakul, president of the Lehigh University Astronomy Club, who is a senior and double-majoring in Physics, and Earth & Environmental Science. His talk was on Cepheid Variables (CV) -- specifically, how their variability is not as stable as had been previously thought, and how to account for that to improve estimations of distances in the universe.

He began by discussing how CV's work, i.e. they exhibit radial pulsations, and as a result, vary in absolute luminosity, which is related to the period of their pulsations. Together with their observed luminosity, this can be used to determine their distance from the Earth, up to approximately 30 Mpc (~100 MLY.) Long term observations of CV's using automated telescopes should significantly improve distance estimates, which are in turn used to estimate the Hubble Constant. The talk and follow-up questions lasted until about 3:00 p.m. After the talk, it was revealed that this was Pond's first public talk, and that he would be going on to study seismology in graduate school. The talk was recorded, so if you wish to hear more, contact our librarian, Dave Raker, concerning availability of the DVD.

After a short break, Scott Fowler, Membership Chair, conducted the readings of new members. Bill Delaney and Dr. Joseph Bacak (a former member, returning to the fold) had their first readings. Pete Lamana, Barbara Boyd, Gary Campbell, and Tejus Shah had their second readings, and are now full members of LVAAS. Scott also reminded everyone that it is membership renewal time again, and that they could renew at the meetings or get the form from the website and mail him the form and payment. Membership cards for those who have already paid their dues are now available and were being handed out. The cards were printed out and laminated by Rich Hogg, who is also in the process of updating the membership lists. If anyone is not receiving meeting notices, newsletters, etc., they should speak to Scott or Rich.

Gwyn Fowler, Treasurer, gave an abbreviated financial report. The income for the General Fund for the previous month was \$1353.38, with expenses of \$1125.68. There was a reconciliation (expense) of \$219.32 to the Red Shift fund for Fiscal Year 2017, resulting in a corrected starting balance of \$47,240.29 for the start of FY 2018. The financial audit was successfully completed, finding only one minor discrepancy (of 42 cents,) and one missing invoice. In addition, the excess funds from the banquet will be transferred from the (temporary) Banquet Fund and placed into the General Fund.

Carol then made the following announcements:

She gratefully acknowledged Warren Landis's donation of a metallic print of the Heart Nebula to the club. It will be properly framed and displayed at South Mountain. For reference, the Heart Nebula is between Cassiopeia and Perseus, not far from the Double Cluster.

The next Astroimaging group meeting will be on Thursday, March 1st at 7:00 p.m. at South Mountain.

The next Star Party will be on Saturday evening, March 24. Carol still needs a few speakers for star parties this year; anyone interested in speaking should contact her. Ideas for presentations can be found on NASA's Night Sky Network website.

Public Relations Director Eric Loch is arranging an Astronomy Watch Night on Saturdays this spring and summer at Covered Bridge Park in South Whitehall Township. More details to follow.

Assistant Director Rich Hogg is planning an event at South Mountain to mark the 70th birthday of Frank Spacek, son of Mike Spacek. Both have made donations to and supported LVAAS over the years. Details to follow.

The next General Meeting will be held on Sunday, March 11th at 2:00 p.m. at Muhlenburg College's Trumbower Hall. Terry Benner will speak on "Observing Variable Stars, and the AAVSO."

Although LVAAS did not publish a calendar this year, ones published by our sister club UACNJ are available from Secretary Earl Pursell for \$10. To see UACNJ's weekly programs at Jenny Jump State Park, NJ which will begin on April 7, please visit their website <http://www.uacnj.org/pubprograms.php>.

The meeting was adjourned at around 4:00 p.m.

Minutes recorded and contributed by Secretary Earl Pursell

Ron's Ramblings

Ron's Ramblings is a monthly series of articles describing some recent or otherwise important event in astronomy. The ramblings will attempt to describe both the astronomical event and its significance. Obviously, the description will be that of a rambling amateur astronomer.



Neutron Star Merger Detected

In March of 2016 I discussed the September 2015 aLIGO detection of the first gravitational waves, i.e. waves from the merger of two black holes. Since then a few other mergers of black holes have been detected.

The detection of gravitational waves by aLIGO was a major milestone for astronomers in their quest to understand our universe, and in October 2017 the Nobel Prize for physics was awarded for this feat. Now aLIGO has succeeded in detecting the merger of two neutron stars. The significance of this feat is no less earth-shaking (note the pun) than the detection of the black hole mergers. In this article, and in the next two installments of Ron's Ramblings, I will discuss some of the many interesting facets of the detection of the merger of two neutron stars.

Following are the details and characteristics of the gravitational wave signal:

September 27, 2017 was the announcement date for the detection of GW170817, the merger of two neutron stars by the LIGO and Virgo collaborations. This gravitational wave signal lasted for approximately 100 seconds starting from a frequency of 24 hertz (cycles per second.) It covered approximately 3000 cycles, increasing in amplitude and frequency to above 600 hertz in the typical infall pattern, and ended with the collision. The signals arrived first at the Virgo detector in Italy, then 22 milliseconds later at the LIGO-Livingston detector in Louisiana, and another 3 milliseconds later at the LIGO-Hanford detector in the state of Washington.

Note the vast difference in the characteristics of this signal compared to that of the black hole mergers. The infall chirp of a typical stellar mass black hole merger lasts only a few tenths of a second. This signal lasted for a phenomenal 100 seconds. Analysis of the signal matches the merger of two neutron stars of masses of about 1.2 and 1.6 times the mass of the Sun, and located at the relatively close distance of about 130 million light-years.

Since the Virgo detector in Italy was operational, this is the first gravitational wave that was able to be located by triangulation. The significance of being able to triangulate the location of the merger in the sky is related to the fact that unlike the case with black hole mergers, neutron star mergers are predicted to emit energy across the entire electromagnetic (EM) spectrum. Black hole mergers were not predicted to emit any EM energy, and none has been observed for any of the four black hole mergers detected to date. No less than 70 observatories searched across the entire EM spectrum, and a few dozen reported observing some EM radiation from this neutron star merger.

Next month's installment will further discuss this "multi-messenger" detection of GW170817, and the subsequent article will discuss additional aspects of this merger.

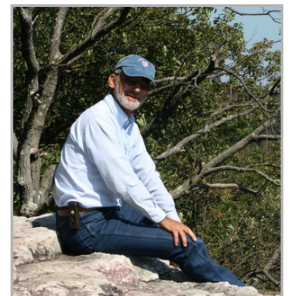
References:

GW170817. Retrieved from <https://en.wikipedia.org/wiki/GW170817>.

McLaughlin, M. (October 16, 2017.) Viewpoint: Neutron Star Merger Seen and Heard. Retrieved from <https://physics.aps.org/articles/v10/114>.

The end of my ramblings until next month.

Ron Kunkel



Eclipse of the Blue Moon



The second full moon of January, near perigee, in penumbra; photographed near Lehigh Valley Hospital, Cedar Crest, Allentown, PA. ($40^{\circ}34'11.2''\text{N}$ $75^{\circ}32'06.2''\text{W}$) at 7:01 a.m. EST January 31, 2018, by society member Blaine Easterwood.

Camera: Olympus Mirrorless OM-D E-M5-II

Lens: Olympus M.Zuiko Digital ED 14-150mm F4.0-5.6

by Gary A. Becker



Ready to Spring Forward?

I am so excited that finally daylight saving time (no “s”) is almost upon us. You’ll be “springing” ahead one hour on Sunday morning, March 11. If you do not set your clocks forward by one hour, then you must be living in Arizona (except for the Navajo Nation) or Hawaii. There is no 2-3 a.m. on Sunday, March 11, if you are working third shift. Will you be paid for eight hours of labor or the seven hours that you will actually be employed?

Lots of people really think that they are gaining an extra hour of daylight, but it really is just an illusion. Our Eastern Standard Time technically shifts to Atlantic Standard Time, which is one hour ahead and the next time zone to the east. This causes the sun to rise one hour later, but also to set an hour later giving us the impression that we have gained that extra hour of light. The amount of daylight, however, is actually expanding. The sun is rapidly moving northward, climbing higher into the sky each day, rising earlier and setting later, increasing the actual amount of time the sun is visible.

The interval between the initiation of daylight saving time and the first week in April, a span of four weeks, sees the sun climb higher into the sky than at any other time of the year, increasing its noontime altitude by 10 degrees and the amount of daylight swelling by one hour, 11 minutes. By April 7, the sun sets about 30 minutes later and rises about 45 minutes earlier, giving us nearly 13 hours of sunlight. The increase continues until the summer solstice, when the sun stands over the Tropic of Cancer and is above the horizon for nearly 15 hours.

If I was the master timekeeper, I would lobby for a double daylight saving time starting in early May and continuing through late August. Giving us an even better fit to our waking time, sunsets would occur around 9:30 p.m., at summer solstice. However, I’m happy that we have reached this mental milestone in making the winter go away, even though as I write this article, a snowy nor’easter is raging outside.

The big chill will eventually be defeated by a more direct sun angle and more daylight as Sol continues to move northward for the next several months.

William Willett, an English homebuilder in London, conceived and promoted the concept of daylight saving time in 1907 with his self-publication of a pamphlet entitled, "The Waste of Daylight." Although his ideas met with its Parliamentary champions, it wasn't until a year after Willett's death in May of 1916, burdened by the financial crunch of conducting WWI, that British Summer Time was enacted. Germany and Austria beat the Brits by several weeks, but one town in Canada, Port Arthur, Ontario (renamed Thunder Bay) enacted daylight saving time in 1908. The US made the switch in 1918. There is still no conclusive evidence that we actually save energy by moving our clocks ahead, but psychologically, human beings simply function better when there is more natural sunlight. Ask anyone who lives in Alaska during their long, dark, cold winters.

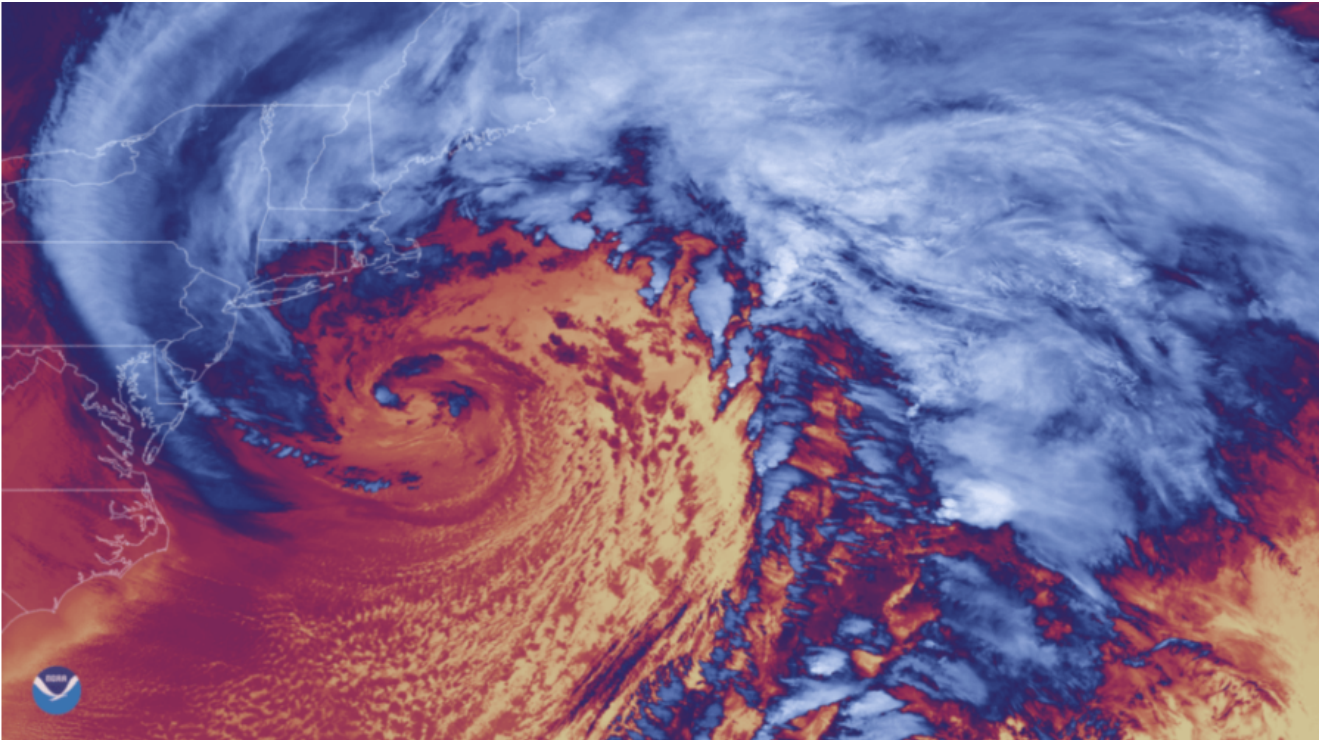
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Moravian College Astronomy - astronomy.org



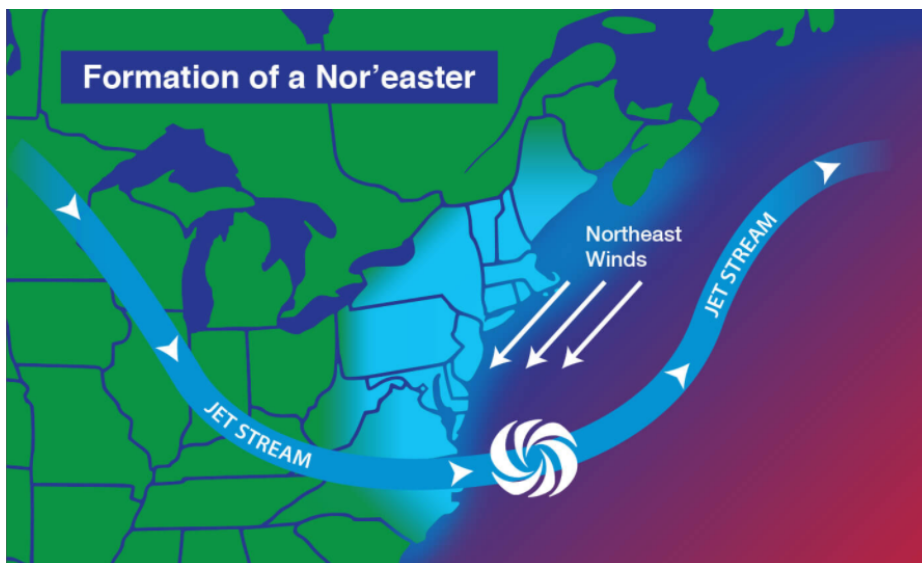
What is a Nor'easter?

Learn more about this increasingly frequent storm system from NASA/NOAA:

<https://scijinks.gov/noreaster/>



This image of a January 2018 nor'easter was created by NOAA-20's VIIRS instrument, which is sensitive to changes in atmospheric temperature. In this thermal infrared image, blue and white indicate cold cloud tops, while the red and yellow shades indicate lower clouds and clear sky over ocean. Credit: NOAA



A nor'easter forms when cold air often originating in Canada blows over the warm Atlantic Ocean off the coast of the eastern United States.

Schlegel Observatory Report

by Rich Hogg — March 2018



There was no Schlegel Report in February because we kind of got derailed. I was working on one thing and before I had it to some point where I could write about it, I had to set it aside and start working on something else — and then the something else did not get to a suitable milestone for reporting, either.

Almost, though. The "something else" was finalizing the specifications for the optical system so that our optician could get to work on finishing our secondary mirror. We received a gentle reminder from him that our primary was taking up a lot of space in his shop, and we decided to make it a priority to give him the specs so he could get on with the work and get it out of his way. I got busy reviewing all of our previous thinking about this (some of which I have written up in previous installments of this column — (see http://lvaas.org/observer/The_Observer_February_2017.pdf) and the additional work we've done since then. We arranged to review the proposed design at South Mountain before our January board meeting, on the 28th.

I was hoping that we would all agree to sign off on the design proposal, and then I could write it up quickly in time for the February Observer. But, it became clear during the discussion that we were not 100% sure about where to put the focal plane. The issue was, if we were doing visual observing using an eyepiece and a diagonal, how close to the back of the mirror cell could we be, and still feel comfortable? At this point our Pulpit Rock Observatory Director, Frank Lyter, made a really good suggestion: since we were enjoying a spell of mild weather for the season, why not go to Pulpit Rock and actually mock up the design and try it?

Frank was thinking in terms of corrugated cardboard and tape, but in fact we have a focuser that is able to be mounted on the telescope. It has a 4.125" draw tube, so all that we would need would be an adapter to allow mounting a 2" diagonal on it.

(I enjoyed a bit of satisfaction at this point because I have a 2" diagonal! I had succumbed to the temptation to buy one at NEAF last year, even though I was almost certain I would have no need for it before NEAF 2018. But indeed I did need it, and I am glad I had it.)



Preparations for the mock-up. I decide that I could make a suitable adapter out of a pine board, using my band saw, my drill press, and a tap to thread some holes for set-screws to hold the diagonal in place. I thought the focuser had a suitable set-screw, to hold the adapter in place, but it turned out I would need to use duct tape for that part of the assembly. (And I was almost out of duct tape, so I ended up using two different colors.) The design requires the baffle to be mounted in place, and then the focuser mounts to the baffle. I separated the bottom section of the baffle from the rest of it to make it easier to handle. The only other prep work required was cleaning up the threads on the old screws and the tapped holes so that they would assemble easily.

Pulpit Rock in February: The weather forecast for the afternoon of the following Thursday, February 1, was for unseasonably mild weather: 40's with light rain. Ron Kunkel and Earl Pursell agreed to meet me to help with the assembly, as well as act as additional test subjects and add their opinions to the final decision. Everything proceeded smoothly, with each of us taking turns at the eyepiece, simulating the act of observing. In the end, we decided to add 1/2" to the back-focus distance to give us a bit more clearance. Afterward, we celebrated a successful mission with dinner at the Logan's Roadhouse in Hamburg, and I got busy drawing up some final specifications. These have now been provided to the optician.

Ron Kunkel takes a turn at the eyepiece and pretends to view Saturn, a favorite object. The excellent optical system makes it no problem to see the faint F ring in his mind's eye.



The author testing the eyepiece position in the mock-up. There is enough room for comfortable viewing even when using the "wrong" eye, and with the 40" mirror, the central star of the Ring Nebula is imagined to be easily visible in the view.



Here are the specs we've provided for the design of the 40-inch telescope in the Schlegel Observatory:

- Primary usable aperture 39.8"
- Primary radius of curvature 293.25"
- Primary focal length 146.625"
- Primary conic constant -1.0 (parabola)
- Secondary usable aperture 9.8"
- Secondary radius of curvature 94.4" (convex)
- Secondary conic constant -2.9724 (hyperbola)
- Spacing 112.03"
- Optical back-focus 17.51"
- System EFL 549.04"
- System f-ratio 13.795
- Fully-illuminated field size 2.01"
- Fully-illuminated FOV 0.209°



Earl Pursell is excited to work his way between the fork and the tube to make believe he is viewing Polaris. Thanks to the quality of the instrument, Earl has no trouble feigning to visually perceive the 0.05-magnitude variability, even during daylight hours, with the dome shutter unopened.

If you compare those figures to the ones I provided in the February 2017 Observer (linked above), you will note a few important differences:

1. We had an incorrect value for the FL of the primary mirror then.
2. The increased primary FL requires an increase in the spacing in order to have a positive field of view, and we determined that we have enough room to do so; in fact we went all the way to a fully-illuminated 2" field. This choice is a somewhat arbitrary benchmark. (We could do with a bit less, and suffer a small amount of vignetting, but reducing the spacing by only 1.5" takes us from a 2-inch field to 0 inches! Since it doesn't make much difference, we choose to fill up a 2" eyepiece barrel with all of the light that the 40" mirror can gather.
3. The optical back-focus distance (measured from the apex of the paraboloidal reflecting surface of the primary, to the focal plane) is about the same as we had previously. In the interim we had contemplated reducing it slightly, but after the mock-up test we ended up back where we were.

There is a possibility that we will need to adjust these again as our optician will need to review and accept them, and something may come up during the work that will require an adjustment. But most likely this is what we will stick with.

Current Status and Activities: We have provided final specs for the complete system to the optician, so he can begin work on figuring the secondary mirror. Also, we are getting back to work on fixing the issue with mounting the telescope to the pier.

What's Up - March 2018

What's Up For March?

Several Planets and the Zodiacal Light!



This month, at sunset, catch elusive Mercury, bright Venus, the Zodiacal Light, Mars, Saturn and Jupiter between midnight and dawn!

<https://nasa.tumblr.com/>



Image credit: [@romcloughlin](#)– at Lakepointe_Forest_Park



Doug Wheelock  [@Astro_Wheels](#) · Feb 24

Time...

we try to save you
but you fly by in haste

often we wish we could
turn back your hands

yet there are moments
when you seem to stand still

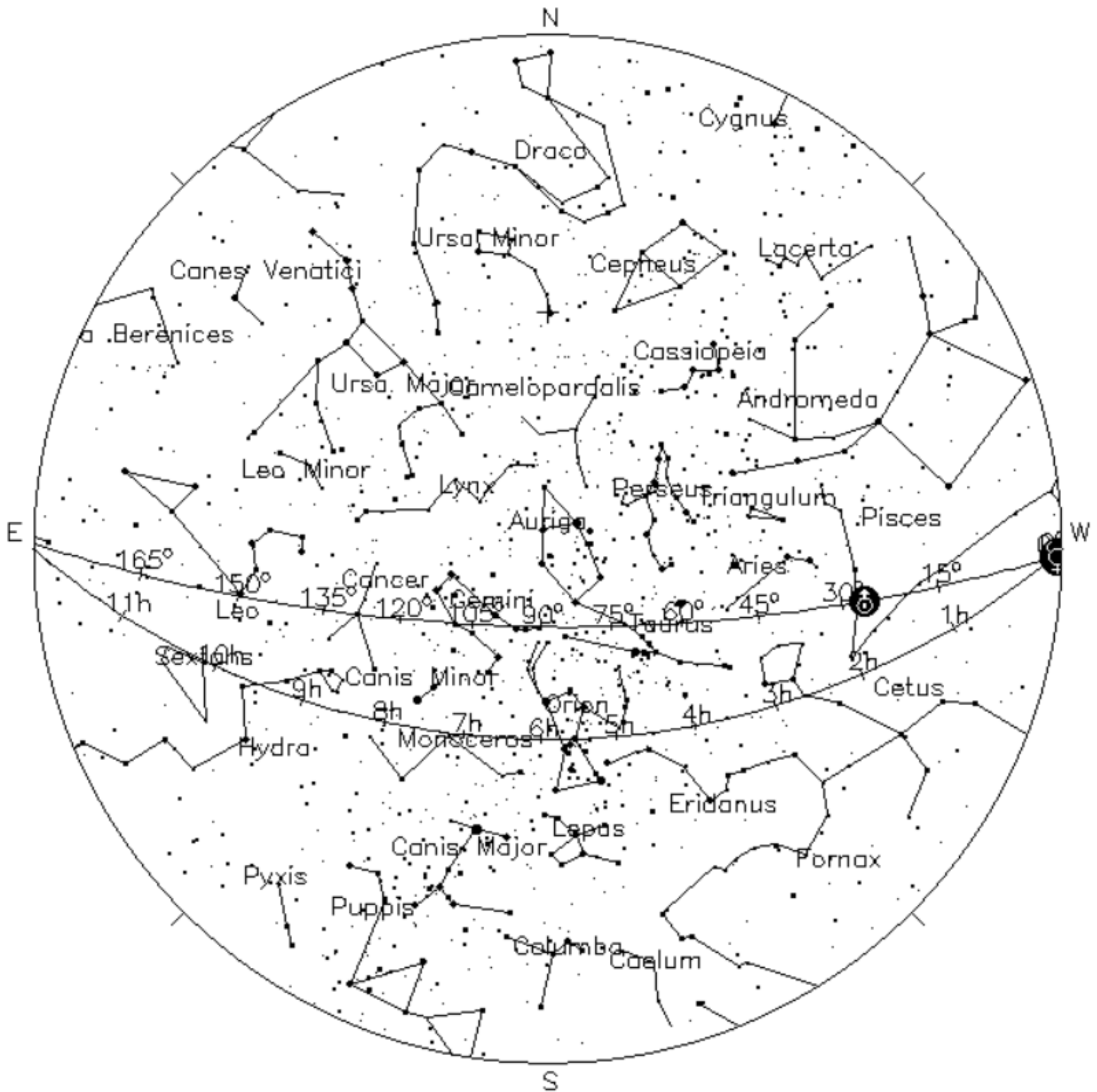
sadly we often waste you
as if 'forever' were ours

fleeting as you are
there is no greater gift

Time...

Credit: Twitter

Sky above 40°33'58"N 75°26'5"W at at Tue 2018 Mar 6 0:01 UTC



Your Sky was implemented by John Walker in January and February of 1998. The calculation and display software was adapted from Home Planet for Windows.

The GIF output file generation is based upon the ppmtogif module of Jef Poskanzer's pbmplus toolkit, of which many other components were used in creating the images you see here.

ppmtogif.c - read a portable pixmap and produce a GIF file

Based on GIFENCOD by David Rowley

Lempel-Zim compression based on "compress"

Modified by Marcel Wijkstra

Copyright © 1989 by Jef Poskanzer.

Check out additional features of **Your Sky** at : <http://www.fourmilab.ch/yoursky/>

MARCH 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				01 Full Moon Astro Imaging 7:00 PM	02	03
04	05	06	07	08	09 Last Quarter Moon	10
11 Daylight Savings Begins General Meeting - 2:00 PM Muhlenberg	12	13	14	15	16	17 New Moon
18	19	20 Spring Begins	21	22	23	24 First Quarter Moon Star Party
25 LVAAS Board of Governors Meeting	26	27	28	29	30 Good Friday Private Star Party	31 Full Moon Passover 1st Day

APRIL 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01 Easter	02	03	04	05 Astro Imaging 7:00 PM	06	07 Passover, Last Day
08 Last Quarter Moon General Meeting - South Mountain 7:00 PM	09	10	11	12	13	14
15 New Moon	16	17	18	19	20	21 NEAF
22 NEAF First Quarter Moon	23	24	25	26	27	28 Star Party
29 Full Moon LVAAS Board of Governors Meeting	30					

2018 LVAAS Event Calendar

2018 LVAAS Event Calendar												
	Sundays			Thursday	Friday	Saturday	Mondays	Multi-Day Weekends	Moon Phase			
	General Meeting time	location	Board meeting	Astro-Imaging	Lunatics and Stargazers	Star Parties	Scouts at S. Mountain	Scouts at Pulpit R.	New	First	Full	Last
January	2:00 PM	14 Muhlenberg	28	4		no mtg		no camping	16	24	1 31	8
February	2:00 PM	11 Muhlenberg	25	1		no mtg		no camping	15	23		7
March	2:00 PM	11 Muhlenberg	25	1		24		30-31-1	17	24	1 31	9
April		8 S.M.	29	5		21		27-28-29	15	22	29	8
May		6 S.M.	20	3		19		25-26-27	15	21	29	7
June		10 S.M.	24	no mtg		23		29-30-1	13	20	28	6
July	5:00 PM	7 S.M.	29	no mtg		21		27-28-29	12	19	27	6
August	7:00 PM	11 Pulpit	26	no mtg		18		24-25-26	11	18	26	4
September		9 S.M.	30	27		15		21-22-23	9	16	24	2
October		14 S.M.	28	25		13		26-27-28	8	16	24	2 31
November	2:00 PM	11 S.M.	25	29		17		no camping	7	15	23	29
December	2:00 PM	8 Grace Com	30	20		no mtg		no camping	7	15	22	29

July, Aug & Dec are Saturday meetings with rain date on Sunday
 Jan, Feb & March meetings are at Muhlenberg College
 August meeting is at Pulpit Rock
 December meeting / Holiday Party is at Grace Community Church

NEAF
 Cherry Springs S.P.
 Stellafane
 Black Forest
 Mega Meet

April 21-22
 June 14-17
 August 9-12
 September 7-9
 May 11-13 (tentative)

Publishing images is a balancing act!

When preparing your images for publication in The Observer, please consider the following guidelines:

Put the quality in:

- ▶ Considering the "print" size of the image, make sure you have at least 150 pixels/inch.
- ▶ Use a reasonably good quality for the JPEG compression ratio.

But watch the "waistline"!

- ▶ Don't go too much above 200 pixels/inch max.
- ▶ Use the lowest JPEG quality that still looks good!
- ▶ Shoot for <300KB for a 1/2 page image or <600KB for a full page.

Tip: If you're not Photoshop-savvy, you can re-size and compress undemanding images ("human interest" not astroimages), with an online tool such as

<http://www.ivertech.com/freeOnlineImageResizer/freeOnlineImageResizer.aspx>. It will also tell you the pixel size and file size of your original, even if you don't download the processed copy.

The Observer is the official monthly publication of the Lehigh Valley Amateur Astronomical Society, Inc. (LVAAS), 620-B East Rock Road, Allentown, PA, 18103 and as of June 2016, is available for public viewing. Please contact the editor at editorlvaas@gmail.com

Members please use above email address for submissions.

Society members who would like to submit articles or images for publication should kindly do so by the Sunday before the monthly meeting of the board of governors (please see calendar on website) for the article to appear in the upcoming month's issue. PDF format is preferred. Early submissions are greatly appreciated. Articles may be edited for publication. Comments and suggestions are welcome.

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Existing members please update your LVAAS profile information by emailing the membership director at membership@lvaas.org

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