

The Observer

The Official Publication of the Lehigh Valley Amateur Astronomical Society

<https://lvaas.org/>

610-797-3476

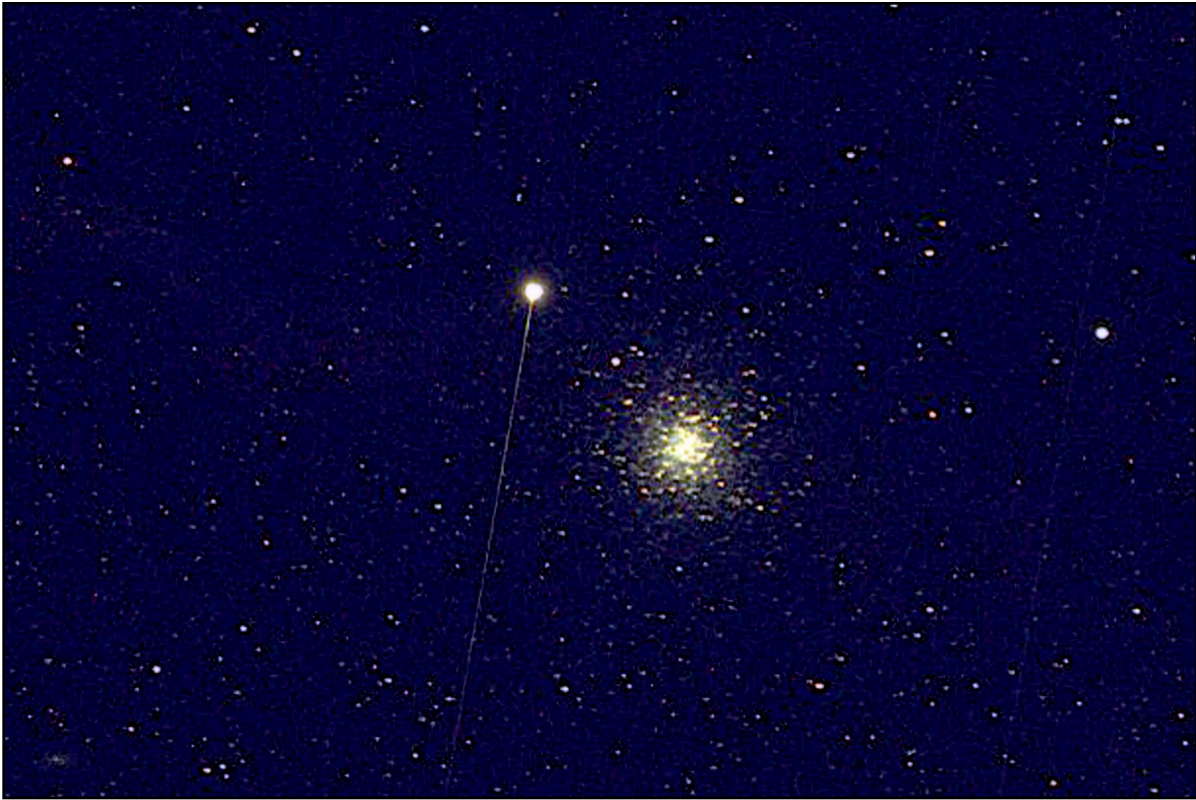
<https://www.facebook.com/lvaas.astro>

December, 2018

Volume 58 Issue 12



...they looked up, and saw a star...



"This is of an exploding meteor (bolide) only about 30 arcseconds from the core of M13. You can see the trail and the "boom." I discovered it in a bunch of screen grabs that I made while testing my new ASIAir system integrator last month. (This is poor quality because it is a screen grab off my iPad.)"

Photography by Dave M. Moll, October 2018

Cover Image: The Western Veil Nebula (NGC6960) and the central nebulosity of the Veil (NGC6974/79.) NGC6960 is also known as "The Witch's Broom." The bright star in NGC6960 is 52 Cygni. Data capture using an Astro-Tech AT-65Q APO on an iOptron iEQ45 Pro mount, ZWO ASI 071MC main camera, ASI 120MC-S guiding. **Capture software:** Nebulosity4 & PHD2. **Exposure:** 20 X 5-minute frames for 1 hour, 40 minutes total integration. **Processing software:** Deep Sky Stacker / Nebulosity 4 / Photoshop CC in that order.

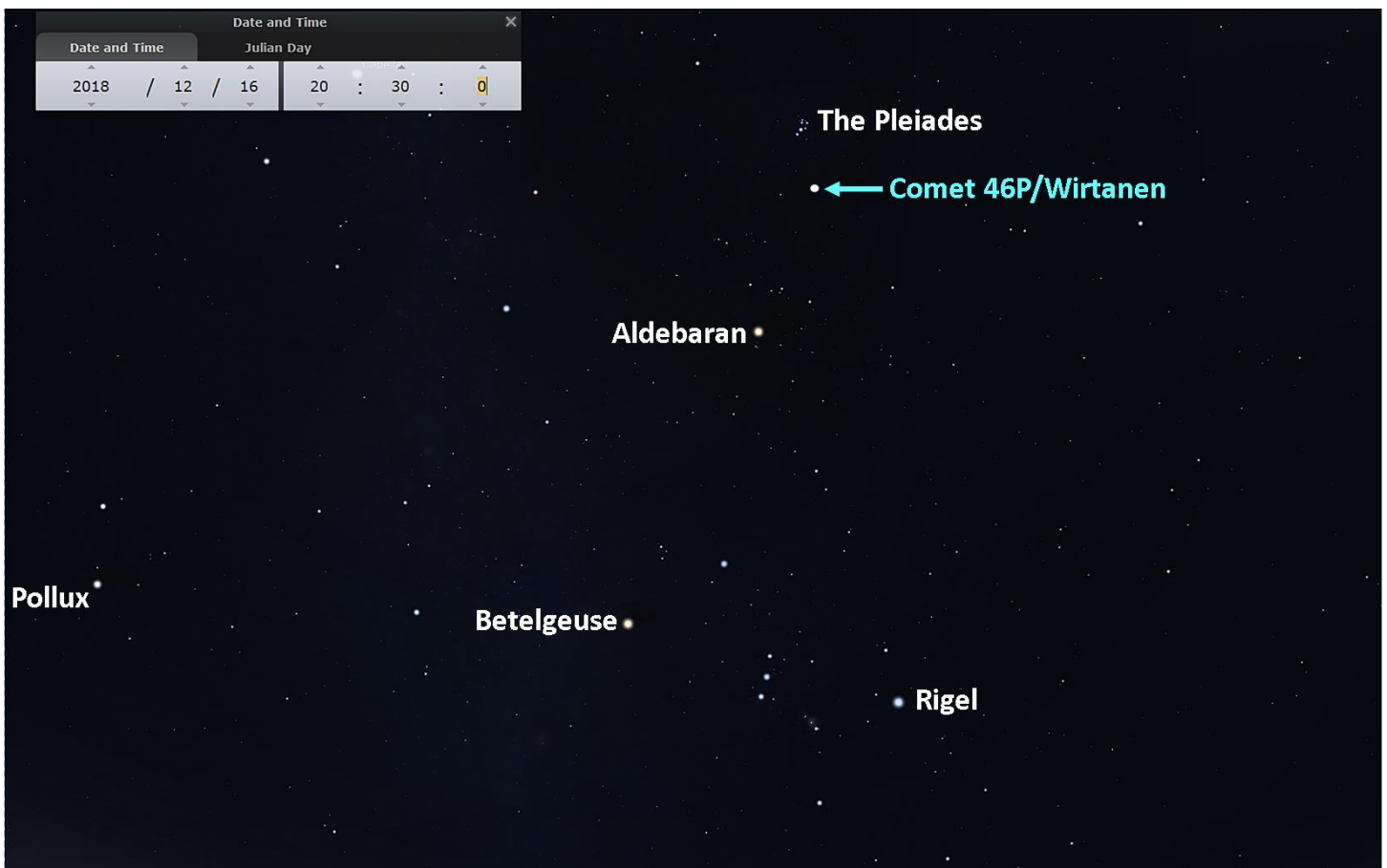
Imaged October 30, 2018 by LVAAS member David M. Moll, North Whitehall Twp., PA



ad astra*****

Last Friday, on our way home from Newark Airport, I looked out of the car window and there he was, Orion - the Hunter, high in the eastern sky above our house. And while on many occasions I have said that Orion is just a big show off, he was a very welcoming sight that night.

As many of you know, you can use the bright stars in Orion as sign posts that enable you to find stars and other objects in nearby constellations. If the sky is clear on December 16th you will be able to use Orion's belt to find a comet - Comet 46P/Wirtanen. While the comet itself has a diameter of only 1.2km, its fluorescent coma (the nebulous envelope of dust and gas that forms when a comet gets close to the Sun) is much larger. On December 16th, only four days after it slingshots around the sun, Comet 46P/Wirtanen will be a mere 7.2 million miles from the Earth before making its way towards the outer solar system, and, as Rich mentioned in last month's ad astra, if the sky is clear, it could be visible with the naked eye, reaching an apparent magnitude of +3.5. Remember, however, you are not looking for a sharp bright star-like object, but rather something like the Andromeda Galaxy, and it may be best to use averted vision. Also, that night the moon will have just passed its first quarter, so you might have a better chance of seeing it a few days earlier when the moon is not as bright and is further to the west.



If you choose to comet gaze on December 13th, you may also see a few shooting stars as the Geminid Meteor Shower will be at its peak. Some people, however, simply could not wait and have already started taking pictures, one of which was **NASA's Astronomy Picture of the Day:**

<https://apod.nasa.gov/apod/ap181115.html>

On December 16th, to the west of the quarter moon you will find the planet Mars close to the border between Aquarius and Pisces. As Mars is moving away from Earth it is becoming dimmer: its apparent magnitude will be close to +0.2, a far cry from -2.7 in August of this year. It will also be in a waning gibbous phase, 86% illuminated. As you look at the planet, I wonder what the NASA Insight Probe will be doing? By then it will hopefully have started performing experiments and be sending data back to NASA.



NASA's Viking Orbiter

The first space craft to make a soft landing on Mars was the Soviet Mars 3 lander on December 2, 1971. The lander began transmitting an image shortly after landing, but the transmission stopped after 20 seconds. Only 70 lines of data were collected. On July 20th, 1976, NASA's Viking 1 Lander was the first spacecraft to land on Mars and send a clear image of the surface of the planet back to Earth .



**The first clear image transmitted from the surface of Mars by the Viking 1 lander
on July 20th, 1976**

As many of you know, I have had to travel back to the UK several times this year which has meant that I have missed several Board Meetings and Star Parties. I would like send a

BIG THANK YOU

to everyone, especially our **Assistant Director Rich Hogg**, who looked after things while I was away. I would also like to sincerely thank everyone for their thoughts and prayers - it is a great comfort to have the support of friends. My Dad is now being cared for at home and is much happier.

This will also be my last ad astra article as I will be officially handing over the reins to Rich on December 1st. I would like to give a **BIG THANK YOU** to my fellow elected officers, Rich Hogg, Earl Pursell and Gwyn Fowler, and all the Board Members for making LVAAS

“the best astronomy club ever!”

- a quote from NASA Scientist and Honorary LVAAS Member, Dr. Bonnie Buratti.



A Call for Star Party Speakers

Many of the members who I used to rely on to give star party talks have moved away from the local area, so I am looking for a few talented and willing volunteers to take their place. If you would like to give it a try but are uncertain about what topic to choose, the Night Sky Network (NSN):

<https://nightsky.jpl.nasa.gov/download-list.cfm>

is a treasure trove of ideas and resources (PowerPoints and kits) to help you. They also organize webinars each month. LVAAS is a member of the NSN and I am the club coordinator. If you would like to become an NSN club member, it is free to join, just let me know.

Our next general meeting is also our **Holiday Party** and it will be held on **Saturday, December 8th** at the **Lower Macungie Community Center**. It will be a good time to test your knowledge as Rich Hogg and Dave Moll will be running a Trivia contest.

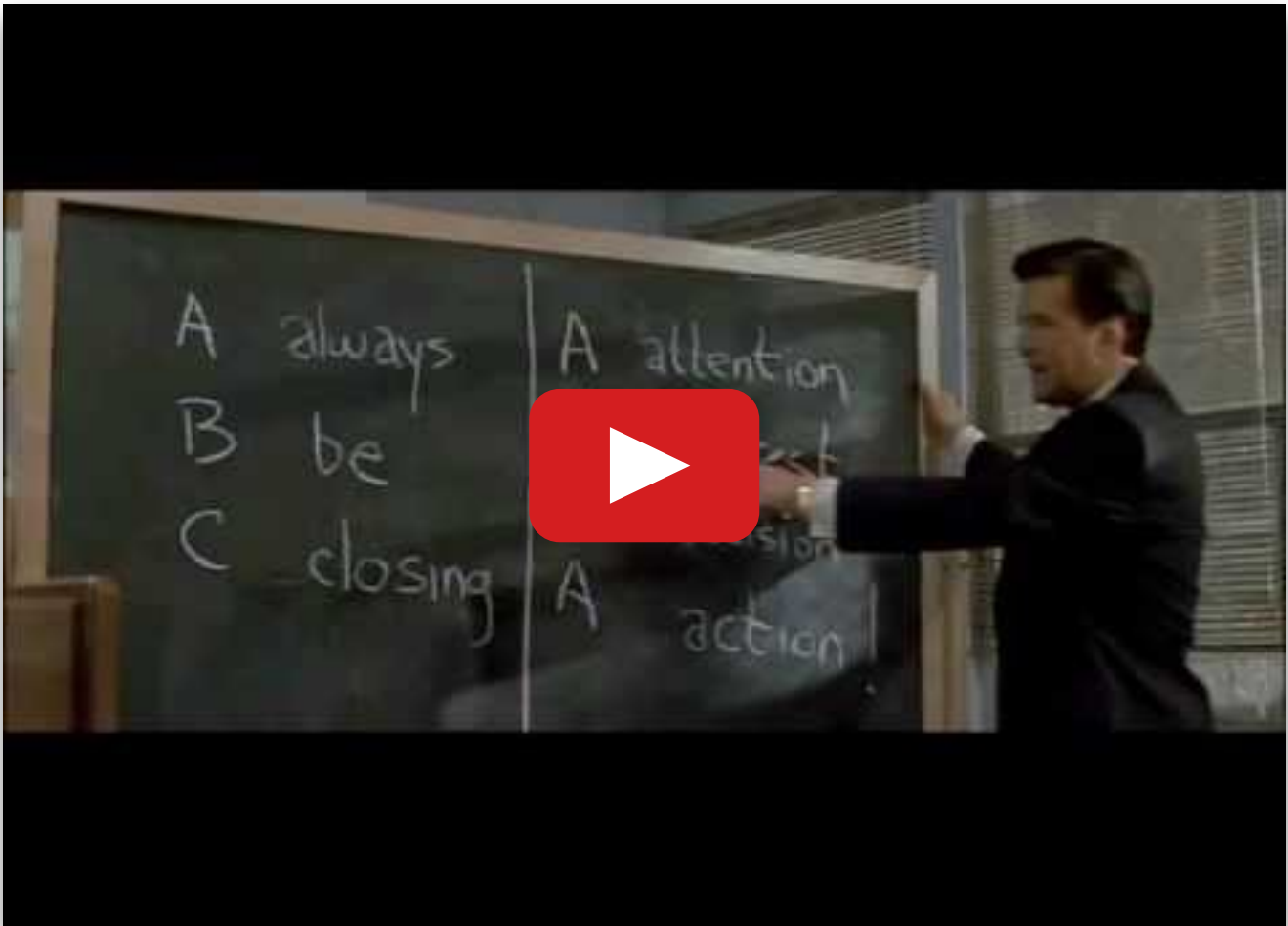
I hope to see you there,

ad astra,

Carol Kiely, Director

A Message for the Season

Carl Sagan Reads from The Pale Blue Dot



LVAAS General Meeting and Holiday party

Saturday, December 8, 2:00 p.m.

Lower Macungie Community Center
3450 Brookside Rd., Macungie, PA 18062



directions:

https://lvaas.org/staticpages/index.php?page=lower_mac_comm_center_directi

"Astronomy Trivia"

The LVAAS Holiday Party is a great tradition, a Pot Luck afternoon meal where members are invited to share their favorite recipes. Please bring a main dish, side dish, or dessert to share.

Please see our website for complete details.



Everyone who participated in the Trivia Contest two years ago said they had a great time, so we are doing it again! And this year, we have some unique prizes that are Top Secret, known only to the Prize Committee (and nobody knows who is on the Prize Committee!) Attendees join up in teams of 4 to 6 players, and will answer questions in 5 rounds on a written answer sheet. Members of the three teams with the highest scores will each win a prize.

Exciting new Live-Action Game!!!



RED SHIFT REVENUE



- **Operate an Astronomy Club Gift Shop!**
- **Optimize product lines!**
- **Purchase inventory!**
- **Manage production!**
- **Complete sales!**
- **Report revenue and expenses to the Board!**
- **Help a great organization do a valuable public service!**

As LVAAS Member Services Director, you will enjoy the challenge of operating the Red Shift gift shop at Public Star Parties. The only way to lose is to not play!

Contact director@lvaas.org to sign up

Minutes for the LVAAS General Meeting - November 11, 2018

The November 2018 LVAAS General Meeting was held on November 11, 2018 at the LVAAS facility on South Mountain in Lower Saucon Twp. The meeting was opened by Rich Hogg, Assistant Director, at about 7:00 p.m. There were approximately 50 people in attendance.

Introduced by Programs Director Sandy Mesics, the talk for the evening was "Video Astronomy - The CMOS Revolution" by Dave Moll and Eric Loch.

Advances in hardware and software have allowed for smaller imaging setups at lower cost than previously possible. There are two types of electronic image sensors commonly in use, CCDs (Charged Coupled Device) and CMOS (Complementary Metal Oxide Silicon.) CCDs have been used for quite some time and are still the choice of professionals, but CMOS has become more common as sensitivity, sensor sizes, and processing speeds have gone up and prices have come down. Sensors are available in monochrome or color versions. The latter are simpler to use, since they record all colors in a single exposure, while the former requires at least 3 images using different filters to generate color images.

CMOS sensors are used for video and real-time imaging, allowing images to be visualized immediately on a monitor, a benefit for public access, especially for older and younger observers, who tend to have difficulty viewing through an eyepiece. Newer systems can even be monitored and controlled via Wi-Fi. There are many software packages available, some of which are capable of viewing individual images as they are collected, or combining multiple images, even stacking them on the fly. Dave and Eric talked about SharpCap and Affinity software and ZWO and Atik cameras. In fact, Dave uses two cameras: one to collect images and another, on a second scope, as a guider. Some other useful software discussed was SkySafari (controls mount) ASIAir (guides, debayers, and shows histograms) and AstroAid (an iPhone app to determine your setup's field of view). After some questions, the talk concluded at 8:21 p.m. and was followed by a break.

Rich Hogg announced that there were some issues with the mailing lists and that all members should be receiving a monthly e-mail and electronic version of the newsletter. Anyone not receiving these should notify him so that he can update the lists. A sign-up sheet was provided for that purpose. The business meeting began at 8:48 p.m.

Membership: Rich attended to the first and second readings, as Scott Fowler was absent.

Second Readings: Gary Schoemaker and Dan Jackson are now full members

First Readings:

Curtis Adams - 5th grade teacher in Easton

Jacob Najarian - recent grad from Muhlenburg (Math and Physics.) Has a telescope.

Maurice Conner - friend of Frank Lyter

Cindy Kunkel - retired teacher and wife of Ron Kunkel.

Library: Dave Raker: there are books to buy or to check out available. As always, suggestions for new purchases are welcome.

Pulpit Rock Observatories: Director Frank Lyter reported that cold and wind on Saturday prevented painting, but the work party was able to begin cleaning out the basement and take measurements for the replacement roof for the rolloff observatory. All interested individuals should sign up for and check the website (pulpitrock@buzz) for information on observing and work parties at Pulpit Rock. There are many things to do. The plan is to clear out the main room of the 40" observatory for presentations and as a place for sleeping bags during inclement weather. Also, the file cabinets were emptied and the paperwork found therein was brought to South Mountain and placed in the Library for evaluation (archive or discard.)

South Mountain Maintenance : Director Bill Dahlenberg reported that there is a group that works every Saturday from 9:00 a.m. until noon. During that time, members can pick up keys, get checked out on the telescopes, borrow rental scopes, bring in their own telescopes for training, etc.

The next meeting will be the Holiday Party on Saturday, December 8 at 2 p.m. at the Lower Macungie Community Center. It will be a pot luck dinner, with the club providing coffee, tea, and sodas. More information will be forthcoming.

The next Star Party will be Saturday, November 17th at 6 p.m. Dave Moll will give a presentation on how to buy your first telescope. Pete Deterline will give both planetarium shows.

The meeting was adjourned at 9:00 p.m.

Submitted by Earl Pursell, Secretary.

Pulpit Rock *Work Party...

*may include fun

Photography by Cindy Kunkel; photo-editing by Frank Lyter



Frank Lyter takes measurements for a new roof for the Spacek rolloff observatory; a new coat of fresh paint works wonders. Join the work parties by signing up for the Pulpit Rock Buzz on our website.



Clean-up crew Ron Kunkel, Carol Stager and Frank are supervised by Frank's dog, Duncan. Thanks for your hard work, all!



Kyle Kramm, Ron, Carol, Frank and Earl Pursell enjoy a hot meal provided by Cindy Kunkel as they warm up after working outside on the cold and windy day. Ron stands by as Carol tries out his solar scope, mounted on the 18" Tinsley telescope.





Outreach, literally, as Ron shows scouts from Troop 651 the 40" telescope on October 26-28, 2018. The scouts enjoy Ron's PowerPoint program while it pours outside; the goal is to clear out the main room of the 40" observatory for presentations, and as a place for sleeping bags during inclement weather.



Under The Shooting Stars

by Rich Hogg

My brother Blair (an LVAAS member, if he remembered to pay his dues this year) and his family reside just outside Reading, and his son Robert is attending Moravian College in Bethlehem. In this, the Fall semester of his Sophomore year, Robert enrolled in the introductory Astronomy course taught by Gary Becker, whose StarWatch column appears monthly in this newsletter. So, I signed up to join the volunteers helping with the Moravian College Astronomy Field Experience.

Gary has two classes, and there is an observing session for each, held at Shooting Star Farm near Quakertown. Robert is in the Monday-Wednesday class, and their session was held on a mild and clear, but incredibly damp and dewy evening near the beginning of October. I brought out my Dad's Coulter Odyssey 13" Dobsonian reflector, which had been decorating the corner of my living room since I adopted it. I thought I had my Dad's system for operating it down pat, but I found out that there was one element that was not under control. A Dobsonian telescope that is not well-balanced is not easy to use, because it doesn't want to stay pointed at the object you're viewing. Needs a little work.

The Tuesday-Thursday class didn't get their opportunity until a rather chilly evening at the end of the month. I decided to try something different, so I asked Ron Kunkel if he could meet me at Pulpit Rock the day before. Two years ago, Ron's friend Pam Reber (now Pam Reese) donated her late husband's Meade 10" LX200R system to LVAAS, and I decided that it was time for it to see some sky again. Ron helped me unpack the instrument and check it out, and I proved that I could set it up, take it down, and load it in my SUV without help (though I discovered later that evening that I had strained something, leaving me to wonder if I would be able to do it again the next day.)

But I got by (with a little help from my friends, Tom Duff and Bill Dahlenberg) and the Tuesday/Thursday students were impressed with a number of fine views through the 10". We saw Saturn, Mars, the Ring Nebula, the "Double Double" ϵ Lyr, and most of the Pleiades. (I brought along

my Surplus Shed 80mm eyepiece, which gave us a wide enough field to see 5 of the "seven sisters" in the view, though you had to get your eye in just the right spot, about 2 inches away from the lens.)

This excellent Meade 10" outfit is LVAAS' largest "portable" telescope, and its GPS-enabled control system can provide an evening of observing using 8 internally installed "C" batteries. Look for it at more LVAAS outreach events down the road.



Rich with LVAAS' Meade 10" LX200R at Shooting Star Farm. Photo by Gary Becker.



From the LVAAS Archives:

The George Ellery Hale of the Schlegel-McHugh Observatory

by **Sandy Mesics**

The December 1968 general meeting was a short affair, lasting about 30 minutes. Outgoing Director Ernie Robson appointed an auditing committee, thanked the board of governors and the outgoing officers for their service, complimented the junior group, the Ursa Majors, and reported that the University of Pennsylvania would be conducting seeing and transparency tests to determine whether the University's Flow and Cook Observatory should be moved there (as it turned out, this didn't happen.)

There was a Treasurer's report, and the new officers for 1969 were sworn in:

- Paul Shenkle, Director
- Roland Lovejoy, Assistant Director
- Gary Becker, Secretary
- William Kuhar, Treasurer



Figure 1: Ernie Robson dancing at the Holiday Party



Figure 2: The Schlegel-McHugh Observatory at about this time.

The annual LVAAS holiday party then ensued, consisting of films, music, and dancing, along with refreshments. The Observer commented on Robson's dedication to the Schlegel-McHugh Observatory at Pulpit Rock: "Always under the expeditious eye of our retiring Director, Ernest Robson, materials were on hand, contractors available, and work pushed forward. As George Ellery Hale was to the 200 inch telescope at Palomar, Ernie Robson is to the 20 inch [telescope] at Pulpit Rock."

References

The Observer, December 1968 and January 1969.

by Gary A. Becker



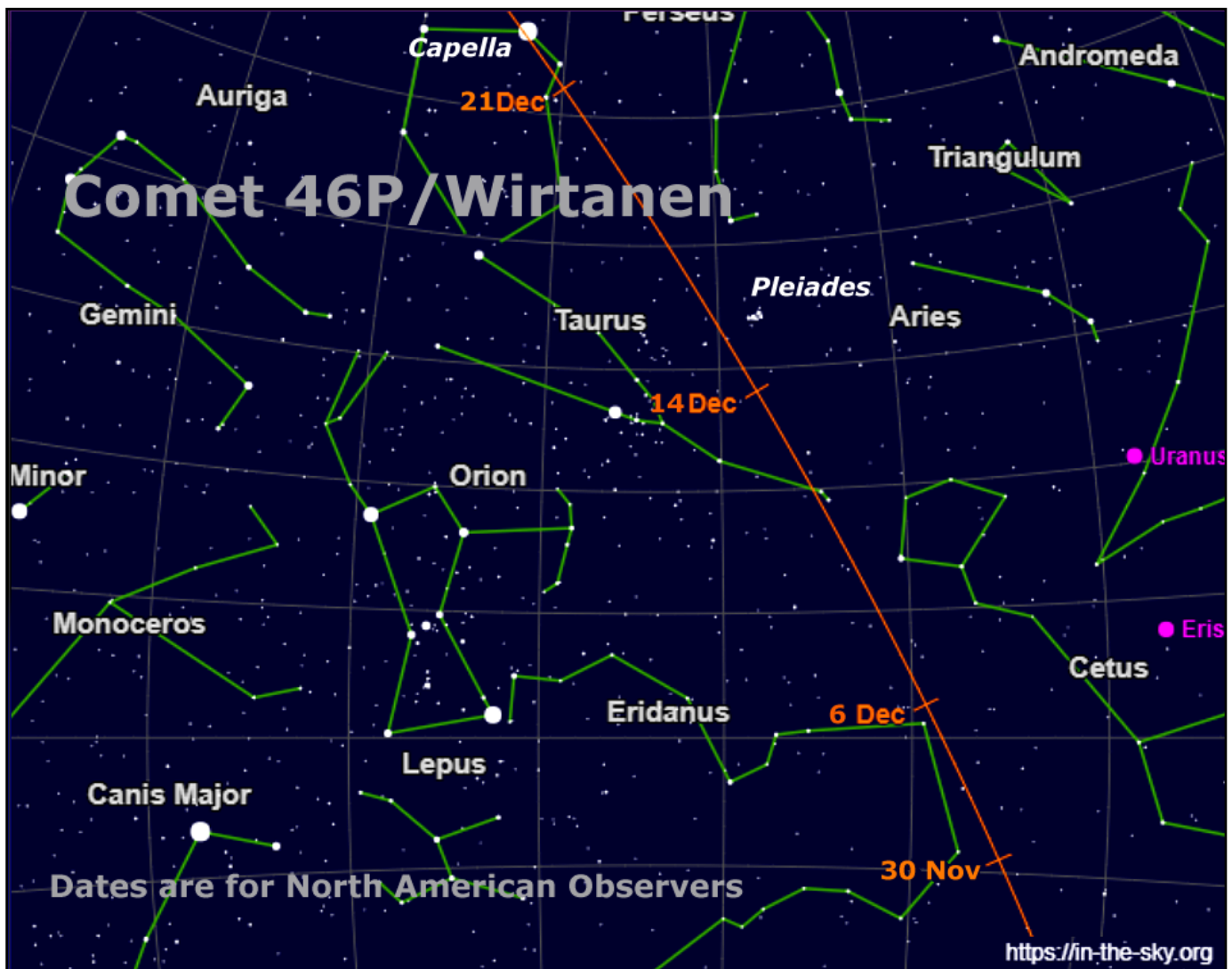
Ho, Ho, Ho—Christmas Comet Approaches

Five years ago, the astronomical community was sitting on pins and needles watching Comet ISON rapidly brighten as it approached the sun. ISON was a sungrazer, passing only 724,000 miles from the sun's "surface," and after its closest approach on Thanksgiving Day it was supposed to become a spectacular naked eye object, visible to Northern Hemispheric observers. However, several outbursts, one on November 12 and the other on the 19th, signaled that perhaps the comet would be too frail to survive its gravitational entanglement with the sun. The pros got it correct. As ISON rounded the sun in the early afternoon of November 28, 2013, SOHO (the Solar and Heliospheric Observatory) monitored the approach and then watched as the comet disintegrated into a fantail-shaped object immediately after perihelion. ISON had become a rubble pile of rapidly sublimating (vaporizing) ices before disappearing from view forever.

Now another interloper, Comet 46P/Wirtanen, discovered photographically in 1948 by Carl A. Wirtanen (1910-1990) of California's Lick Observatory, is approaching the sun and the Earth. As comets go, Wirtanen has been fairly well-observed because its orbital period is only 5.4 years, but its nucleus is very small, about six regular city blocks in diameter. Usually no one would make a big fuss about such a tiny object, however, this time around 46P/Wirtanen will pass unusually close to the Earth, about 7.1 million miles (11.5 million kilometers) on December 16, the tenth closest approach of a comet since 1966. Because of its nearness to Earth, Wirtanen (could) should become visible to the unaided eye from suburban and rural locales, making it a fine sight through binoculars and small telescopes. It could be easily observable for several weeks moving northward through Cetus the Whale, Taurus the Bull, and Auriga the Charioteer, passing the Pleiades (Seven Sisters in Taurus) on December 15/16 and appearing about a lunar diameter from Capella, the alpha star of Auriga on December 23. An online map has been included with this **StarWatch** at <http://astronomy.org/StarWatch/November/index-11-18.html#11-11-18>.

The last super "Earth-grazing" comet was Hyakutake which passed just a little more than 9 million miles (14.5 million kilometers) from the Earth on the 25th of March, 1996. Hyakutake was spectacular, dubbed the Great Comet of 1996, with a tail stretching over 80 degrees from rural locales.

From my backyard in suburbia, the bluish apparition was the length of the Big Dipper, and because of its closeness to Earth, it had a large change in position from night to night. That was one of its downfalls, because Hyakutake came and went before the public could become fully aware that something spectacular was happening in the evening sky. A year later, Comet Hale-Bopp dazzled everyone in the morning and evening heavens, the brightest comet visible for the longest duration of time in recorded human history. Comet Wirtanen will be nothing like these blockbuster comets, but still, a comet that will be about the brightness of the faintest star in the Big Dipper (Megrez), is worth the effort of locating your binoculars so that you can take a peek. Just remember the saying, “Comets are like cats: they have tails and do precisely what they want (David Levy.) More about 46P/Wirtanen in a few weeks if the prognosis is as optimistic as it is right now...



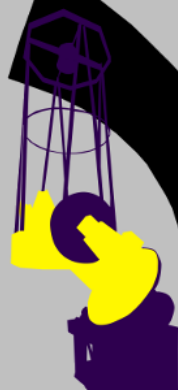
The path of Comet 46P/Wirtanen during the time when it will be at its brightest is shown in this modified star chart from <https://in-the-sky.org/>

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Moravian College Astronomy - astronomy.org

Now on Facebook at facebook.com/StarWatchAstro/

Schlegel Observatory Report

by Rich Hogg – December 2018



As I write this I am watching the first significant snowfall of the season, and thinking that the results of my most recent efforts at Pulpit Rock are probably just about invisible by now.

We've been slowing down for a bit on the Schlegel Observatory project, to get ready for winter, both at home and on the mountain. I've deferred to Frank Lyter, our Observatory Director for Pulpit Rock, to decide what's important and lead the activities, and when possible, I've put my plans aside to help him with what he wanted to get done, to keep our other assets in good order.

Which is why, 12 days ago, I had planned to work on the 40-inch but instead could be found doing a pretty good job of painting myself white with Rustoleum exterior enamel. In the process, I somehow managed to get a good deal of paint on the Kawecky Observatory, which is actually where we wanted it to end up. I do not particularly enjoy painting and I am not very good at it. But by the end of the afternoon, that building was really, really white, up to (but not including) the roll-off roof. With the roof and the surrounding grounds now coated with fresh snow, I imagine it is pretty well camouflaged.

The roof needs more work, and some of that got done the following weekend, though I was not able to participate. I believe you will find more about these efforts elsewhere in this issue of The Observer, so let me just wrap up by saying that I think the improvements on the Kawecky will prove well worthwhile. Having the Meade 12" SC installed in it makes for a very nice observatory and I think it will see a lot of use in the coming years.

Meanwhile, back at the ranch

I was thinking about the overall 40" project a few weeks ago, and I decided to assign myself a new, and somewhat high-priority, sub-project. So I have pushed the efforts on the secondary cell design to a "back burner" to work on it.

Quite a few times, while moving the telescope around on its mount in the Schlegel dome, we have been impressed with how closely it seems to fit. There is not a lot of extra room between the "nose" of the optical tube and the inside of the dome. If one of the bats that flies around in there should decide to try to just "hang out" on the inside of the dome, it really seems like you could knock it down with the scope.

But, it's hard to see to what extent this is true! We are talking about a spacing of a few inches somewhere around ten feet over our heads, with no easy way to get up there and look at it.

I decided it would be good to come up with a way to measure it, so that we could go forward armed with accurate knowledge of how much clearance we have. And, since we are planning to remove the truss section of the tube in order to rebuild it, the time to get this done would be before we perform that disassembly. That's why I decided to make this a priority project.

Yeah, but what sort of project?

A science project, of course! If I was doing this in the context of my last job, at Broadcom (in an organization that traces its roots to Bell Labs), the term "science project" would have been thrown at me as a criticism, a suggestion that I had overlooked an easy, straightforward method, in favor of a fancy stunt that requires a lot of technological maneuvering in order to accomplish the same result. And it's probably true. I did consider one alternative, but I could see ways in which it would fail, and besides, what I'm planning to do will be a lot more fun and more educational.

And here is that plan: I intend to configure a pair of Raspberry Pi Zero W microcomputers, with camera modules, in a calibrated stereo vision configuration. We'll be able to determine the distance to objects in their field of view by where they fall on each of the camera sensors. In this respect, they will work almost exactly the way our eyes work, except with greater precision and quantifiable measurement. I plan to attach this configuration to the front of the scope, and move it all around the dome (while also rotating the dome), capturing images that will reveal the separation between the front of the instrument and the inner surface of the structure.

So what, exactly, is a Raspberry Pi Zero W? Well, it's a very small, but still very powerful, computer that costs about ten bucks. It can communicate over a Wi-Fi network, and can be outfitted with a camera and case that brings the cost up to \$45.00. You could hide it under a Hershey bar. I have just gotten started putting this together, so look for a progress report next month.



A Raspberry Pi Zero W, alongside its case (with camera board mounted inside), is shown in front of the Lincoln Memorial for size comparison.

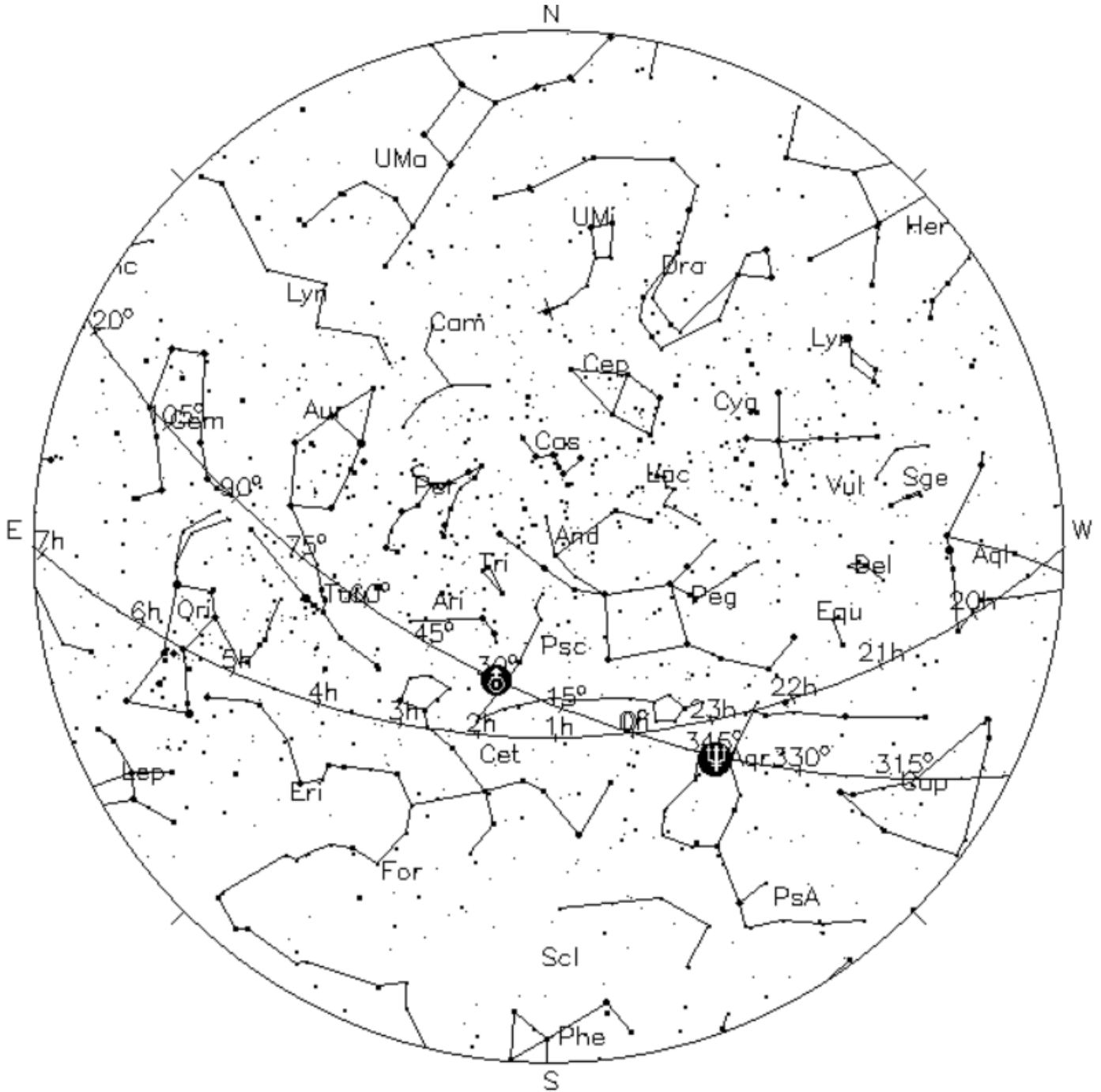
Current Status and Activities: Efforts on the 40" have slowed down in favor of preparations for winter. Development work on the secondary cell is on hold, while I come up with a way to accurately measure the clearance between the telescope and the dome.



What's Up for December 2018



Sky above 40°33'58"N 75°26'5"W Saturday 2018 Dec 8 1:00:00 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.

Customize Your Sky ->

at : <http://www.fourmilab.ch/yoursky/>

DECEMBER 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01
02	03 Hanukkah, First Day	04	05	06	07 New Moon	08 General Meeting/Holiday Party 2:00 PM Lower Mac Community Ctr
09	10 Hanukkah, Last Day	11 LVAAS Scout Program - P364	12	13	14	15 First Quarter Moon
16	17	18	19	20 Astro Imaging 7:00 PM	21 Winter Begins	22 Full Moon
23 Deadline for submissions to the Observer	24	25	26	27	28	29 Last Quarter Moon
30 LVAAS Board of Governors Meeting	31 New Years Eve					

JANUARY 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01 New Years Day	02	03	04	05 New Moon
06	07	08 LVAAS Scout Program - South Mountain	09	10	11	12
13 General Meeting - 2:00 PM Muhlenberg	14 First Quarter Moon	15	16	17	18	19
20 Deadline for submissions to the Observer	21 Full Moon MLK Day	22	23	24 Astro Imaging - 7:00 PM	25	26
27 Last Quarter Moon LVAAS Board of Governors Meeting	28	29	30	31		

2019 LVAAS Event Calendar

2019 LVAAS Event Calendar												
	<u>Sundays</u>				<u>Thursday</u>	<u>Saturday</u>	<u>Mondays</u>	<u>Multi-Day Weekends</u>	<u>Moon Phase</u>			
	General Meeting time	Date/location	Board meeting	Observer submission deadline	Astro Imaging	Star Parties	Scouts at S. Mountain	Scouts at Pulpit R.	New	First	Full	Last
January	2:00 PM	13 Muhlenberg	27	20	24	no mtg		no camping	5	14	21	27
February	2:00 PM	10 Muhlenberg	24	17	21	no mtg		no camping	4	12	19	26
March	2:00 PM	10 Muhlenberg	31	24	21	16		22-23-24	6	14	20	28
April	7:00 PM	14 S.M.	28	21	18	13		no camping	5	12	19	26
May	7:00 PM	5 S.M.	19	19	16	11		17-18-19	4	11	18	26
June	7:00 PM	9 S.M.	30	23	no mtg	8		14-15-16	3	10	17	25
July	5:00 PM	13 S.M.	28	21	no mtg	6		19-20-21	2 31	9	16	24
August	7:00 PM	10 Pulpit	25	18	no mtg	3		16-17-18	30	7	15	23
September	7:00 PM	8 S.M.	29	22	12	7		13-14-15	28	5	14	21
October	7:00 PM	13 S.M.	27	20	17	5		11-12-13	27	5	13	21
November	7:00 PM	10 S.M.	24	17	14	2		no camping	26	4	12	19
December	2:00 PM	15	29	22	12	no mtg		no camping	26	4	12	18

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

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

April 6 – 7
 May 30-June 2
 Aug 1 – 4
 Sept 27 – 29
 May 4 – 5

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:

<https://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.

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