

# The Observer

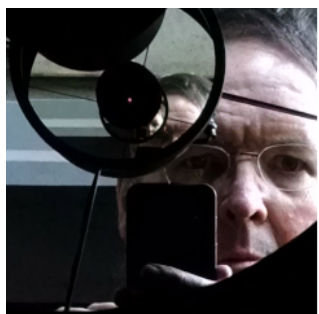
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## ad astra \*\*\*\*\*

I found an empty package of lunch meat on the counter this morning, that I forgot to throw away. It was empty because last night, I flushed what was in it down the disposal. I did that because I had found it on my table, having left it out since lunchtime.

I also found a bottle of salad dressing that I left out overnight.

In the fridge, I found a pint of milk instead of a pint of half-and-half. I thought I drank the milk a few days ago, but apparently I grabbed the half-and-half and drank that instead, without even realizing it.

I've been feeling like I'm starting to lose it, and now I'm finding hard evidence. Not long before I'll need somebody to watch me.

### NWJAA

By the time you read this, if things go well I shall have visited our friends at North-West Jersey Amateur Astronomers and delivered a presentation that I fearlessly signed up for last year. I'm not prepared for that yet, so I will be concentrating on that for the rest of the week. If it goes well I will probably offer it as an LVAAS program sometime next year.

I'm looking forward to the visit. The meetings are held at the home of Alan Midkiff, an LVAAS member and the owner (since earlier this year) of a 50" Dobsonian, as well as a bunch of other attractions that you don't find in the average home. But I need to get my presentation into shape so I can relax and enjoy this visit.

### Field Trip Report

Another LVAAS member, Curt Adams, asked us in the late Spring to help him plan an outing for the fifth grade at Palmer Elementary. We talked about this at one or two Board meetings, and decided to overcome the objections to see if we could make it happen. I'm happy to report that it was a success, and I hereby thank Blaine Easterwood, Bryan Jolley, Carol Kiely, Eric Loch, Terry Pundiak, and Earl Pursell for volunteering to help staff the event. The kids were great, and their teachers and chaperones all helped to make it a fun and educational visit for all involved.

We were lucky in one respect. Although the clouds rolled in, so that not all of the students got to see the Sun through the telescope, at least it didn't rain. We quickly realized that that would have been a disaster, so if we do it again we will make sure to plan a rain date.

The downside is that I can imagine us having to say "no" to this in the future, if the idea catches on. There are a lot of fifth-graders in the Lehigh Valley! I would love to see everything that LVAAS has to offer being made available to all of them, but we are a small organization with an even smaller corps of active volunteers, and there is only so much we can handle.

### **It's Membership Drive Season**

"Hi, I'm speaking to you live from the WLVAAS studio, and we'd just like to take this brief interruption in our program to remind you that we depend on the contributions of members — like You! — to enable us to keep this station on the air and to keep bringing you the programming that you enjoy and love!"

I hope we are not as annoying as the public radio station when we start with the renewal reminders. Unfortunately, we need to do it and **you need to listen!** Otherwise, too many of us will let it slide until we forget about it entirely. (I noticed one member early this Fall, who was actively participating in our online forums, but had completely forgotten to renew!) The sooner we get to the point where the bulk of the renewals are in, the sooner we can stop with the annoying general reminders and switch to a focused campaign sent to only the few who have procrastinated for a bit. So why not **do it now** and get it over with! Just download the form [https://lvaas.org/filemgmt\\_data/files/LVAAS\\_Renewal\\_Form.pdf](https://lvaas.org/filemgmt_data/files/LVAAS_Renewal_Form.pdf) and just follow the instructions.

Ad Astra!

— Rich Hogg

## Torturing the Latest AI by Rich Hogg

There was a [news article](#) in February about GPT-2, an AI program that some guys at OpenAI had developed. A neural network, which they "trained" by feeding it a bazillion or so books and news articles, it was capable of generating eerily real-sounding -- um, nonsense, mostly. They announced that the potential for misuse made this "too dangerous" to release to the public.

In early November they changed their minds. With a shrug and an eye-roll, they not only made this menacing Skynet clone available, they even created an easy-to-use [website](#) so that any fool (like me) could do their worst with it. Why not? I fed it the same "seed text" and sampled some of its responses:

**The Pleiades are high in the evening sky. That means it's time to renew your membership in LVAAS!**

LVAAS is the Long-Awaited Lunar and Asteroid Awareness and Tracking Association of America. It was formed in 1991 by a group of astronomers who had become increasingly concerned about the dangers to the public of NASA's failed plans to study the far side of the Moon, an area that contains millions of dollars worth of valuable resources. NASA now says it's going to study the Moon's far side in the 1980s and 1990s, but LVAAS is still the only group of astronomers who have had a chance to study the far side.

*Seriously, you can't make stuff like this up. It takes a sophisticated AI program to do that.*

**The Pleiades are high in the evening sky. That means it's time to renew your membership in LVAAS!**

LVAAS is a professional organization devoted to the study of astronomy. We have a membership of amateur and professional astronomers from around the world. Each month, LVAAS holds an open night, during which we give presentations on astronomy topics, and invite people to come see the stars. Our meetings are held on Saturdays and Sundays at 2:30 p.m. at The Temple of the Pleiades.

The LVAAS Observatory is a small observatory near the city of Tucson. It offers public access to skywatching, including telescope viewing, in a safe and friendly atmosphere. Our observatory has a 30" f/2.8 Newtonian reflector, two 80" f/4 Schmidt-Cassegrain telescopes, and a 10" Newtonian Reflector.

*Maybe we should rename South Mountain "The Temple of the Pleiades." I like the "safe and friendly atmosphere." But come on, who needs TWO 80" f/4 SCTs?*

**The Pleiades are high in the evening sky. That means it's time to renew your membership in LVAAS!**

LVAAS (the Pleiades and Arcturus Association of Solar Observers) is a volunteer organization of amateur astronomers, led by a board of directors who are professional astronomers. LVAAS offers education, events, and opportunities for membership. The organization is also an active observer and host of a number of public events for the public, and hosts a website with a calendar of all public events and the opportunity for the public to join and/or purchase a "day pass". LVAAS is a 501c3 organization.

*Some of those are actual facts. That's the scary part, I guess. It all sort of sounds real, but a lot of it is just cottage cheese.*

**The Pleiades are high in the evening sky. That means it's time to renew your membership in LVAAS!**

If you're a member, why not renew your membership now?

Now we're talking! Download your renewal form from [here](#) and get your check in the mail right away!

# **LVAAS General Meeting: Public Welcome!**

**Sunday, November 10, 7:00 p.m.**

**South Mountain Headquarters, 620B East Rock Road, Allentown PA**

**Program: "Occultation Timing with the IOTA"**

*Presented by Steve Conard*



Measuring the size and shape of small solar system bodies using occultation timing has received increased attention recently due to the outstanding success of the pro-am team that measured 2014MU69 “Ultima Thule” prior to the New Horizons encounter. Future NASA and JAXA missions, such as Lucy and DESTINY+, are currently using the technique to determine the properties of their future encounter objects. The recent increased success of this technique can be directly attributed to the ESA Gaia astrometry mission.

These measurements can easily be made by moderately skilled amateurs, who occasionally make exciting discoveries and regularly are credited in scientific papers. The International Occultation Timing Association, IOTA, is the leading amateur group for coordination of these observations. Steve Conard, a long-time IOTA member, will describe the techniques used to make these measurements and show some of the equipment used. He will also show results of past measurements.

Steve Conard has been an amateur astronomer since 1971. His teenage enthusiasm for telescope building led to a 35+ year career building space optical instrumentation for the Johns Hopkins University. Steve currently resides in central Maryland, and serves as the director of the Roelke Observatory at Bear Branch Nature Center in Westminster, Maryland.

## **Minutes for the LVAAS General Meeting - October 13, 2019**

The October 2019 LVAAS General Meeting was held on October 13th at the LVAAS facility at South Mountain in Upper Saucon Twp. Attendance was approximately 50 people. Director Rich Hogg opened the meeting at 7:00 p.m. The speaker was Ray Harris and his presentation was "Uranology: The History of Celestial Cartography - The Evolution of Art and Science on Early Printed Star Charts and Atlases."

Ray is a former LVAAS Director and has been an LVAAS member since 1985. He has been studying and collecting antique star charts and atlases for 30 years. Our journey through the history of star charts began in the 15th century with the invention of printing, which made terrestrial maps and atlases more common. Star charts soon followed. The study of maps and atlases make an interesting study of the knowledge and how it has changed through the years. Modern charts (and internet apps) show all that current knowledge allows, but early charts were limited. Starting with woodcuts, the earliest charts were less than informative, showing the signs of the zodiac, but no stars, let alone where they were located in the sky. One in 1482 showed the constellations, but the stars did not match their appearance in the skies!

One of the first printed charts (1515) was by the noted artist Albrecht Dürer, and was based on Ptolemy's Almagest (7th century, with 48 constellations). There were large gaps in the southern sky, because the ancients had not assigned constellations to areas they could not see. As was common at the time, the constellations were reversed, as if they were meant to be printed on a globe and viewed from outside. In 1532 to 1541, the first charts to show the geocentric view and use equatorial coordinates (as opposed to ecliptical coordinates) appeared. The first real atlas was published in 1540 by Archbishop Piccolomini and showed 47 of the 48 known constellations, but had no coordinate system, so was not particularly useful for observation. Gallucci published one in 1588 which showed the constellations figures, stars, coordinates (ecliptical) still reversed, and still using Ptolemy's data and his non-stellar objects, like the Beehive cluster in Cancer and M7 in Scorpius (he put it in the wrong place and it took 100 years until someone corrected it!).

In 1603, Uranometria was published by John Bayer - the first to use copper printing plates, resulting in greatly enhanced detail. It showed, among other things, Tycho Brahe's supernova, even though it had long since faded below the visibility threshold. By this time, Magellan's voyage had been completed, so there was more Southern Hemisphere data, and the charts included the Large and Small Magellanic Clouds. He also used a Dutch cartographer's southern constellations, many of which still exist today. One of the first atlases published after the invention of the telescope was the Coelum stellatum Christianum concavum by Schiller, which, unfortunately, replaced all the pagan constellations with characters from the Bible, e.g.: the 12 constellations of the zodiac were replaced by the 12 apostles. The new constellations did not catch on. Interestingly, the author must have had access to the observations of the Arabian astronomer al-Sufi, since the Coat Hanger asterism appears in this atlas 20 years before it was "discovered" by Europeans.

Hevelius published the first atlas of the surface of the Moon, detailing every phase and naming all the features. He believed it to be a mirror of the Earth, so named the features accordingly; most did not stick. Aeroli, in 1651, published a Moon map with the features named after famous people, and those names did stick. The *Harmonia Macrocosmica*, by Cellarius (1660), was one of the most famous atlases, showing the skies as a whole, rather than just individual constellations. It also had charts of the models of the solar system according to Ptolemy, Copernicus, and Brahe, just to cover all the bases. Although there was very little new scientific knowledge included, he did create some new constellations to fill in the gaps and the atlas was a great piece of art. Hevelius made his own star atlas in 1687 (but published posthumously, by his wife, in 1690.) He did not trust telescopes, so all his charts are based on his own naked-eye observations; he finally put M7 in its correct position. Since he couldn't see the southern constellations from Poland, he commissioned someone else to gather the data for him: Edmond Halley, who also got credit for discovering M13 and Omega Centauri.

In 1619, John Flamsteed, the first Astronomer Royal, charted stars as an aid to navigation. His atlas was also published 10 years after his death by his wife because he was such a perfectionist he refused to allow his work to be published during his lifetime, even going so far as to retrieve and destroy copies of his data that Halley had stolen and published. Including 3000 stars in his atlas, the Beehive and Pleiades were now identified as clusters of stars instead of nebulae. He was also the first to use equatorial coordinates as the primary system.

Subsequent atlases were mostly copies of Flamsteed's, adding more "deep sky" objects. In 1782, Bode included extra plates in the back of his atlas for the Pleiades, Hyades, Orion Nebula, Andromeda Nebula (as it was known at the time), etc. He also began to show nebulae with imbedded stars, and made a table of double stars, including separations, angles, etc. Bode produced the last of the great atlases: *Uranographia*. It included 17,000 stars, Messier's 100 nebulae, as well as the 2500 nebulae cataloged by Herschel.

Through the years, Cancer vacillated between being represented as a crab and a lobster, finally settling on the Crab incarnation. After *Uranographia*, there was a divide in atlases: they could either contain more art or more science, not both. In 1980, the International Astronomical Union defined 88 constellations that covered the entire celestial sphere, as well as settling on numbering and naming systems for all existing and future objects. The talk went very well and was followed by a Q&A which lasted until 8:14 p.m. A break followed.

Rich called the meeting to order at 8:26 pm.

There was a brief business meeting:

1) Elections: Ron Kunkel was appointed Judge of Elections. Bill Dahlenburg, chair of the nominating committee was not present. The slate (Director: Rich Hogg; Asst Director: Tom Duff; Treasurer: Scott Fowler; Secretary: Dennis Decker (assisted by his wife, Kelly) was unanimously approved by the members present. The new officers will assume their duties as of Dec 1, 2019.



2) There was a brief discussion regarding the purchase of a new bulb for the planetarium projector. A motion was made by Scott Fowler and seconded by Pricilla Jacobsen to authorize up to \$4000 for the purchase of a new bulb, an amount which was high enough to require approval by the membership. There are two choices: the carbon arc type we have been using (~\$1200) and the LED type (~\$3600). There was some discussion on the pros and cons of the two types, plus some items were brought up that Rich said he would need to clarify with the manufacturers. Although the LED should last longer (indefinitely, at the rate we use it?), Rich said the current thought was to get another carbon arc since we have been successfully using those for many years and the cost is significantly less. There was a vote and the motion was unanimously approved by the members present. A motion to conclude the business meeting was made by Mike Clark, seconded by Terry, and unanimously approved.

**Membership:** Gwyn Fowler proceeded with the introduction of new members. There were no first readings, but Richard Nelson had paid his dues and attended a previous meeting, so he introduced himself at his second reading: He is a landscape photographer who is interested in landscape astrophotography. He is now a full member of LVAAS, entitled to, among other things, obtain keys to the facilities and be trained on and use club equipment. Gwyn also reminded everyone to please renew their memberships by Dec 31st.

**Library:** Dave Raker reported that he has a few new DVD's on the shelf in the library. There are more books/videos for sale. He also asked for suggestions for more materials to purchase. He noted that the November meeting is the last meeting in the HQ building until April. The December meeting will be the Holiday party, and the January, February, and March meetings will be held at **Muhlenburg College**, at 2 p.m.

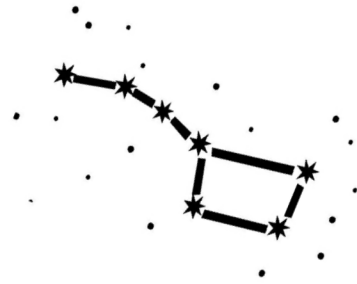
Rich reminded everyone that the **next general meeting** is on Nov. 10th, and will feature a talk by a member of the **New Horizon** mission, concerning occultation of stars by asteroids. The December meeting (Holiday Party) location has yet to be determined, although the BOG is working on securing a location.

**Astroimaging:** Tom Duff reported that the next meeting will be the following Thursday, 7:00 p.m., and will be a demonstration of processing the exposures into a final image, start to finish.

A member noted that there will be a **transit of Mercury on November 11** (Veteran's Day, a Monday) from 7:36 a.m. to 13:04 p.m. The BOG is considering options. At the very least, we will open the 6" and solar scope at South Mountain, although the view to the east is obscured by trees, so the first part of the transit will not be visible. We are looking for a location with a better view to the east; perhaps Pulpit Rock or the DaVince Science Center. Suggestions are welcome.

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

Submitted by Earl Pursell, Secretary



UACNJ provides free public programs at our Observatory in Jenny Jump State Forest from April through October on Saturday evenings. An astronomy presentation begins at 8 PM in the lecture hall regardless of the weather and is followed by stargazing on the observatory's telescopes until 10:30 PM, weather permitting.

## UACNJ Weekly Talks for 2019

April 6	- What's Up in the April Sky?	- Lonny Buinis
April 13	- Size Scales of the Solar System and Beyond	- Jason Kendall
April 20	- Journey to the Stars	- Karl Hricko
April 27	- What Happened to Pluto?	- Ron Kunkel
May 4	- What's Up in the May Sky?	- Lonny Buinis
May 11	- Making Isaac Newton Proud: Modern Newtonian Telescopes	- Rob Teeter
May 18	- Astronomy for Beginners	- Ken Taylor
May 25	- Night Vision and Astronomy	- Earl Pursell
June 1	- What's Up in the June Sky?	- Lonny Buinis
June 8	- How the Stars Got Their Names	- Bill Murray
June 15	- The Life and Death of Stars	- Walt Windish
June 22	- Mars Through the Dust Storm	- Clif Ashcraft
June 29	- Eclipses, Occultations, and Transits	- Gregg Waldron
July 6	- What's Up in the July Sky?	- Lonny Buinis
July 13	- Fly Me to the Moon	- Sean Post
July 20	- New Rides to the Moon	- Dale Skran
July 27	- Let's Go to the Moon	- Karl Hricko
Aug 3	- What's Up in the August Sky?	- Lonny Buinis
Aug 10	- Astronomy for Beginners	- Ken Taylor
Aug 17	- New Horizons Visits Ultima Thule	- Michael Dean Lewis
Aug 24	- You Bought a Telescope, Now What?	- Paul Fischer
Aug 31	- The Milky Way Galaxy - Structure & Evolution	- Ron Kunkel
Sept 7	- What's Up in the September Sky	- Lonny Buinis
Sept 14	- Photographing Night Sky Landscapes	- Stan Honda
Sept 21	- Traveling in Space and Time	- Gary DeLeo
Sept 28	- Northern Lights	- Gregg Waldron
Oct 5	- What's Up in the October Sky?	- Lonny Buinis
Oct 12	- Introduction to Video Astronomy	- Bill Murray
Oct 19	- The Cosmic Distance Ladder	- Jason Kendall
Oct 26	- The Beauty and Power of the Universe	- Walt Windish



Street Address:  
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More information and alternate directions  
can be found through our website

[www.uacnj.org](http://www.uacnj.org)





# LVAAS SKY SURVEY

It's Sky Survey time! Now that it's getting darker earlier in the evening, we would like to collect some data on just how bright the lights of the Lehigh Valley are, and what affect they are having on our hobby. Beginning on the evening of our next General Meeting, October 13, 2019, and continuing for two months until December 13, we are asking that members and friends of LVAAS help the club gather sky brightness measurements in the area. The process will be totally on your schedule. There are no fixed times for measurement, but we'd like to have readings include times from just after dark (stars visible) to just before dawn breaking, for every night possible during the two-month survey period. So, if you decide you would like to help out, you can take as many readings as you would like, on as many or as few nights as you would like. We will compile the data and use it to bolster our arguments for lighting ordinances and light trespass controls across the region. For the purposes of this project we are defining the "region" as the local news coverage area of WLVT-TV, Channel 69.

So, you will need an iPhone or an iPad in order to participate. Unfortunately, Android phones will not work for this purpose because the cameras in Android phones are not standardized as those in an iPhone are, so there are no sky brightness metering apps available for Android devices. We apologize profusely to those with Android devices, but the circumstances are beyond our control. We are not happy about this, either, because it will very much limit the final size of our dataset.

You will need to purchase and install the Dark Sky Meter app by DDQ from the App Store. Unfortunately, the Dark Sky Meter app is not free, but it is only \$1.99. Consider it a small donation to LVAAS! Once installed on your device you will use this app to take readings of the brightness of the night sky.

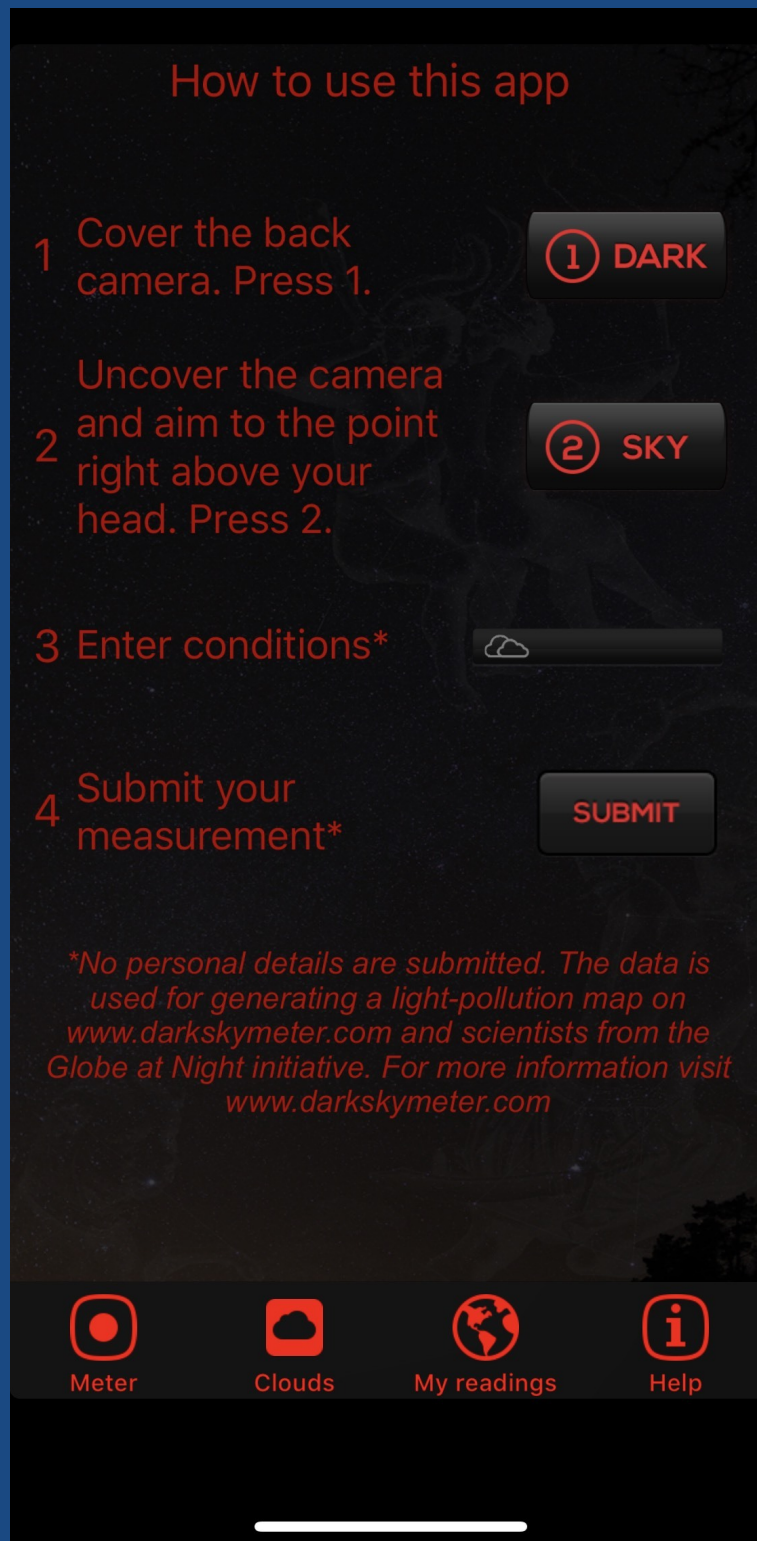
The process is very simple:

1. Using a microfiber cloth or lens tissue, wipe off the protective glass of your device's camera
2. Start the Dark Sky Meter app
3. Cover the camera and take a dark frame (press button 1)
4. Point the camera straight up at the sky (zenith) and press button #2 to take a reading
5. Enter the sky conditions
6. Either take a screen shot or write down the resulting SQM number
7. When the results are displayed, enter the sky conditions.
8. DO NOT PRESS the SUBMIT button
9. Repeat the process four more times, at an altitude angle of 45°, to the N, S, E, & W
10. Send your results to [darksky@lvaas.org](mailto:darksky@lvaas.org) (DO NOT submit through the app), and include:
  - a. Your location coordinates from the GPS in your phone
  - b. The time you started each five-shot sequence
  - c. The sky conditions you chose from the app drop-down menu
  - d. The SQM number and the pointing direction for each shot.

You can take as many or as few readings as you like during the two-month survey period. And please, if you are a true "night owl", those late-late night readings will be very useful, because a number of "bright-light" sources (car dealers, athletic fields, and the like) are dimmed or out after 11pm or so. And readings don't have to be from your home. If you are out and about, and can take the time to get a set of readings, that would be very helpful, as long as you are located in our survey region.

We hope all of you iPhone users will decide to participate. Thank you in advance for helping us out!

----- SEND ALL RESULTS TO [DARKSKY@LVAAS.ORG](mailto:DARKSKY@LVAAS.ORG) -----



Step 4 is to be done via email, NOT through the app. If you send your results through the app they will not be tabulated in this survey.

----- SEND ALL RESULTS TO [DARKSKY@LVAAS.ORG](mailto:DARKSKY@LVAAS.ORG) -----

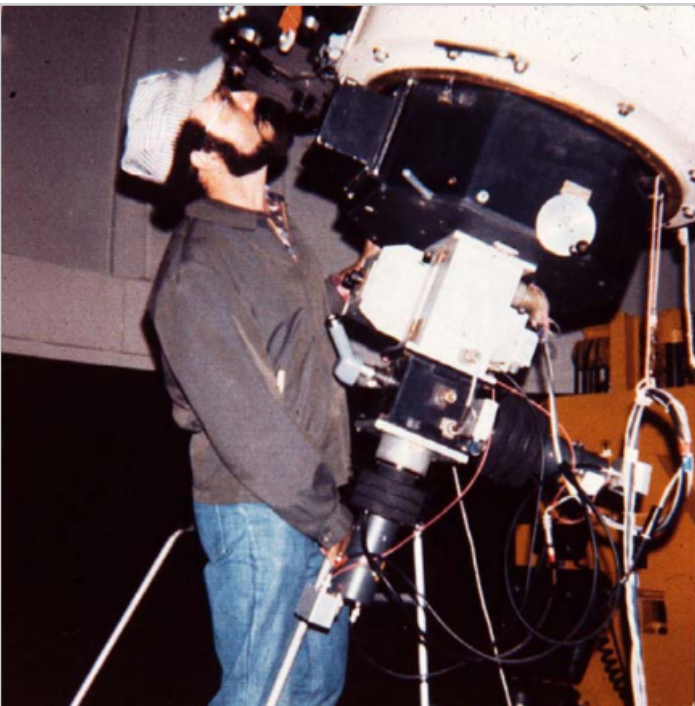


*From the LVAAS Archives:*

## "The First Astronomer in the First State"

**by Sandy Mesics**

Professor Richard Herr (1936-1997) from the University of Delaware's Mt. Cuba Observatory spoke at the November, 1969 LVAAS meeting. Dr. Herr was born in Pennsylvania, graduated from Franklin and Marshall College, earned an MS in Physics from the University of Delaware and a PhD from the Case Institute of Technology. His doctoral thesis concerned the spectroscopic absolute magnitudes of high-luminosity O and B stars. He established the Astronomy Department at the University of Delaware, and was the first research astronomer at Mount Cuba Observatory. He enjoyed his nickname, "The First Astronomer in the First State."



Richard Herr observing at the 24-inch telescope. From <http://www.physics.udel.edu/gp/darc/earlyobservers.html>

At Mt. Cuba, research at that time centered on photoelectric photometry of early-type stars in connection with studies of galactic structure. Herr chose the subject of flare stars as his major research topic at Mt. Cuba because of his students, since undergraduates would only have to look for one target star. He also had a Ralph Schlegel-type knack of cobbling together junk into useful instrumentation. He sometimes successfully wedded old and new technologies in developing instruments. He digitized data from old strip chart recordings or centuries-old observations with state-of-the-art scanners.

He was also noted for his rich sense of humor, which he displayed with colleagues as well as students.

Dr. Herr's presentation at LVAAS was on his research. "The recording of rapid photometric changes of stars is still relatively new so that there is a rich opportunity for discovery for all who enter this field. Dr. Herr noted several dynamic changes recorded at Mt. Cuba that appear to be original discoveries. While apparently new, this information lacks confirmation because of the lack of other recorded data. Dr. Herr noted how a facility such as our Pulpit Rock observatory could be of invaluable assistance in his photometric program. Once outfitted with photometric equipment and tracking the same object as the Mt. Cuba Observatory, any new or unusual light intensity changes would be virtually instantly confirmed. Dr. Herr's lecture was obviously most appealing to the members as indicated in various



group conversations after the meeting. It also appears likely that photometric work will be one of the proposed programs at our new observatory.” (Observer, December 1969)

The 24-inch Tinsley telescope at Mount Cuba Observatory was subsequently named the Herr Telescope in his honor.



Mount Cuba Observatory in Delaware: Sky & Telescope  
July 1965



Above: The Baker reflector-corrector (transparent) is within this unit, which is attached to the top of the telescope to provide for prime-focus photography of unusually wide field. The camera's plate holder is seen here with its back open and the dark slide partially withdrawn.

Left: Richard B. Herr demonstrates the observing chair, which is moved over the floor by a battery-operated lift truck. An air bearing between the platform and the chair provides for vibration-free movement. To the observer's left are the lift controls; in his hand is a switchbox connected to the interval timer on the telescope. All photographs with this article are from Mount Cuba Astronomical Observatory, Inc.

## References

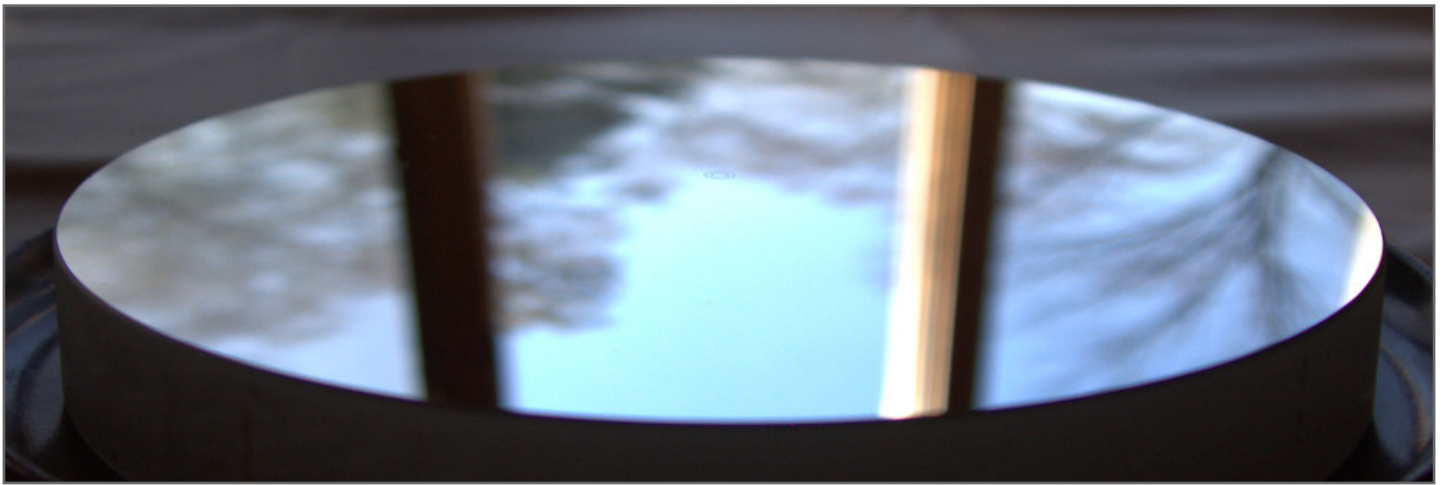
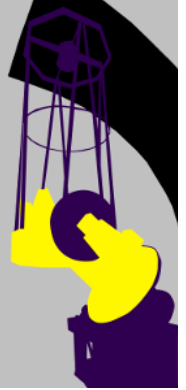
Richard Herr Obituary, retrieved from: <https://baas.aas.org/obituaries/richard-b-herr-1936-1997/>

DARC Photo Gallery, retrieved from: <http://www.physics.udel.edu/gp/darc/earlyobservers.html>

Mount Cuba Observatory in Delaware: Sky & Telescope, July, 1965.

# Schlegel Observatory Report

by Rich Hogg – November 2019



The secondary mirror was scheduled to be delivered on a day when I had plans to leave in late afternoon, so just to be safe I asked them to hold it for me at the FedEx site on MacArthur Road. It got there in time for me to bring it home before my planned departure, so it spent a couple of days in my house, still packed in its shipping box.

I then took it with me to South Mountain on the day of the Palmer Elementary field trip, October 11. I took it out and stored it in the "optical shop" before loaning my Jeep to the school bus drivers, so they could go get some lunch. Then, after the kids left, a few of us gathered to bear witness to the opening of the box.

We found the mirror in apparently perfect condition, as expected and hoped, as well as a letter with some advice from Carl Zambuto on how to care for our new aluminum coating. Basically, we are to avoid touching it or even breathing on it for the first 90 days, while preferably storing it so that some air can circulate near it, with as little dust as possible.

We breathed carefully until we had it packed up again, and I thought about how to fulfill those requirements. The more-controlled environment of the first floor of my home seemed preferable to the LVAAS facilities, but I don't have a good spot to leave the shipping box lying flat for three months.



I came up with an idea involving a large glass-door cabinet, a round serving tray, and a mixing bowl. I'll explain how the idea worked out in reality.

The serving tray wasn't as big as I thought. Instead, I chose a hand-turned wooden tray made by the [Robert Treate Hogg Shop](#) in Oxford, PA. RTH was my Dad's uncle, and the shop continued to operate for 47 years after he passed away, finally closing just this past August. I have collected a number of items made by "Uncle Bob" and his employees, but this tray was made by the shop in 1974, after he was gone. That qualified it to be put to work for something, rather than just cherished as an artifact.

I cleaned it with some Lemon Pledge and then placed on it a round silicone-rubber kitchen pad, which I had also cleaned carefully and baked in my oven for a bit to make sure it was dry. Then, wearing a face mask and rubber gloves, I carefully unpacked the mirror and laid it on the pad. The photo on the previous page shows it in this state, with the inscribed concentric center-circles visible, along with the reflections of my window frames, distorted by the mirror's convex figure.

I have a large, finely-made and heavy glass-door corner cabinet in my living room, which was also made by R. T. Hogg. The doors close tightly and I notice very little dust inside. I had cleaned off one of the shelves, and when I was done inspecting the mirror I placed it carefully on the shelf, surrounded by three ball-point pens that will act as spacers to allow air to circulate.



Finally, for additional protection from dust, I carefully placed a clean aluminum wok cover on the pens, and closed the doors. (The mixing bowl that I had in mind for this was also not quite large enough.)

The mirror will rest there, air-exposed but clean and safe, for at least the 90 days required for the coating to reach maximum hardness.



**Mirror Support** - I've been working on ideas for a central "hub support" for the mirror, as I mentioned in last month's column. I still think it is a good way to support the glass in the radial direction, i.e. to keep it in the center of the mirror cell when the telescope is tilted away from the vertical direction.

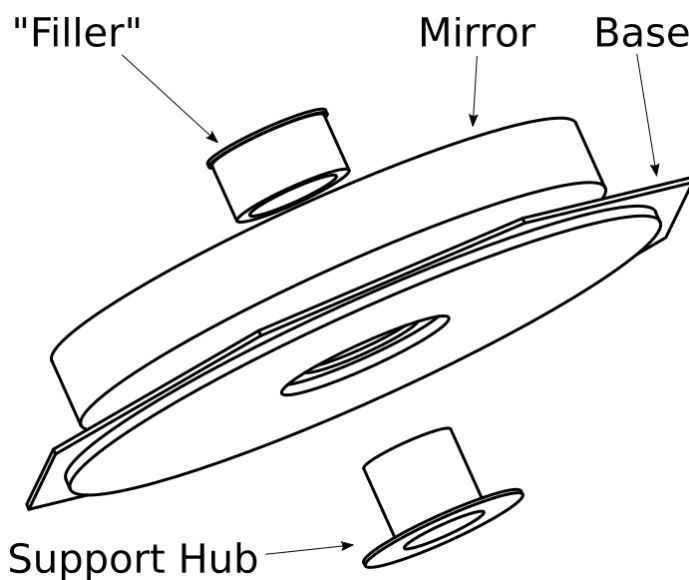
The radial support needs to fulfill several requirements:

- It has to counter the force of gravity pulling the mirror towards the side of the tube, when the telescope is pointed other than at the zenith.
- Its support force must be spread more-or-less evenly across the "uphill" side of the mirror bore to avoid distorting or over-stressing the glass.
- It must not apply too much pressure from its own structure, such as might be caused by thermal expansion of a rigid structure tightly fitted into the bore.
- It must also provide some retention of the mirror from flopping towards the front of the telescope, in case the tube is ever pointed horizontally or slightly downward (which the mount allows to happen.)
- It must allow the mirror to tilt slightly, and to raise or lower slightly from the base plate of the mirror cell, to allow collimation.

At right is a diagram of the basic concept I am working with. The simple part is a "Support Hub" in the shape of a 12" flange on a 6" section of pipe. I think the thickness should be about 1/4" to be strong enough, and to provide enough material for drilling and tapping holes for the other components. It should probably be made out of stainless steel, for corrosion resistance with a much lower thermal expansion coefficient than aluminum.

I don't think this will be too difficult to come up with. We might need to buy a section of pipe and a piece of plate, and get them machined and welded to make the flange. Maybe one of us has a TIG welder and the expertise to do this?

The part labeled "Filler" is more interesting, and I am still researching it. I show it as another pipe-like piece, with a lip to prevent the mirror from "flopping out," but I think maybe it ought to be made up in pieces, like the segments of an orange, that are inserted from the front one at a time and secured with some arrangement of screws from inside the hub. They would have some freedom of motion to allow the mirror to tilt a little bit.



The part that I have been concentrating on is to build in a little "give" to allow the hub to expand thermally without placing undue stress on the mirror. I was originally thinking a layer of some kind of rubber, but I found that solid rubber is basically considered incompressible, like a liquid. A perforated rubber might have the cushioning quality we want. but I don't know how to evaluate that.

I then looked at foam rubber. There is a brand called Plastazote which comes in various hardness grades, and I think the firmer grades might work. I bought a sample of Plastazote LD45 from [TNT Cosplay Supply](#), where it is made available for constructing super-hero costumes to wear to ComicCon, etc. I'm concerned that it will "take a set" if compressed for a long time in cold temperatures, and I may put a bit of it between the jaws of a clamp, and store it in my freezer for a bit to see what happens.

Most recently I discovered springs like [these](#) and [these](#). Here we have a wonderful selection of capabilities to enable engineering just the right amount of cushioning into the assembly. It potentially involves a lot more moving parts than a a layer of foam would, so we need to think about a design that we could assemble easily, but if that can be solved it seems more dependable than the foam.

By the way, the diameter of the cone of light passing through the 8.5" bore in the main mirror to the eyepiece is just under 3.5" (for the 2" fully-illuminated field at the focal plane), so we have a lot of room to work with.

Also, we'll need to be able to mount the main baffle tube to the support hub. We'll have to think carefully about this mounting arrangement, hopefully to avoid needing to work too close to the coating on the main mirror.

by Gary A. Becker

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## Mercury to Transit the Sun November 11

It only happens 14 times this century, in either May or November. You will have to look at the filtered sun to see it, and you will need a telescope to boot. On November 11, starting just after 7:36 a.m. EST and continuing until just after 1:04 p.m., the Messenger God, Mercury, will be swiftly crossing—transiting—the disk of our sun. Transits are similar to eclipses which hide the sun or the moon, but in a transit the occulting object is much smaller; in this case, the planet Mercury is only 10 seconds of arc in diameter. That is equivalent to viewing a 12-mile in diameter crater on the moon's surface. However, because the filtered sun is still bright, and Mercury is black against Sol's disk, the silhouette of Mercury will show up easily.

Transits of Mercury, and especially Venus, are rare because the alignment of Earth, planet and sun must be virtually dead on. Mercury orbits Sol in a period of only 87.97 days, while it takes the Earth 365.24 days to complete the same (tropical year.) Mercury's orbital tilt is 7.01 degrees to the plane of Earth's orbit called the ecliptic. This means that as Mercury revolves around the sun, it must cross the ecliptic at two locations (nodes) - a descending node, where it moves from above to below the ecliptic, as well as an ascending node where Mercury crosses from below to above the ecliptic. For a transit to occur, Mercury must be at a node just as it is moving exactly between the Earth and the sun. That puts a high price on the frequency of Mercury transits and relegates them to a position of rarity among astronomical events; something you don't see every day and don't want to miss. Transits of Venus are even rarer, occurring in eight-year intervals separated by interludes of 105 years or 122 years respectively.

We'll have to wait until December 8, 2125 before the US sees its next Venus transit. I was fortunate to witness the Venus transits of 2004 and 2012, the maximum number of transits possible to view in a single lifetime. If successful, this will only be the fourth transit of Mercury that I have witnessed even though 11 have occurred since my birth. Three Mercury transits happened prior to age 11 before I knew what a transit was, some were not visible in our part of the world, and others were ruined by cloudy weather. That could easily happen in November, one of the cloudier months of the year. Locally the long-range forecast for the Lehigh Valley on transit day is for cloudy skies, but that is still a week off, and when preparing for any rare sky event, you strive to remain optimistic and plan for success.

Hang in there; more about the Mercury transit next week.



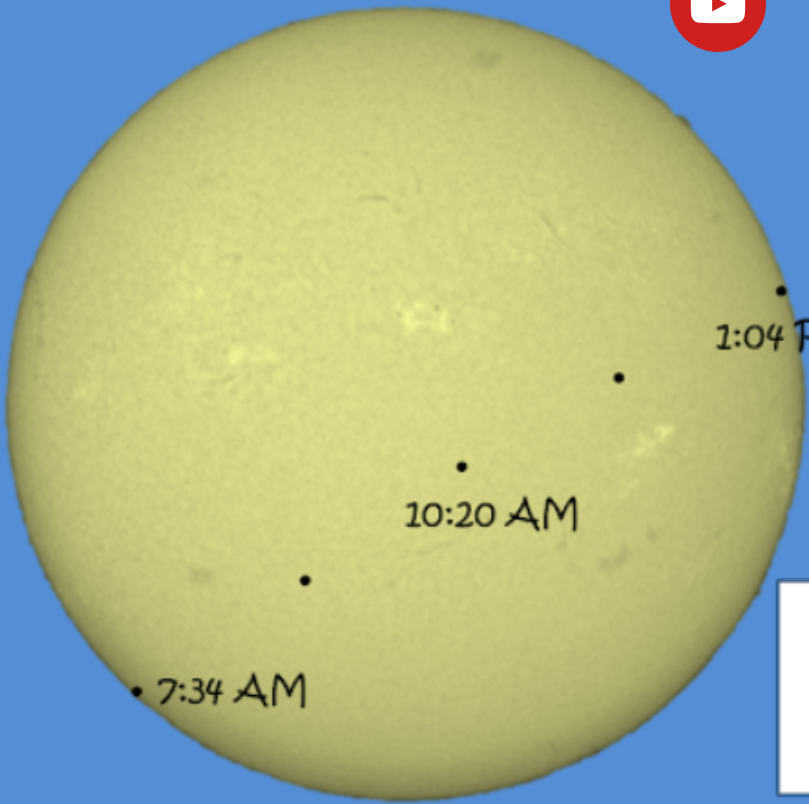
# Night Sky Notebook for November

by

## Pete Detterline

### Night Sky Notebook

Peter Detterline



#### Mercury Transit

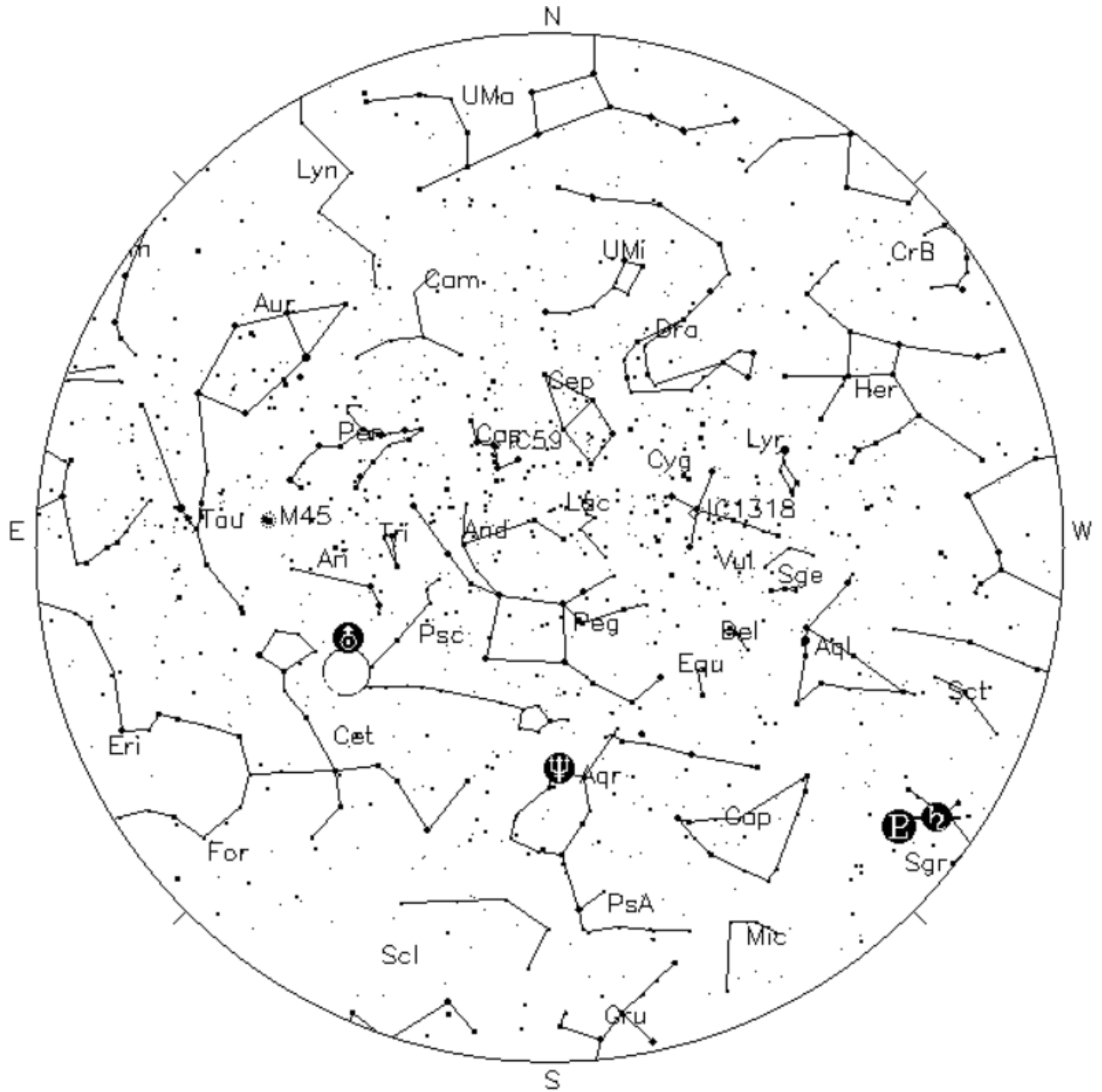
The planet Mercury traverses the Sun for 5½ hours beginning on the morning of November 11. You will need a properly filtered telescope to view this event.

The next one won't be until November 23, 2032

**NEVER** look directly at the sun without proper filters. **EYE DAMAGE WILL OCCUR**

### November 11

# Sky above 40°33'58"N 75°26'5"W Monday 2019 Nov 11 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

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**Customize Your Sky** -> at : <http://www.fourmilab.ch/yoursky/>

## NOVEMBER 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01	02 <a href="#">Star Party</a>
03	04 <a href="#">First Quarter Moon</a>	05 <a href="#">LVAAS Scout Group</a>	06	07	08	09
10 <a href="#">General Meeting - 7:00 PM</a>	11 <a href="#">Veterans Day</a>	12 <a href="#">Full Moon</a>	13	14 <a href="#">Astro Imaging - 7:00 PM</a>	15	16
17 <a href="#">Deadline for submissions to the Observer</a>	18	19 <a href="#">Last Quarter Moon</a>	20	21	22	23
24 <a href="#">LVAAS Board of Governors Meeting</a>	25	26 <a href="#">New Moon</a>	27	28 <a href="#">Thanksgiving</a>	29	30

## DECEMBER 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02 <a href="#">LVAAS Scout Group</a>	03	04 <a href="#">First Quarter Moon</a>	05	06	07
08	09	10	11	12 <a href="#">Full Moon</a> <a href="#">Astro Imaging - 7:00 PM</a>	13	14 <a href="#">General Meeting/Party - 2:00 PM</a>
15 <a href="#">General Meeting/Party (alternate day) - 2:00 PM</a>	16	17	18 <a href="#">Last Quarter Moon</a>	19	20	21
22 <a href="#">Deadline for submissions to the Observer</a>	23	24	25 <a href="#">Christmas</a>	26 <a href="#">New Moon</a>	27	28
29 <a href="#">LVAAS Board of Governors Meeting</a>	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  
*see website*

## 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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