

# amateur ASTRONOMER



sharing the wonder and science of astronomy

## The Astrophotographers Have Been Busy...



Tom Nolasco captured this image of the November 19 partial lunar eclipse from his 8" F/4 reflector.

See more of what DVAA astrophotographers have been imaging on pages 11-12. Also, check out the club website at [www.dvaa.org](http://www.dvaa.org) for additional images of the partial lunar eclipse. There is a great slideshow on the front page.

### PLAN ON IT!

**December 4 New Moon** Dark sky observing at various sites. See the [DVAA groups.io](http://DVAA.groups.io) for more info.

**December 5 (4:30-7:30 pm) Late Autumn/Early Winter Telescope & Constellation Clinic** (see p. 5).

**December 17 (7:30 pm via Zoom) General Meeting** (see p. 8).

**December 19 (1:00 pm via Zoom) Annual DVAA Business Meeting.** All members are invited.

**December 21 (10:59 am) Winter Solstice.** Many contemporaneous secular and sectarian celebrations are planned.

**December 22 (7:20 am) Currently Scheduled Launch of NASA's James Webb Space Telescope**

FOR ALL EVENTS, SEE THE DVAA WEBSITE [www.dvaa.org](http://www.dvaa.org) FOR ADDITIONAL INFORMATION AND UPDATES.

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A link to Dave Mitsky's Celestial Calendar can be found at [dvaa.org](http://dvaa.org) on the Home Page.

## Welcome New DVAA Members!

**Janis Cortese (Langhorne, PA)**  
**Scott Erwin (North Wales, PA)**  
**Michael Strizziere (Collegeville, PA)**

We welcome all new members to enjoy the most our club has to offer by participating in DVAA activities. You are encouraged to ask questions and pursue your interests in astronomy through the club.

We suggest that new members attend our observing events and special interest group meetings, or volunteer to help with an outreach event or committee. Participation can advance your skills and enjoyment of the hobby and help you get to know your fellow members. New members are entitled to all benefits of membership.



**Brian Lee**  
Welcoming Committee Chair

## DVAA Board & Committee Chairs

Title	Name	Email
President	Harold Goldner	<a href="mailto:president@dvaa.org">president@dvaa.org</a>
Vice-President	Jan Rush	<a href="mailto:veep@dvaa.org">veep@dvaa.org</a>
Secretary	Mike Tucker	<a href="mailto:secretary@dvaa.org">secretary@dvaa.org</a>
Treasurer & Astronomical League Coordinator	Louis Berman	<a href="mailto:treasurer@dvaa.org">treasurer@dvaa.org</a>
Members-at-Large	Roy Patton Tracey Trapuzzano Barry Johnson	<a href="mailto:mbratlarge@dvaa.org">mbratlarge@dvaa.org</a>
Astrophotography	Lou Varvarezis	<a href="mailto:astrophotography@dvaa.org">astrophotography@dvaa.org</a>
Camping & MSSP	Nate Prentice	<a href="mailto:camping@dvaa.org">camping@dvaa.org</a>
Door Prizes	Roy Patton	<a href="mailto:doorprizes@dvaa.org">doorprizes@dvaa.org</a>
Newsletter Committee	(see below right)	<a href="mailto:newsletter@dvaa.org">newsletter@dvaa.org</a>
Night Sky Network	Al Lamperti	<a href="mailto:nightsky@dvaa.org">nightsky@dvaa.org</a>
Light Pollution	Barry Johnson	<a href="mailto:lpollution@dvaa.org">lpollution@dvaa.org</a>
Observing	Andrew Hitchner	<a href="mailto:observing@dvaa.org">observing@dvaa.org</a>
Outreach	Jan Rush	<a href="mailto:outreach@dvaa.org">outreach@dvaa.org</a>
Programs	Jeremy Carlo	<a href="mailto:programs@dvaa.org">programs@dvaa.org</a>
Publicity	Bill McGeeney	<a href="mailto:publicity@dvaa.org">publicity@dvaa.org</a>
Scope Rentals	Joe Lamb	<a href="mailto:rentals@dvaa.org">rentals@dvaa.org</a>
Website	Louis Berman	<a href="mailto:website@dvaa.org">website@dvaa.org</a>
Welcoming	Brian Lee	<a href="mailto:welcoming@dvaa.org">welcoming@dvaa.org</a>
Women of DVAA	Jan Rush	<a href="mailto:women@dvaa.org">women@dvaa.org</a>

## Mark Your Calendars!

### Upcoming Monthly Meetings

**Friday, December 17, 2021:** Featured Speaker: Bart Fried: "Holenstein's Holey Lens" (see page 8).

**Due to an overwhelming member preference for virtual monthly meetings, we will continue with the Zoom/YouTube format for the remainder of the year. Watch your email for sign-on directions.**

Upcoming Meeting Dates: (all Friday evenings): January 21st, 2022.

### 2021 Public Star Parties

DVAA public star parties at Valley Forge National Historical Park have returned to our customary format as COVID-related precautions are being relaxed. They are held at Valley Forge National Historical Park on the Model Airplane Field. ([Google Maps](#)). **Weather Hotline: 484-367-5278.**

**All attendees are asked to wear a mask.**

**No further Public Star Party dates for 2021. Star parties will resume in 2022, following the Season of Storms.**

*Note: Consistent with recommendations from Governor Wolf and the Centers for Disease Control, some live DVAA public events are following a modified format. Monthly meetings are being held via Zoom and livestreamed via YouTube. Check the website ([www.dvaa.org](http://www.dvaa.org)) for updates.*

### Time to Vote!

The annual election of DVAA officers will take place electronically Dec. 1-14. Electronic voting is efficient and secure, so make your vote count! Members should watch for an email within the next week with voting instructions.

**Newsletter Editorial Committee:** Jeremy Carlo, George Keighton, Tom Nolasco, Dana Priesing, Jan Rush and Barclay Thorn.

If you would be interested in joining us on the Newsletter Committee, or serving as guest editor for one month, just drop us a line at [newsletter@dvaa.org](mailto:newsletter@dvaa.org) — we'd love to have you on board, regardless of your experience level! Online tutorials are available to get you quickly up to speed.

Thanks to Jan Rush for being lead editor last month. This month's lead editor is Dana Priesing.

## ***A Thank You to All the Stars in DVAA's Sky***

**Harold Goldner** [email](#)



I have spent most of the last two years writing about the wonders of the sky. While I readily concede it would be easier (and cheaper) to be a cloud watcher, not all of the stars that dazzle me are in the sky. I am not referring to the ones embedded in the pavement of Philadelphia's Avenue of the Arts, nor the ones painted on the ceiling of Grand Central Station, or living in obscenely expensive cliffside homes in Hollywood. I write of the stars of the Delaware Valley Amateur Astronomers.

As I write this December column, the long Thanksgiving Weekend is ending, and feelings of gratitude continue to be on my mind. I have what might be the simplest and easiest jobs in the world, besides perhaps, that of a professional paperweight. That could only be because of the amazing people who give their time, energy, initiative, creativity, and efforts for the benefit of our membership which has grown to 215 strong.

Our DVAA stars include (in alphabetical order):

Louis Berman, who is one of several members who fulfills multiple roles, serving both as treasurer (which, from personal experience, I can assure you is a thankless job), and as our webmaster (which is equally thankless). He handles it all with aplomb. Jeremy Carlo has also done double duty as a newsletter editor and, more prominently as our Programs Chair, providing us nearly a dozen programs in another year in which the very notion of a "meeting" was a challenge.

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## ***State Level Lighting Guidance Petition***

Love the Night Skies? Please sign our [petition](#)!

As many of you might be aware, recently Dark Sky Advocates scored a modest victory in Pittsburgh. The ordinance affects lighting policies within park areas of the city. This win caught the attention of Senator Carolyn Comitta's (Chester Co) office, whom sought out additional information through the PA Chapter of the IDA, where members of both the PA Chapter of the IDA and the Pennsylvania Outdoor Lighting Council both met with the Senator's team to plead their case for responsible lighting practices.

We look forward to utilizing this petition to showcase the level of support for determining adequate nighttime lighting guidance at a state level. It's my hope that each and every one of the members of this club can assist us in this cause! In addition to the petition, we're building a coalition of nighttime partners involved in health, environmental, and related fields. If you'd like to support our activities, please reach out to the following contacts below. Every little bit helps!

Thank you for your consideration.

Barry Johnson ([johnsonb52@comcast.net](mailto:johnsonb52@comcast.net)), Pennsylvania Outdoor Lighting Council

Bill McGeeney ([billmcgeeney@gmail.com](mailto:billmcgeeney@gmail.com)), PA Chapter of the International Dark Sky Association



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Bart Fried has continued to shine in the role of listserve janitor, a role which he has assumed for years and as he continues to shepherd our online activities. Andrew Hitchner has tried to provide us with star parties when Mother Nature cooperated and has given us regular and useful observing tips at our monthly meetings. Barry Johnson has continued to monitor light pollution and served as one of our three members-at-large. George Keighton served on our newsletter editorial committee. Brian Lee tackled our Welcoming Committee in a year where we increased our membership more than any prior year in my recollection. Joe Lamb ably handled our expanded list of rental equipment (I will certainly get that donated 8" Orion Dob out of my shed to you, Joe!)

Our club firmament also includes Al Lamperti, who found time to work tirelessly at several outreach events in between earning new observing pins as well as handling the Night Sky Network, and Bill McGeeney who handled the club's publicity and, with Lou Berman, our podcast (you do know about our podcast, right?). Tom Nolasco served on our editorial committee and often graced our email with great photographs of various events in the sky. Roy Patton aced his only opportunity to do door prizes at our July meeting and was a frequent contributor as one of our members at large. Dana Priesing also worked on our newsletter editorial committee (and has been kind enough to hold a space for this month's column while she tries to get a draft out for review!), as did Bart Thorn, who will also monitor our elections to prevent any intrusion by the Cyber Ninjas or subsequent lawsuits.

Many thanks also to our secretary, Mike Tucker, who overcame his own health battles to be available to cover for me from time to time and has been a resource for me personally since I first joined DVAA. Also to Tracey Trapuzzano, another of our members-at-large (and who, along with Gary Trapuzzano and the Lambs provided sustenance for our July live meeting at Fort Washington State Park). I must also shout out Elias "Lou" Varvarezis whom I remember starting out trying to take astrophotographs in the field not very long ago, but who is now a skilled and talented astrophotographer with images that have, quite simply, blown my mind.

Many of our members, too numerous to mention (or for me to remember) have contributed newsletter articles, programs, images, information, resources and volunteered their time at events to make this past year one a very active year notwithstanding the seemingly endless pandemic. I hope I have not forgotten anyone, and I do not intend to offend by omission. If it is any solace, I do not know many of the real stars' names in the real constellations either. That has been a constant challenge for me.

Finally, a not-in-alphabetical order very special thanks to the "supernova" of DVAA, Vice President Janet Rush, who also heads up our very active outreach programs, works on the newsletter editorial committee, created the "Women of DVAA" and kept me on schedule and compliant with the club by-laws while I tried to practice law occasionally between DVAA activities. I most certainly could not have gotten through this year without Janet, or any of you.

While it is very difficult to become a *real* star, involving a massive amount of hydrogen and gravity, it is far easier to become a star of DVAA. We benefit from a very active membership. Anyone who has any interest at all at helping out, please email me at [President@dvaa.org](mailto:President@dvaa.org) and I will be happy to get you "ignited."

Meanwhile, my best holiday greetings to everyone, along with a wish for fewer clouds in 2022 --- atmospheric or otherwise --- and clear skies to all.

*Follow the DVAA on Facebook!*



DVAA [Facebook](#) group  
DVAA [Photo Enthusiasts](#)



# **Late Autumn/Early Winter Telescope and Constellation Clinic for Beginning and Intermediate Observers**

**December 5, 2021**

If you would like to sharpen your visual observing skills, this is the opportunity for you! This clinic will be personalized to your level of experience and address your specific questions so you can take your observing to the next level. Bring your telescope or binoculars for assistance from DVAA's seasoned observers. Bring your questions about filters, viewfinders, eyepieces, and observing tools. Master Observer Al Lamperti will also point out the late fall/early winter constellations and the locations of the best seasonal celestial objects. Those of you who are interested in the Astronomical League Constellation Hunter Program will have the opportunity to record your observations of seasonal constellations.

Provided the skies cooperate, our targets for the evening will include Saturn, Jupiter, double stars, and Messier objects if your telescope and the skies allow. We will demonstrate how to find some popular celestial targets such as the Hercules Cluster, Andromeda Galaxy, the Double Cluster, and the Coathanger asterism. Hot coffee and cider will be available.

The clinic will take place in Heebner Park, Collegeville PA (Worcester Township) on December 5, 2021, 4:30-7:30pm. (An alternative date will be set if the clinic must be postponed due to rain or clouds). Advance registration for attendees is essential to ensure that we have the right number of DVAA experts on site. During the registration process you will have the opportunity to provide information on any equipment you will be bringing to the clinic to ensure that expert help for your specific scope (or binoculars) will be available. Although the clinic will be held outdoors, telescope tutoring may involve proximity of participants so please wear a mask.

We invite newer observers, and any members who would like some individualized telescope time with an expert observer, to join us! To register: [Telescope Clinic](#)



Left: Constellation Hunter Clinic held Sept. 11.

*Photo credit: George Keighton*

Right: Telescope Clinic held Aug. 29.

*Photo credit: Al Lamperti*



## What First Got You Started in Astronomy?

"NASA and the space race sparked my interest. I watched Neil Armstrong walk on the moon, early in the morning, sitting on the floor in front of the TV at age 11. Luckily, I had a teacher that came to our grade school and we ran the classic "space capsule-egg drop" experiment. My 'eggonaut' didn't survive re-entry. We had a planetarium in the high school and field trips there were always a highlight. I took astronomy in H.S. and joined the astronomy club."

- Bart Fried

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"Had an Edmond 3" reflector as a kid in the Bronx using newspaper (remember them?) delivery earnings (\$29.95). I could find the Moon & Polaris and not much else. Did not know constellations. Fast forward to 1984 when our older son did likewise with his earnings and got a Kiddie City telescope. That Summer we saw Saturn & Jupiter from the front yard and I got hooked again. My wife saw an announcement in the local paper for a star party at Temple Ambler, where the DVAA had them at the time. Joined the DVAA shortly after that, bought a used pair of binoculars from a former military guy, learned the constellations while waiting for my first telescope: 10" Odessey reflector. The rest is history."

- Al Lamperti

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"I received a 60mm Monolux Alt/Az refractor for Christmas when I was 8 years old. While I had a few hobbies at that age, collecting butterflies and moths, rocks and fossils, frogs reptiles etc, I was interested in space as the space age was in the news with lots of stories to prompt my interest. One evening I was pointing my scope at different stars from our 4th floor apartment balcony, when one of the "stars" I was looking at had a ring around it!. WOW I had discovered Saturn!! Boy was I surprised and impressed."

That and trips to nearby Edmund Scientific Co. spurred my interests in astronomy more and more. If there was one thing that got me interested in astronomy, that was it. Lots of things happened in the years that followed that left astronomy in the back seat, but my love of the night sky has never abated and has grown in my later adult years. Nearly all of the credit goes to my parents who encouraged my curiosity and were able to afford (Dad) the hobby equipment and had the time (Mom) to foster my interests..

- Harry Orlind

"I remember being a young child in Oklahoma, maybe eight or so, lying in the grass with my brother, looking up at The Pleiades. The dark night sky and its constellations were a wonder to me, and I wanted to be an astronomer — until heard that they work at night, in the cold. At that age I couldn't imagine working in such conditions. I did ask my parents for a telescope, visions of giant reflectors in my head. They gave me a small spotting scope on a camera tripod to get started. Five decades passed before I obtained another scope."

- Dana Priesing

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"I got started in astronomy just before the Transit of Venus of June 8, 2004. I reasoned that an event so rare ought to be experienced. That's when I first bought a telescope, and started to learn to use it."

- Jan Rush

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This Girl Scout troop learned how to find constellations, use telescopes and observe the Moon, Jupiter, Saturn, Alberio & Alcor/Mizar with the help of Tracey (a former scout herself) and Gary Trapuzzano, George Keighton and Al Lamperti at the recent Heebner Park outreach event. Excitement was such that they wanted to look again, so they helped themselves to the telescopes, even attempting imaging with their phones.

Photo courtesy of George Keighton.

# How to Find Moving Targets When Imaging or Observing

## Joe Lamb & Al Lamperti

Recent emergence of bright comets had one of us (J.L.) imaging several of them. Images were posted on the io.groups of the DVAA. Some of you may be wondering how to find these constantly moving objects. Herein are some strategies that we used to observe and image comets and asteroids so you can try yourself.

**Visual:** Finder charts for comets currently in the sky can be found on <https://cometchasing.skyhound.com/>. This site is updated at least monthly. Scrolling down the list one will find details about each comet, the constellation it is located in, its magnitude and size. Clicking on "Finder Chart" will give show you the comet's position at the tick marks ~12 hours. Fig. 1 shows an example of C/2021 A1 (Leonard) with its position at the time of this writing. As you can see it is close to the "Whale Galaxy" (NGC 4631).

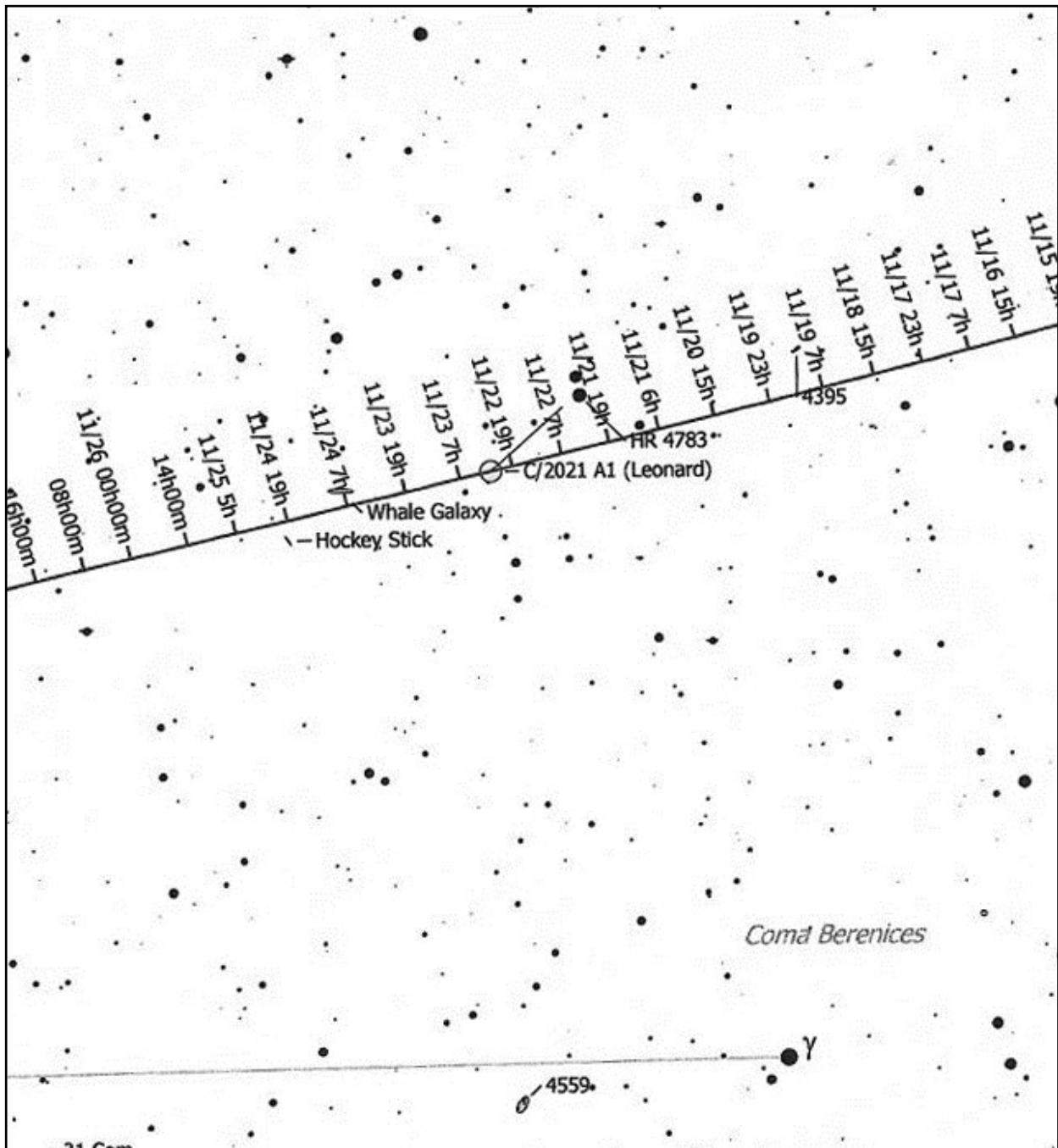


Figure 1

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Alternative charts can also be generated using Sky Tools 4, a software program by Skyhound that is constantly updated. Fig. 2 shows the location of the same comet. Additionally, the chart also has Right Ascension and Declination at the margins, with North up and East left.

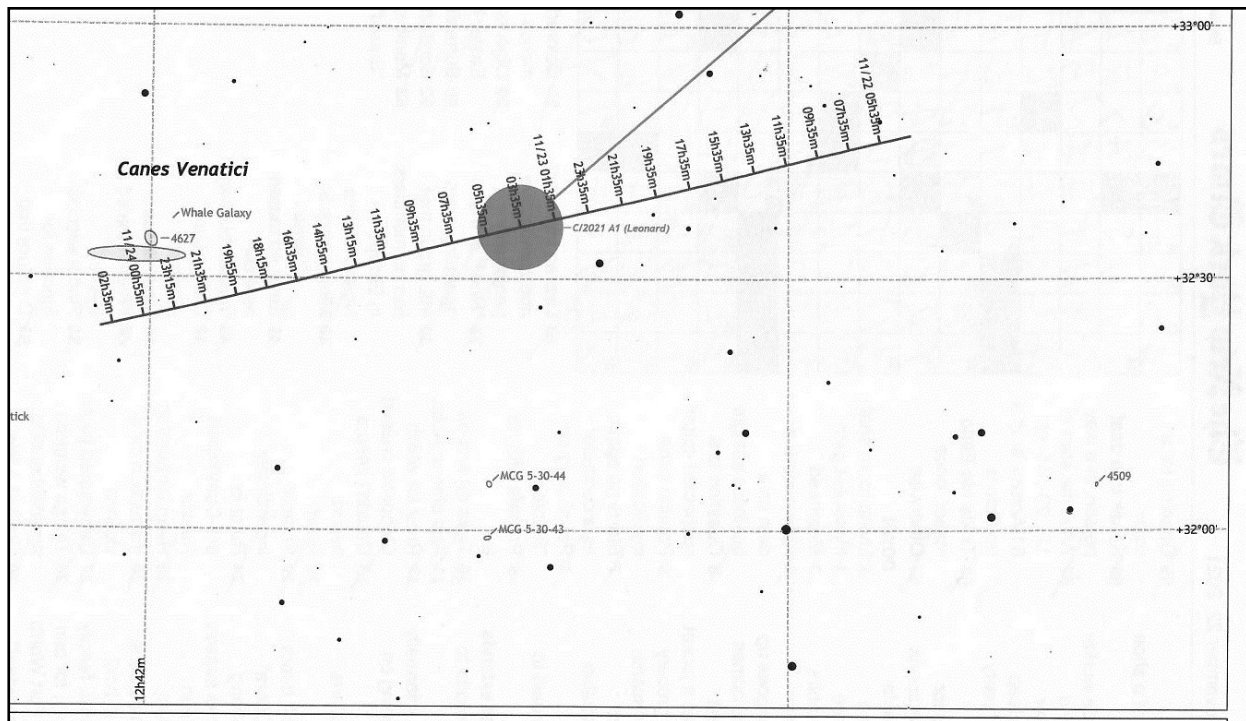


Figure 2

Using a Go-To device or a star atlas, one can easily locate NGC-4631 and star hop to the tick mark close to you time of observation. When star hopping, it is helpful for the observer to know the scale (in degrees/inch or similar) of

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## Don't Miss the Final Monthly Meeting of 2021: December 17, 2021

### "Holenstein's Holey Lens" Bart Fried

Bart Fried will reprise a presentation he will give on December 3rd in La Chaux-de-Fonds, Switzerland at the Workshop: Observatories and Chronometry: Time, Science and Instruments (18th-20th Century). It's the story of how a lens found sitting in a closet in Philadelphia opened up a rabbit hole of intrigue leading to Bart's deeper understanding of the origin of Universal Coordinated Time, observatories seemingly drifting in position and the search to design the world's most accurate astrometric telescope. The story starts in the 1850's in England and ends with the development of the Cesium Atomic Clock and radio telescopes studying background quasars.

DVAA life member Bart Fried joined the club in 1983, occasionally holding the job of Nominating Chair. He started the DVAA's list-serve in 1999 and has been it's List Janitor since then. Now semi-retired from business, he is currently Executive Vice President of the Amateur Astronomers Association, Inc; Board Director, Custer Institute & Observatory; Founder and Past President, Antique Telescope Society; and a Member of Astronomical Society of Long Island, Amateur Observers Society of NY and Westchester Amateur Astronomers, Inc.

DVAA Virtual Meeting: December 17, 2021, 7:30 PM (sign-on starts at 7:00pm).

- DVAA Members via Zoom (check your email for the link)
- Members of the public can watch the livestream on [YouTube](#)



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the reference chart as well as the finder telescope or binocular being used. In the case of the finder or bino; this is easily done. At this time of year, the pointer stars (Dubhe and Merak) of the Big Dipper asterism (Separation: 5.4 degrees); the Belt of Orion (width: 2.8 degrees); and the bright Gemini twin stars Castor and Pollux (separation: 4.5 degrees) are conveniently placed in the sky; and can be used as references. Fig. 3 shows an example on the night

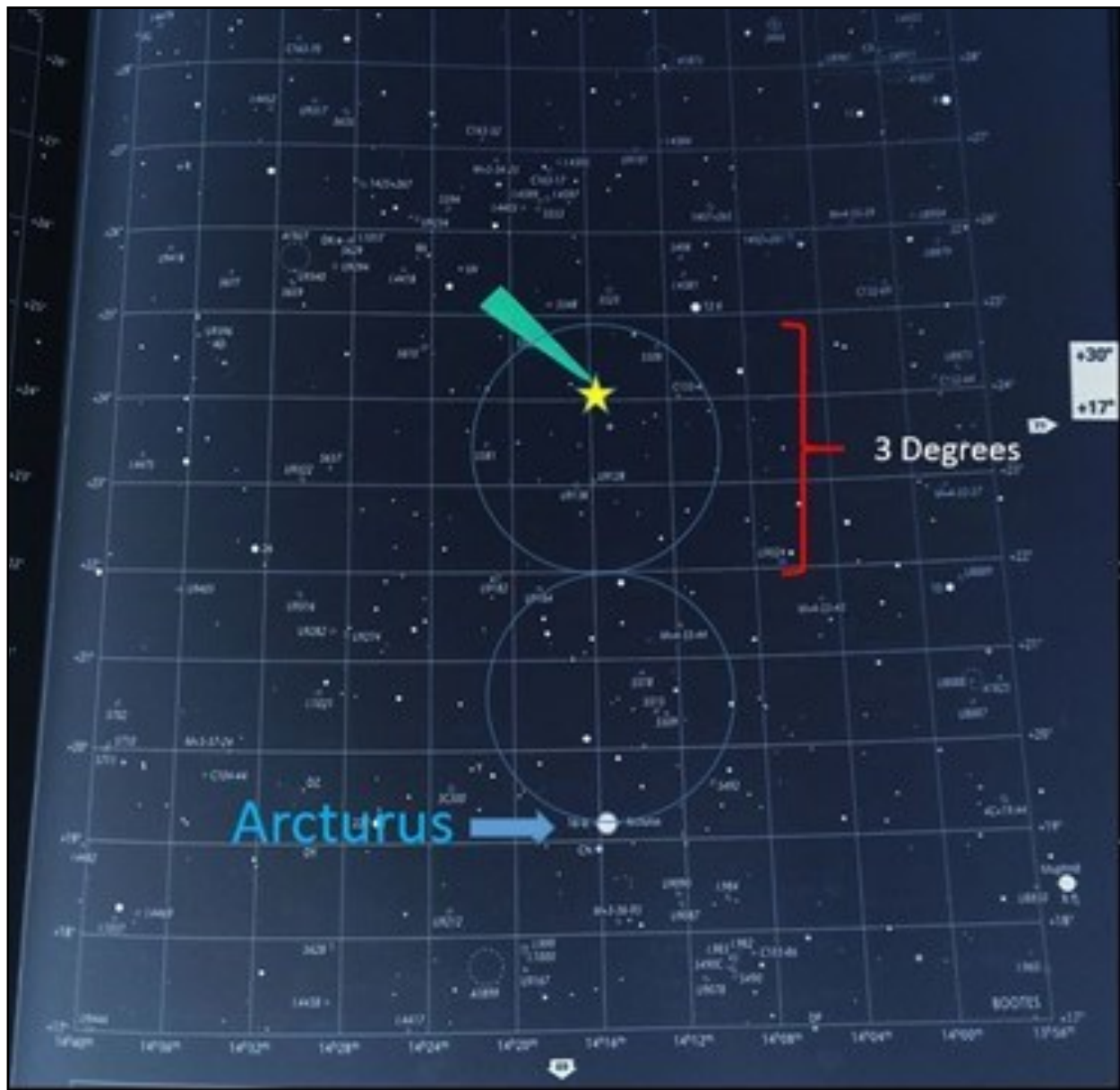


Figure 3

of December 6th, for example, Comet Leonard's nucleus will shine less than two (3 degrees wide) finder fields North of the first magnitude star Arcturus.

Alternatively, one could observe the transit time of any star located near the celestial equator. Record the time in minutes and divide by "4". The result is your instrument's true field in degrees! Armed with this knowledge, it is a

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straightforward task to calculate the number of “fields” you need to move from a reference point to your target. Sky Tools 4 also can be used to find another moving target, asteroids. Fig. 4 shows the location, at the time of this writing, of Ceres, the largest asteroid and the first discovered in 1801. The chart shows it to be located in the Hyades in the constellation Taurus. Pointing your telescope (at this day & time) to gamma Tauri, the “chin” of the bull Taurus, and moving north & west about a degree, you will find an arc of 4 stars, even in your finder scope. Star hop to the location indicated. One needs to orient the chart to coincide with North in the eyepiece.

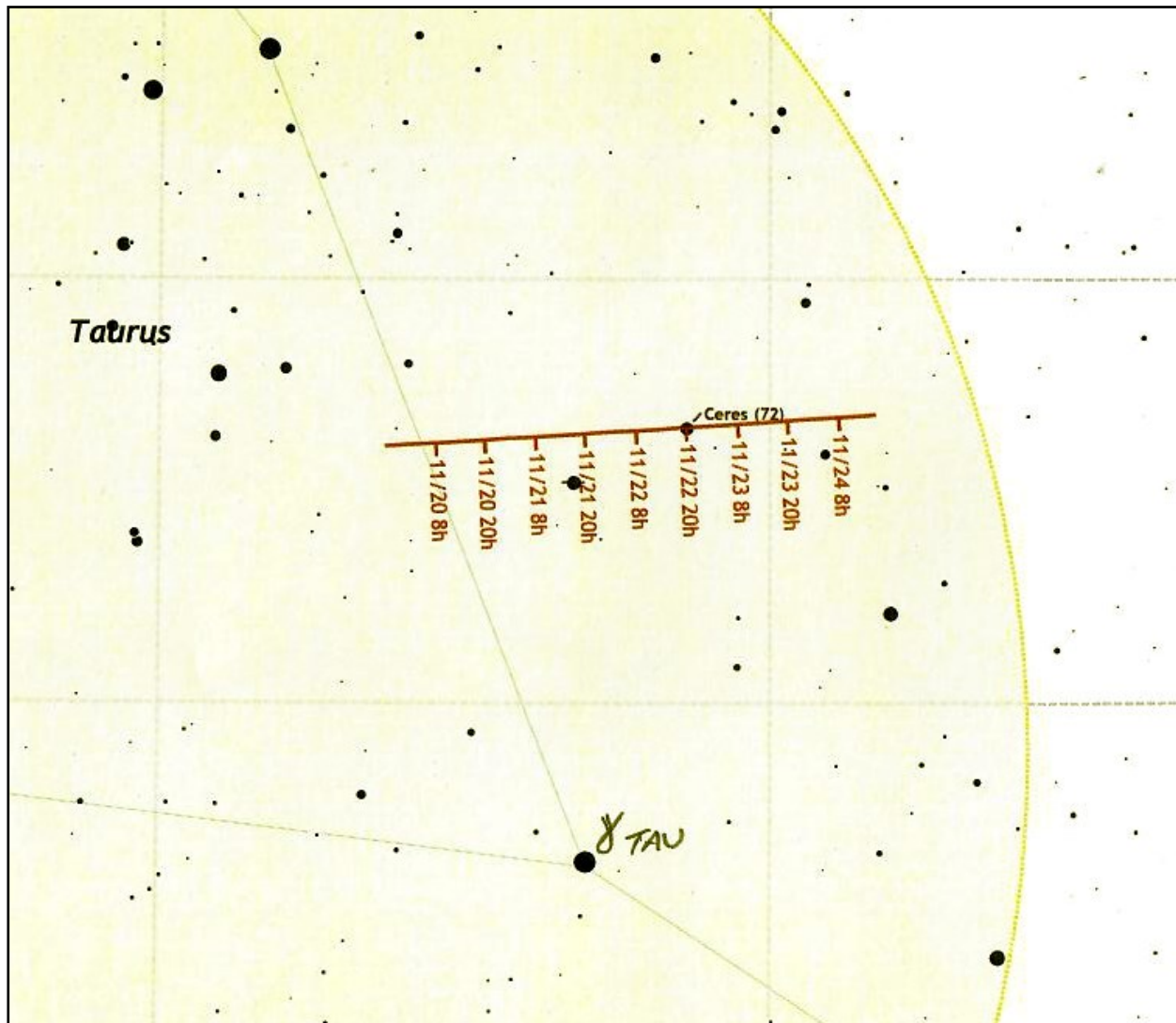


Figure 4

Sketch the comet and/or asteroid and their surrounding star field along with the date, time and N and W. Come back to the same field a couple of hours later or another day and do a similar sketch to show movement of the object. Sky Tools allows the user to zoom in more closely to get more field stars. Right clicking on the stars will give useful information, e.g., magnification, so you can compare magnitudes of the asteroid with surrounding stars. (Helpful hint: use high magnification to do the first sketch; movement can easily be seen in the second sketch 1.5-2 hours later the same night.)

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### **Imaging:**

Comets can be big or small; bright or faint! To a camera, they look and act a lot like deep sky objects, and so, the same imaging techniques apply. Comets can be imaged well using dSLRs or dedicated astronomy cameras. In the former case, most folks recommend shooting multiple length “wide open” on “bulb” and with a fairly high ISO setting. Focusing (using the surrounding stars) can be tricky. Use of the camera’s “Live View” should help. For those using a camera with a fixed tripod, stars will begin to trail at a certain point. Our esteemed astrophotography chair, Lou Varvarezis, recommends using the 500 rule (500/f.l. of lens) to calculate maximum exposure times. One caveat is that comets appear to drift among the fixed stars. For single exposures, this shouldn’t matter much. But, those imagers who enjoy using software to “stack” multiple exposures may face a dilemma. Stacks with aligned stars may show a smeared image of the comet; while aligning on the comet nucleus may result in “trailed” stars in the final image.

In any case, though, the unusual shapes and beautiful colors of these strange, ethereal visitors should amaze the beholder!

If so inclined and we hope you are, you may think of doing the Comet (<https://www.astroleague.org/al/obsclubs/comet/comet.htm>) and/or Asteroid (<https://www.astroleague.org/al/obsclubs/asteroid/astclub.html>) Observing Program of the Astronomical League. Once you get your certificate and pin, please let Andrew Hitchner, our Observing Chairman know, so he can institute accolades and festivities at the next DVAA meeting.

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## ***The Astrophotographers Have Been Busy... (continued)***



Comet C 2021 A Leonard, pre-dawn, November 16th.

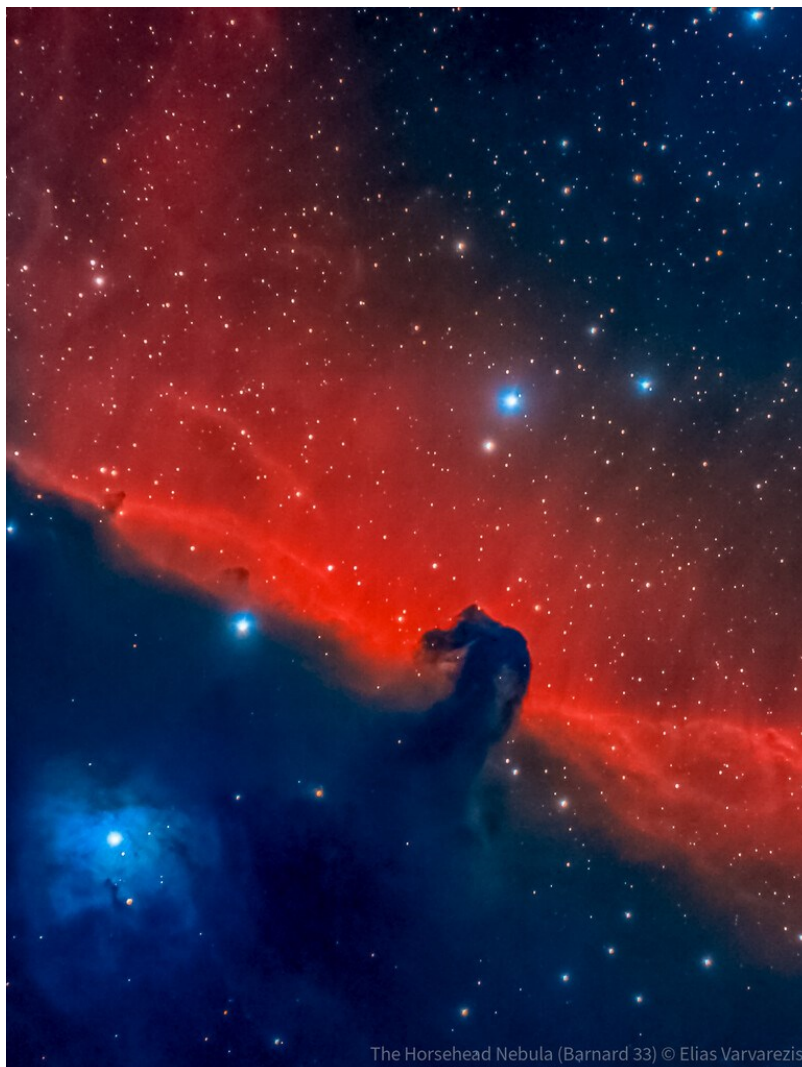
Photo credit: Joe Lamb

## *The Astrophotographers Have Been Busy... (continued)*



Comet 67P Churyumov-Gerasimenko, pre-dawn, November 16th.

Photo credit: Joe Lamb



Lou Varvarezis tells the story of this amazing image:

“This group of objects, Barnard 33 (the dark nebula-aka The Horsehead Nebula), IC 434 (the emission nebula-the red curtain behind the Horsehead) and NGC 2023 (the blue reflection nebula-located on the bottom left) are a notable group of deep sky objects that are part of the much larger Orion Molecular Cloud Complex. Specifically, they are located very close and slightly south of Alnitak, the easternmost star in Orion's belt. The data was collected under Bortle 5 skies (SQM close 20.20 most nights) as follows: Total exposure (light frames) 13 hours and 5 minutes collected over 11 nights from October -- November 2019 as follows. 157 x 300 sec light; 150 x 300 sec dark; 150 flat; 60 bias

Equipment used: Celestron Edge HD 8; 0.7x focal reducer; Canon EOS rebel 1000D (full spectrum modified); Astronomik CLS-CCD Clip-in filter; Orion thin off-axis autoguider; QHY5L-II-M guide camera; Celestron CGX mount; Optec TCF- Leo focuser. Sequence Generator Pro, Backyard EOS dithered and guided with PHD2 calibrated, stacked and integrated with Pixinsight.”

The Horsehead Nebula (Barnard 33) © Elias Varvarezis



## The November Monthly Meeting

### Jeremy P. Carlo [email](#)



With DVAA President Harold Goldner away on business, and VP Jan Rush with spotty internet connectivity at her current location, Programs Chair Jeremy Carlo presided over the November 2021 DVAA meeting.

Changing the order of business a bit, Observing Chair Andrew Hitchner gave the opening report, focusing on the constellation of Taurus. Taurus is more or less centered around the bright red star Aldebaran, nestled in corner of the V-shaped Hyades cluster. The Pleiades open cluster is nearby, and the remainder of the constellation consists of the two “horns” extending to Aldebaran’s left (east). The famous Crab Nebula (M1) is found just above the lower horn star, and the upper horn star is actually shared with neighboring constellation Auriga, recognizable as a pentagonal shape with bright Capella as its alpha star. Aldebaran and Capella, in turn, are two of the main stars forming the Winter Hexagon, dominating most of the winter sky; the other stars are Castor/Pollux in Gemini, Procyon in Canis Minor, Sirius in Canis Major, and Rigel in Orion, with Orion’s red supergiant Betelgeuse residing near the Hexagon’s center. Andrew then talked about some of the main deep-sky objects in Taurus. These include the aforementioned Hyades (Melotte 25), a very large open cluster best seen by the naked eye or in binoculars; the Pleiades (M45), a young, dense open cluster which can be seen with a variety of instruments; and the Crab Nebula (M1), the remnant of the supernova of 1054 AD, with low surface brightness and best seen in larger telescopes. Other highlights include NGC 1807 and NGC 1817, two open clusters in the same field of view, and NGC 1555, a nebula lit by the variable star T Tauri. T Tauri is the prototype of a class of variable stars known as T Tauri stars; these are very young stars which are in the process of shedding their protoplanetary disks. They are commonly found near molecular clouds and in areas of high starbirth rates, which leads nicely into the evening’s main presentation.

Next, Welcoming Chair Brian Lee welcomed 8 new members, including one returning member who was previously involved in the DVAA as a child. Welcome, and Welcome Back! Treasurer Lou Berman reminded attendees that dues renewal time was approaching, and that an automated email would be

coming to request renewals through the DVAA website. Scope Rentals Chair Joe Lamb gave an update on the rentals program. Most of the rental equipment so far has focused (no pun intended...) on visual observing, but a photographic star tracker will be added to the retinue (see page 18), for folks looking to experiment with wide-field photography. See Joe’s accompanying article on pages 7-11 in this newsletter for more information.

VP and Outreach Chair Jan Rush then announced the upcoming DVAA elections and the DVAA Annual Business meeting, scheduled for December 19 at 1:00 PM on Zoom. Jan welcomed the incoming Outreach Chair, Roy Patton, who will be taking over next month. (Many thanks to Jan, who has been wearing multiple hats for several years now!) Jan gave a summary of outreach activities for the year: the DVAA has held 20 events in 2021, staffed by 25 DVAA members, reaching approximately 700 attendees. Wow! Finally, Jan announced the final Telescope and Constellation Clinic of the year, to be held on December 5 at Heebner Park. This will include a laser pointer tour of the sky by Al Lamperti, information about seasonal observing, hands-on help with your telescope, and given the expected weather, hot coffee and cider will be available! See page 5 in this issue for more information on the Telescope and Constellation Clinic.

With committee reports complete, there was a brief discussion about observations of the lunar eclipse which took place earlier that morning. Finally, Jeremy read a note prepared by Publicity Chair Bill McGeeney and Light Pollution Chair Barry Johnson regarding a petition to “Improve and Protect Dark Skies of PA.” (Details on page 3.) You can find the petition [here](#). Then, Jeremy switched back to his usual hat, and welcomed the evening’s invited speaker, Dr. Natalie Butterfield of Villanova University, to speak on the topic of “Dense Molecular Gas in the Galactic Bar Dust Lanes.”

Natalie started her presentation by outlining the main goals for her presentation. What is molecular gas, what are molecular clouds, and how do we observe them in space? What are the different types of gal-

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# The November Monthly Meeting (continued)

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axies, and what is the structure of our own Milky Way Galaxy? Finally, where is the gas located in our galaxy, and is the so-called galactic bar the “missing link” between the galactic center, and the outer disk where we reside? Natalie then tackled each of these in turn.

Molecular clouds contain atoms in gas phase (i.e. not solid or liquid), typically in the form of small molecules (2-8 atoms, such as water (H<sub>2</sub>O) and carbon monoxide (CO)); larger molecules exist but are harder to detect. Molecular clouds come in two forms, segregated by size: giant molecular clouds (GMCs) are typically 15-650 light-years in diameter, are 10,000 to 10 million solar masses, and form many stars, exemplified by the large molecular gas clouds around the Orion constellation; globules are typically less than 0.3 light-years in diameter, are 2-100 solar masses, and typically form into one or a few stars.

Natalie then talked about how we detect gas clouds. Visible light, unfortunately, doesn't penetrate well through gas and dust, making it of limited use when studying these clouds at great distances. Fortunately, other parts of the electromagnetic spectrum penetrate much better, including infrared and radio waves. Molecules can be identified by their unique spectral patterns; much as we can use “nebula filters” to identify specific elements (such as hydrogen or oxygen) in visible light, spectra can be used in infrared and radio to identify atoms and molecules as well. In contrast to visible-light spectra, which typically come from transitions of electrons between energy levels in atoms, spectral lines in infrared and radio typically come from vibrations and rotations of larger molecules. With these tools, molecular clouds – and their contents – may be identified using radio and infrared telescopes; specific molecules including methanol, formaldehyde, carbon monoxide, water, ammonia, and hydrogen sulfide can be detected, and other information such as temperature, pressure, and density may be deduced as well.

Changing gears a bit, Natalie then talked about galactic structure. Broadly speaking, galaxies can be divided into three categories: spiral galaxies with the classic “whirlpool” appearance, elliptical galaxies with a round or elliptical shape but no spiral structure, and irregular galaxies which fit neither pattern. Spiral galaxies are further subdivided into “normal” spiral galaxies with arms radiating out from a round central core, and barred spiral galaxies, in which the core is

surrounded by a straight bar of varying length. As it turns out, the Milky Way is a barred spiral galaxy, although this took quite a while to figure out because we're looking at the galaxy from within.

However, all spiral galaxies share one commonality: they're very densely packed near their cores (like a big urban city center), and more sparsely populated further out in the “galactic disk” (which one can think of as more like the suburbs and exurbs of that city). The sun resides about halfway from the center to the edge of the galaxy, placing us solidly in the suburbs. Given this vantage point, the best way to see to the galactic center is with wavelengths which can penetrate through all the gas and dust, which leads us to using radio and infrared.

Bringing it all together, Natalie then talked about molecular gas clouds in the Milky Way. Most of them are located in the galaxy's dust lanes. These are densest in the so-called “Central Molecular Zone.” The dust lanes in the Milky Way's galactic bar appear to facilitate the flow of molecular gas from the spiral arms into the inner region of the galaxy. As luck would have it, the direction of gas flow is almost exactly along our line of sight, enabling us to use the Doppler effect to determine the direction of flow velocity. Natalie then talked about the measurements she has conducted, many using the 100-meter telescope at the Green Bank Observatory in West Virginia. Natalie concluded by remarking that these galactic bar dust lanes may be the “missing link” tying the flow of gas between the outer parts of the galaxy and its core. This was followed by an extensive Q+A covering a number of topics; rather than summarizing the individual questions I suggest you check out the meeting recording, which is available [here](#).

Many thanks to Natalie Butterfield for an engaging and accessible presentation!

[To watch this meeting or any of the DVAA's previous Zoom meetings, visit our YouTube playlist.](#)

# The James Webb Space Telescope: Ready for Launch!

David Prosper



This article is distributed by NASA  
Night Sky Network

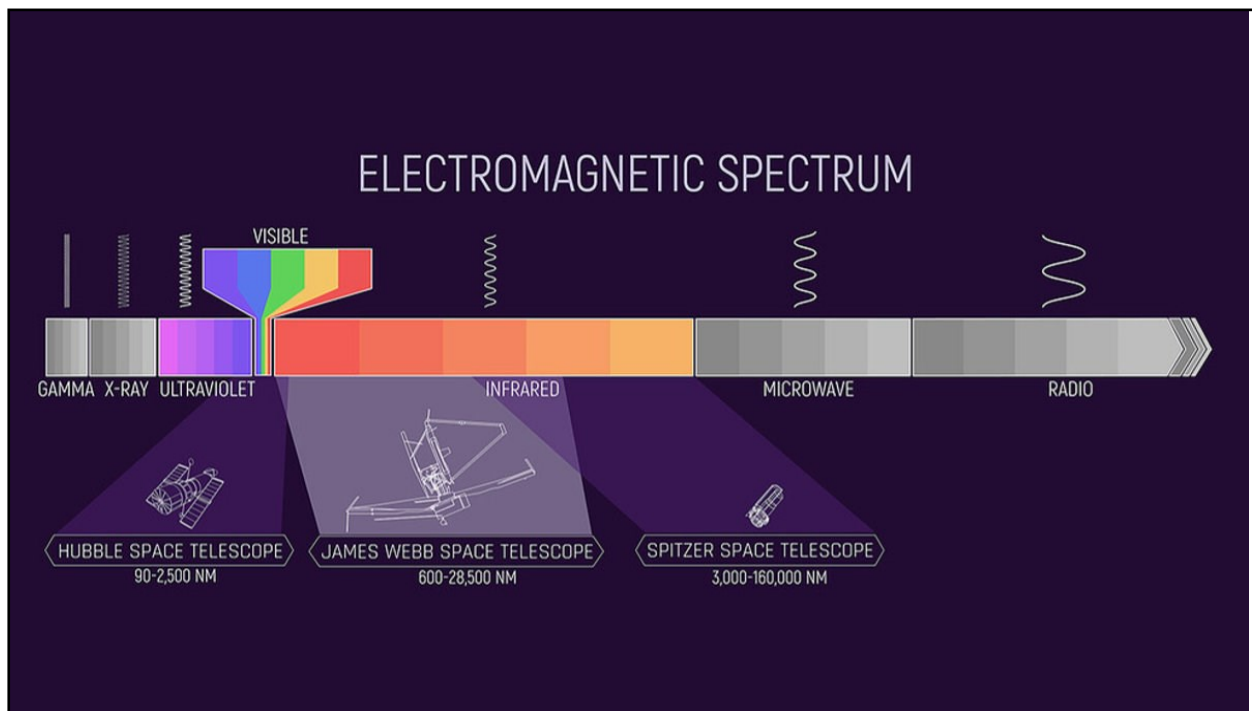
NASA's James Webb Space Telescope is ready for lift-off! As of this writing (November 15), the much-anticipated next-generation space telescope is being carefully prepared for launch on December 18, 2021, [Current scheduled launch date is December 22 at 7:20 am - Ed.] and will begin its mission to investigate some of the deepest mysteries of our universe.

The development of the Webb began earlier than you might expect – the concept that would develop into Webb was proposed even before the launch of the Hubble in the late 1980s! Since then, its design underwent many refinements, and the telescope experienced a series of delays during construction and testing. While frustrating, the team needs to ensure that this extremely complex and advanced scientific instrument is successfully launched and deployed. The Webb team can't take any chances; unlike the Hubble, orbiting at an astronaut-serviceable 340 miles (347 km) above Earth, the Webb will orbit about one million miles away (or 1.6 million km), at Lagrange Point 2. Lagrange Points are special

positions where the gravitational influence between two different bodies, like the Sun and Earth, "balance out," allowing objects like space telescopes to be placed into stable long-term orbits, requiring only minor adjustments - saving Webb a good deal of fuel.

Since this position is also several times further than the Moon, Webb's sunshield will safely cover the Moon, Earth, and Sun and block any potential interference from their own infrared radiation. Even the seemingly small amount of heat from the surfaces of the Earth and Moon would interfere with Webb's extraordinarily sensitive infrared observations of our universe if left unblocked. More detailed information about Webb's orbit can be found at [bit.ly/webborbitinfo](http://bit.ly/webborbitinfo), and a video showing its movement at [bit.ly/webborbitvideo](http://bit.ly/webborbitvideo).

Once in its final position, its sunshield and mirror fully deployed and instruments checked out, Webb will begin observing! Webb's 21-foot segmented mirror will be trained on targets as fine and varied as planets, moons, and distant objects in our outer Solar System, active centers of galaxies, and some of the most distant stars and galaxies in our universe: objects that may be some of the first luminous objects formed after the Big Bang!



Webb will observe a wide band of the infrared spectrum, including parts observed by the Hubble - which also observes in a bit of ultraviolet light as well as visible - and the recently retired Spitzer Space Telescope. Webb will even observe parts of the infrared spectrum not seen by either of these missions! Credits: NASA and J. Olmstead (STScI)

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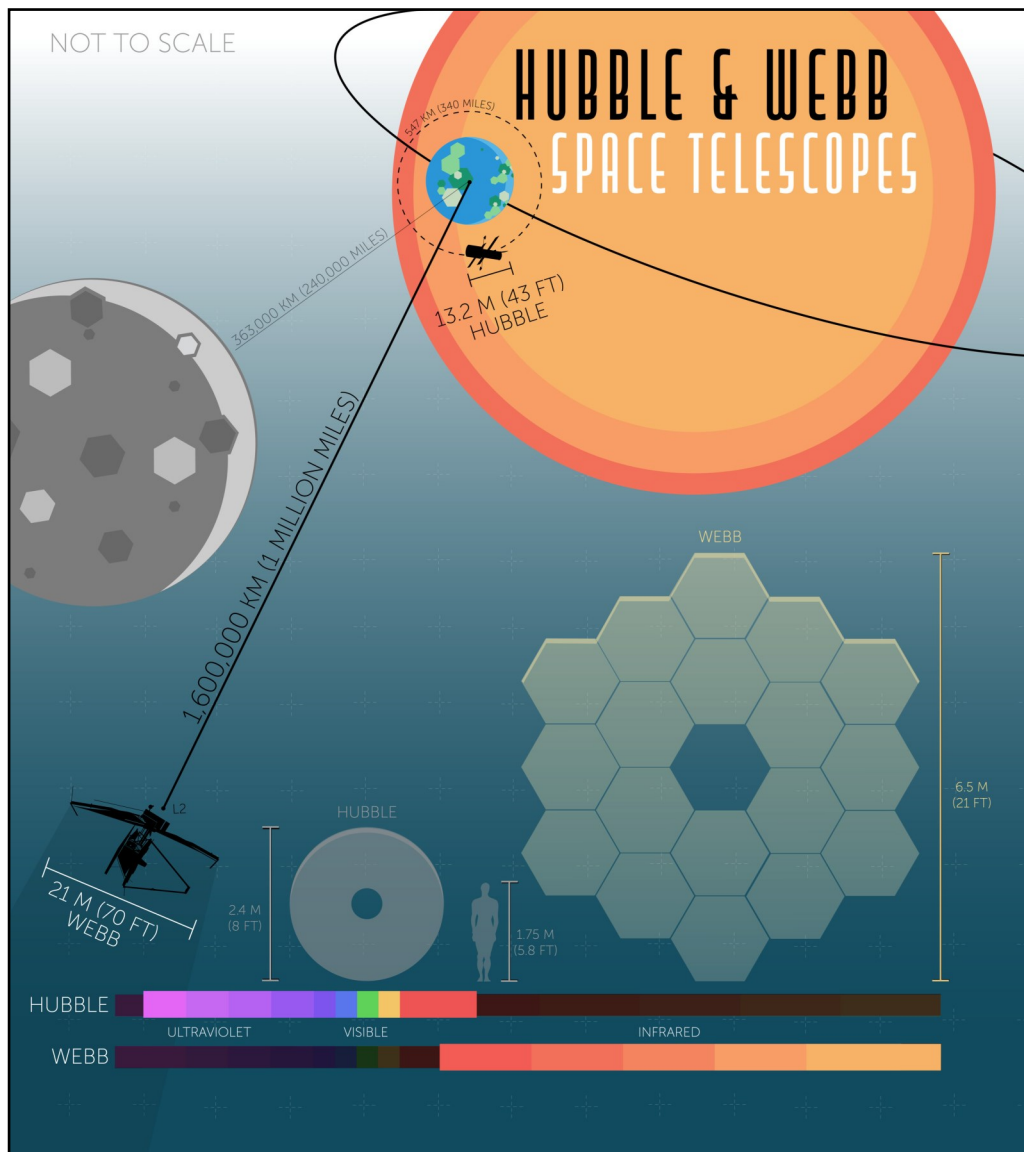
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Webb will join with other observatories to study black holes - including the one lurking in the center of our galaxy, and will study solar systems around other stars, including planetary atmospheres, to investigate their potential for hosting life.

Wondering how Webb's infrared observations can reveal what visible light cannot? The "Universe in a Different Light" Night Sky Network activity can help - find it at [bit.ly/different-light-nsn](https://bit.ly/different-light-nsn). Find the latest news from NASA

and Webb team as it begins its mission by following #UnfoldTheUniverse on social media, and on the web at [nasa.gov/webb](https://nasa.gov/webb).

The above article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit <https://nightsky.jpl.nasa.gov/> to find local clubs, events, stargazing info and more.



Webb will follow up on many of Hubble's observations and continue its mission to study the most distant galaxies and stars it can - and as you can see in this comparison, its mirror and orbit are both huge in comparison, in order to continue these studies in an even deeper fashion! Credits: NASA, J. Olmsted (STScI)



# Methacton SCHOOL DISTRICT

PRESENTS:

## Mallon Planetarium Community Shows



Follow Mallon Planetarium  
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Space Facts, News, & Events

### Friday, September 17th

6:30 - Celestial Highlights & Planet Tour

8:00 - Celestial Highlights & Moons: Worlds of Mystery 

### Friday, October 15th

6:30 - Celestial Highlights & Moon Witch

8:00 - Celestial Highlights & Space Exploration Update

### Friday, October 29th

6:30 - Funny Thing About The Sky

8:00 - Funny Thing About The Sky (Encore)

### Friday, November 19th

6:30 - Celestial Highlights & We Are Stars

8:00 - Celestial Highlights & Eclipses

### Friday, December 3rd

6:30 - Celestial Highlights & Seasons of Light Holiday Special

8:00 - Celestial Highlights & Seasons of Light Holiday Special (Encore)

### December 10th - 18th

6:30 - Laser Light Shows Return to the Mallon Planetarium!!!!!!

**[www.methacton.org/Planetarium](http://www.methacton.org/Planetarium)**

for Details, Tickets, & News

Arcola Intermediate School  
4001 Eagleville Road  
Eagleville, PA 19403

**Adults: \$8**

**Children/Students/Seniors: \$6**

## DVAA Telescope Rentals

Celestron NexStar 5SE



Orion 6" Dossonian



DayStar 60mm Solar Scope



Ioptron Tracker



Orion 6" StarBlast Dobsonian



All scopes include tripod/base, eyepieces, manuals, power, etc. Rental is \$10/month with \$20 deposit. More info. at [www.dvaa.org](http://www.dvaa.org) under the OBSERVING tab. To rent one of these scopes, contact Joe Lamb at [rentals@dvaa.org](mailto:rentals@dvaa.org).

## The Delaware Valley Amateur Astronomers

Since 1976, the **DVAA**, a non-profit corporation, has **shared the wonder and science of astronomy** with thousands of amateur astronomers and the public in the Philadelphia area. Each month we host dark-sky and local star parties, telescope workshops, science & astronomy lectures, educational outreach sessions, and more. To learn more or to join DVAA, please visit [www.dvaa.org](http://www.dvaa.org).

Check the schedule for our **free monthly meetings open to the public**, usually held on Friday via Zoom.

**get in on the fun:**  
**JOIN the DVAA TODAY!**

**Dues are \$40 per year** for an individual, \$60 for a Family Membership, or \$10 for a Junior or Student Membership. **Membership benefits** include our monthly newsletter, membership in the Astronomical League (including its publications), access to our dark-sky observing sites, and inexpensive rentals of fine telescopes. You can join or renew online at [www.dvaa.org](http://www.dvaa.org). If paying by mail, include a note stating what you are paying and membership category desired. Make checks payable to "DVAA" and send to our treasurer: Louis Berman, 477 Turner Avenue, Drexel Hill, PA 19026, or for more information contact [treasurer@dvaa.org](mailto:treasurer@dvaa.org).

