

# amateur ASTRONOMER



sharing the wonder and science of astronomy



## PLAN ON IT!

**August 6 (8:00 pm - 11:00 pm) Public Star Party** at Valley Forge National Historical Park model airplane field. Free and open to the public (pre-registration encouraged). Backup date June 3. [More info.](#)

**August 13 (all night) Perseid Meteor Shower Peak.** See groups.io for updated plans to observe (although the nearly-full moon will interfere greatly)

**August 17 (7:30 pm) Astrophotography Workshop on Zoom.** Details on Page 5 or at [www.dvaa.org](http://www.dvaa.org).

**August 19 (6:30 pm) In-person General Meeting and Picnic** at Fort Washington State Park, Militia Hill Pavilion L-3. Details on [Page 4](#) or at [www.dvaa.org](http://www.dvaa.org).

**August 20 Chesmont StarFest** at Hopewell Furnace National Historic Site. Details on Page 16.

**August 20 (8:00 PM) Dark Sky & Telescope Clinic for Beginning and Intermediate Observers** at Green Lane State Park. Rain dates Aug. 21 and 22. For further details, and to register go to [www.dvaa.org](http://www.dvaa.org).

**September 3 (7:30 pm - 11:00 pm) Public Star Party** at Valley Forge National Historical Park model airplane field.

**September 9 (7:30 pm) In-person General Meeting** at Radnor Township Building; will also be livestreamed.

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

## JWST: First Light!

After 6 months at L2, the James Webb Space Telescope is aligned and operational, and has released its first images!

Here is the first image released, the “Webb Deep Field,” showing numerous galaxies going back most of the way to the Big Bang, many of which have been lensed by foreground objects.

*Public domain image from ESA / NASA / STScI courtesy of Wikipedia.*

## CONTENTS:

**Club News & Events**  
PAGES 1-2

**Getting My Fix**  
Harold Goldner  
PAGE 3

**Upcoming Monthly Meetings & Outreach Events**  
PAGE 4

**Dark-Sky Observing Clinic Notice**  
PAGE 5

**Zoom Astrophotography Workshop Notice**  
PAGE 5

**STEM-YEA Outreach Event Summary**  
PAGE 6

**Recap: June Monthly Meeting**  
Jeremy Carlo  
PAGES 7-8

**Photos**  
PAGES 9, 11, 12, 14

**DVAA Outreach Toolkits**  
Al Lamperti  
PAGE 10

**Artemis: A Trip to the Moon (and Back)**  
David Prosper  
PAGES 13-14

**ChesMont StarFest**  
PAGE 15

**Regional Star Parties**  
PAGE 16

**Telescope Rentals**  
PAGE 17

**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!

**David Hogue (Newtown Square)**  
**William F. Thesing (Willow Grove)**  
**Tom Toale (Langhorne)**  
**Atticus Wells (Berwyn)**

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	Barry Johnson Tracey Trapuzzano Scott Vanaman	<a href="mailto:mbratlange@dvaa.org">mbratlange@dvaa.org</a>
Astrophotography	Lou Varvarezis	<a href="mailto:astrophotography@dvaa.org">astrophotography@dvaa.org</a>
Camping and MSSP	Bill McGeeney	<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 note at 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	Roy Patton	<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, August 19, 2022: Astronomy Fair at Fort Washington State Park. Details on p. 4.**

Monthly Meetings have returned to the Radnor Township Building! All are welcome to attend in-person. Meetings will also be livestreamed on [YouTube](#), although this month's meeting will not be due to the location.

**Meeting Location: Radnorshire Room**  
**301 Iven Avenue, Radnor, PA 19087**

Upcoming Meeting Dates: (all Friday evenings): Aug. 19, Sept. 9, Oct. 14, Nov. 11, and Dec. 9.

### 2022 Public Star Parties

DVAA public star parties are held at Valley Forge National Historical Park on the Model Airplane Field. ([Google Maps](#)). **Weather Hotline: 484-367-5278.**

*The star party has returned to the traditional public telescope viewing format. The Board will continue to monitor the pandemic status throughout the year. Check the web-site ([www.dvaa.org](http://www.dvaa.org)) for updates.*

**Public Star Party dates for 2022 (all Saturday evenings):**  
**Aug 6 (8:00), Sep. 3 (7:30), Oct. 8 (6:30), Nov. 12 (5:00).**

*New this year: Backup dates will be designated the Friday preceding each date above. Check your email or the web-site, or dial the hotline, for the final weather call.*

**Newsletter Editorial Committee:** Jeremy Carlo, George Keigh-ton, 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 taking the lead for the May and June issues. Jeremy Carlo is the lead editor for July and August.

*Follow the DVAA on Facebook and YouTube!*



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



# Getting My Fix

## Harold Goldner [email](#)

I am at the location near my house where I occasionally enjoy my observing. I don't often take any equipment with me (although I always have my binoculars in my trunk.) The location is not more than three miles from my house, almost walking distance away (and shall remain unidentified because it might not be legal for me to be there after hours.).

The location is above the level of its parking lot, and below the level of the street, separated from the street by tennis and basketball courts. There is a radio tower not far away, atop a brick building which has a bright white light on one side that tends to go on for a minute, then off for a minute, but I am able to drift far enough to the west to get away from that white light.

The light dome from Philadelphia is significant in the south and east, and I would imagine that the location's Bortle score is nothing to write home - probably 7 or worse - but it provides a level grassy surface on which I can put my anti-gravity lounge and simply stare at the sky for hours at a time. It's a decent Perseids viewing site for a moonless night.

Once there were a handful of guys playing basketball on the courts until well after dark using some kind of devious spotlight to continue, which annoyed me to no end. Another time a romantic couple decided to set up a dinner picnic and blanket not far away. I just waited them out until I had the place to myself.

Then it's just the sky and me, as I wait for meteors, or practice identifying the constellations in mediocre conditions relying upon my limited recall of the brightest stars. Occasionally I will even get to watch an ISS fly-over. Near meteor shower peaks, I can usually catch a half dozen or so shoot-

ing stars. Last night, caught a few late Southern Delta Aquariids or early Perseids.

When I feel particularly ambitious (and am willing to schlep my equipment up the steps from the parking area, which requires several trips, and, unlike our Valley Forge Site, the wagon is of no use), I will bring telescope and observe the planets or double stars. This year, of course, the planets are early morning objects, so I am not likely to bother with my equipment.

I recently acquired a used Canon EOS t3i, and I hope to mount it on a simple tripod and take test shots this summer as I ease, very slowly, into very rudimentary astrophotography. I'll never be anywhere up to the caliber of Dick Steinberg or Lou Varvarezis, and I don't aspire to be. I have no patience for post-processing; I have attended two astrophotography sessions online and recognize both that they are exceptionally fine resources to the skilled and experienced astrophotography and are also about as far over my head as the James Webb Telescope is. Last session started by exploring how many photons hit the CMOS and I knew I was lost.

But it's private and personal time. It's quiet time. No music in the background. I'm not listening to a podcast (although I do sometimes listen to one telling me what to expect to see before I go). Nobody is around to bother me. My wife has absolutely zero interest in standing or sitting in a field in the middle of the night and looking up. I even know that if a police officer comes by and wants to know what I am doing, I'll tell him or her all about DVAA, our star parties, and might even show him or her something they've never seen before.

To a certain extent, I feel like a magician or wizard, conjuring up a world that is wide open to the imagination, alone with my own thoughts, and enveloped in the darkness and wonder of the night sky.

It's more addicting than the most powerful of drugs. Utterly harmless, and completely irresistible. I hope you each have your own places where you can get such a "fix."

Clear skies.

*(left) Jupiter and Saturn from Harold's "personal" viewing location.*

*Photo credit: Harold Goldner.*





# **DVAA August Meeting: “Take Your Observing to the Next Level”**

**August 19, 2022  
Fort Washington State Park  
Militia Hill Day Use Area MHL3 Pavilion**

**6:30-8:30 pm Picnic and Astronomy Exhibits (rain or shine)  
8:30-10:30 pm Observing & Telescope Help (weather permitting)**

This is your invitation to an outdoor, in-person meeting of the Delaware Valley Amateur Astronomers, conducted in an “Astronomy Fair” format. DVAA experts will set up displays and demonstrations, and answer questions on how you can take your observing to the next level. If you would like help with your telescope or binoculars, bring them along for some expert hands-on help. Meeting is open to the public. Newer DVAA members especially encouraged to attend.

- ⇒ Solar & night sky observing (weather permitting)
- ⇒ Solar eclipses: How to plan
- ⇒ Big Dobsonian telescopes & big binoculars
- ⇒ Live astrophotography demonstration
- ⇒ Celestron gizmos and gadgets
- ⇒ Astronomical door prizes
- ⇒ There will be FOOD!
- ⇒ Everything is FREE!

Note that this meeting  
will NOT be livestreamed  
due to the outdoor location.

“Be there or be square”

For directions and more info, visit [www.dvaa.org](http://www.dvaa.org) and click on the link under “Upcoming Events.”

Registration is recommended.

## **Upcoming Observing Events**

**August 6 - Public Star Party at Valley Forge National Historical Park (see p. 2 for details)**

**August 13 - Perseid Meteor Shower**

**August 20 - ChesMont Astronomical Society StarFest  
(see announcement on p. 15)**

**August 20—Dark Sky Clinic for Beginning and Intermediate Observers  
(see announcement on p. 5)**





# Astrophotography Workshop on Zoom

Wednesday, August 17 at 7:30 PM

[Zoom Link](#)

*This will be an informal session geared toward post-processing of images. Anyone who has any questions about post-processing which they would like addressed can send an email to [astroimagers@dvaa.org](mailto:astroimagers@dvaa.org). Or just show up!*

[Youtube recordings of past Astrophotography Workshops](#)



## Dark Sky Observing Clinic for Beginning and Intermediate Observers

Green Lane Park

August 20, 2022 (Weather backup dates August 21 & 22)

If you would like to sharpen your visual observing skills, join DVAA seasoned observers for a dark sky observing clinic at one of our favorite local spots, Green Lane Park. The 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 and your questions about setup, filters, viewfinders, eyepieces, observing tools, and celestial targets. Master Observer Al Lamperti will point out the season's 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 planets, double stars, and Messier objects. You will learn how to find some popular celestial targets such as the Hercules Cluster, Ring Nebula, Owl Cluster, the Double Double, and the Coathanger asterism.

The clinic will take place at the field adjacent to Red Trail Parking at [Green Lane Park](#), 2144 Snyder Road, Green Lane PA 18054 (approximately 40 minutes' drive from Radnor). Success will depend upon clear skies so in addition to the main date of August 20th, we have two backup weather dates (August 21st and 22nd). Please arrive on time before 8pm to allow setup before darkness descends.

Advance registration for attendees **on or before August 14th** 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. This clinic is open to DVAA members and their immediate family members. Any seasoned DVAA observers who would like to participate as experts are welcome; please email [veep@dvaa.org](mailto:veep@dvaa.org) if you would like to participate.

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](#)



Photos: Observing clinics held in 2021. Photo credits: George Keighton and Al Lamperti.



## STEM Youth Explorer Academy



George Keighton, Joe Lamb, Al Lamperti, and Jan Rush on the astronomy field. *Photo credit: Elan Lift*

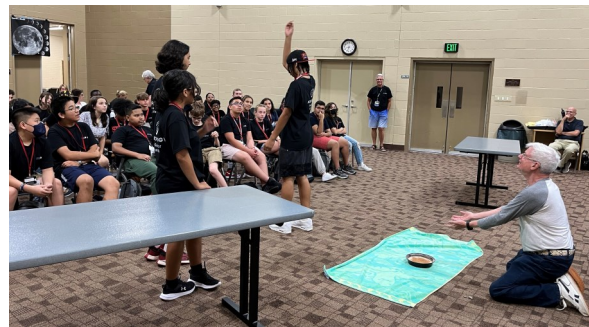
On July 8th and 9th, DVAA, along with other regional astronomy clubs, had the opportunity to participate in a residential STEM camp for disadvantaged students in a 5-county area. This initiative was developed and supported by regional Rotary Clubs. Forty-one rising 8th Graders participated in the inaugural academy at Albright College in Reading, PA.

The goal of the hands-on learning experience was to deliver an immersive STEM curriculum that sparks intellectual curiosity and a love of lifelong learning. The curriculum focused on "Astrobiology – Search for Life on Mars" developed with the SETI Education Staff and Albright SRI Educators.

On two evenings, the students were invited to learn how to operate a telescope and observe the moon. DVAA members George Keighton, Joe Lamb, Al Lamperti, and Jan Rush participated in these evening sessions along with 8 other astronomers from the Berks, ChesMont and Lehigh Valley astronomy clubs. It was an exhausting but gratifying experience for the DVAA astronomers! Many thanks to Melissa and Lou Varvarezis for identifying this outreach opportunity!



Forty-one rising 8th graders from schools in a 5-county area participated in the residential STEM camp. *Photo credit: Darlene Scott*



On the first night, the indoor Cloudy Night Plan was in effect. Here Al Lamperti demonstrates moon cratering. *Photo credit: Jan Rush*



Left: With 3-4 students at each telescope, everyone received hands-on telescope experience.

Right: Doubtless a future astronomer!

*Photo credits: George Keighton*





# The July Monthly Meeting

Jeremy P. Carlo [email](#)



With President Harold Goldner in quarantine and VP Jan Rush away on business, the DVAA July meeting was presided over by Programs Chair Jeremy Carlo.

Jeremy started by showing some of the new images from the James Webb Space Telescope, which had been released earlier that week. Following this, Jeremy gave an update on upcoming events. These included a "JWST First Light" event at Penn State—Abington on July 24, the upcoming Astronomical League Convention (ALCON) and Stellafane Convention on the last weekend of July, and the next Public Star Party to be held at Valley Forge on August 6. Jeremy welcomed three new members to the club, and gave a plug for the next monthly meeting, entitled "Take Your Observing to the Next Level," to be held outdoors at Fort Washington State Park on August 19.

Next, DVAA Observing Chair Andrew Hitchner gave his observing report for July, focusing on the constellation of Aquila. Aquila's alpha star is Altair, one of the three stars of the Summer Triangle dominating the evening sky in the summer and much of the fall. It's one of the oldest constellations, noted by the Sumerians back in 2600 BC. Aquila is located near the Celestial Equator, and is also quite close to the galactic plane. Within Aquila lies the Great Rift, a split in the Milky Way visible to the naked eye under dark skies.

Telescopically, Aquila has a wealth of sights. It's the home of a large number of planetary nebulae and dark nebulae, although surprisingly has relatively few open clusters (although nearby constellations such as Scutum contain a high density of open clusters). These include the planetary nebulae NGC 6781, NGC 6772, NGC 6778, NGC 6852, NGC 6804, and Abell 70. Prominent dark nebulae include Barnard 142, shaped like the letter E, and Barnard 139. Open clusters include NGC 6709.

Aquila is also home to the variable star R Aql, which is a Mira-type long period variable star, which varies from a magnitude of 5.5 (visible to the naked eye under very dark skies) to 12 over a period of 284 days. Aquila also hosts a number of double stars, including 23 Aquilae, one of which appears green! Andrew then gave a discussion of why green stars do not exist in nature; for an object which emits broadband radiation, if its peak wavelength of radiation is in the green part of the spectrum, it is also giving off red and blue light, which the human eye resolves as "white." The sun, for example, peaks somewhere near the green part of the spectrum, yet we see it as white, or maybe a bit yellowish as blue light is preferentially scattered by the atmosphere. Thus, the only way a star can appear "green" is an optical illusion as a result of contrast with a companion star of very different color. Hence the proliferation of impossible "spectral" colors - green, emerald, lilac, turquoise, violet - in descriptions of double stars.

Switching hats, Programs Chair Jeremy Carlo then introduced the evening's speaker, NASA/JPL Solar System Ambassador John Conrad. John has given a number of presentations to the DVAA in recent years, on topics including lunar science, Cassini's visit to Saturn and Titan, global climate change, and most recently, Rocket Science 101: Getting Into Space.

John started by noting how great it was to be back at an in-person meeting, with his most recent presentations delivered by Zoom. John also noted that his last in-person trip to Radnor was literal: he tripped in the parking lot on the way home and ended up with a broken ankle, just a few months before Covid locked everything down.

With introductions out of the way, John introduced a serious topic for the evening: impacts by asteroids and comets. In contrast to the recent movie "Don't Look Up," in which people chose to ignore the advice of scientists and engineers, John encouraged us to "Do Look Up!" Impacts are a significant risk to life on earth; while their frequency may be low, their potential to cause massive devastation serves as a counterweight to their rarity. Toward this end, it would be desirable to identify any potential impactors well in advance, giving us a chance to deflect the object to avert collision. It is against this backdrop that the Double Asteroid Redirection Test (DART) was launched in November 2021, for an impactful (pun intended) encounter in September 2022.

The Minor Planet Center (MPC) of the International Astronomical Union (IAU) maintains info about objects whose orbits pass close enough to the earth to potentially impact someday. Currently about 500,000 of these objects are known, although it is also known that this is only a small fraction of the total (although, if it provides some consolation, we do believe most of those unknown objects are on the smaller end of the spectrum, to be explained below).

John then gave a rundown about what is known. Obviously, larger impactors are going to cause much more damage, with the largest objects being potential "species enders," like the Chicxulub event which wiped out the dinosaurs (among others) 65 million years ago, and smaller objects being limited to local or regional devastation, like the Tunguska impact of 1908.

To make the above points more quantitative, John talked about size, frequency, and what percentage of these objects we think are known (and thus being tracked). The largest objects are 10 km in diameter or larger; these "Chicxulub" type impacts are believed to occur once every 100-200 million years; four such objects are currently known in orbit, and we believe (hope, fingers crossed) that this is all of them, and there isn't a mysterious fifth one with our name on it. An impact from one of these objects would be a "species ender." Hopefully some small mammals (or cockroaches) survive and can repopulate the planet over the next few million years.

Going down in size are objects in the 1-10 km class; of these 900 are known, and we think this is about 90% of the total. These objects probably impact the earth once every few hundred thousand years. Such an object would cause global devastation; while it wouldn't wipe out humanity entirely it would certainly kick the survivors back to about the Stone Age for a good chunk of time.

Next down the list are objects in the 160 meter - 1 km range. Of these, about 8,000 are known, and this is believed to be about 40% of the total. These are the objects which would cause regional devastation, and are expected to collide with the earth once every 25,000 years or so. Meteor Crater in Arizona, roughly 25,000 years old, is an example of this sort of impact, estimated to have caused a fireball extending to a radius of 6 miles, with "heavy casualties" out to 15 miles, and hurricane-force winds out to 25 miles. (Imagine that hitting a populated city rather than a rural area in Arizona!)

Next down the list are objects in the 25 - 160 meter class.

# The June Monthly Meeting (continued)

(Continued from previous page)

These would be classified as “locally devastating,” and occur once a century or so, releasing the energy of 0.5 to 5 megatons of TNT, comparable to a hydrogen bomb. Tunguska would be an example of this sort of impact (which thankfully struck over a desolate area so the local devastation was mostly limited to trees). The more recent Chelyabinsk event was probably on the smaller end of this scale. However, there are believed to be about 5 million such objects in orbit, of which only about 1% are known.

Finally are the smallest objects, those in the 4-25 meter class. These would be proportionately less damaging, with most not making it to the surface, although it's believed that there are something like 500 million of these, 99.9% of which are undiscovered. Even if they don't make it to the surface, though, they could fool us into thinking it was a nuclear explosion and cause somebody with a quick trigger finger to hit the Big Red Button...

With the threat enumerated, the question turns to what to do about it. For the largest of these objects (1 km and above), a nuclear bomb is the only device with enough energy to deflect them enough to avert collision. Of course, the more time we have the better, since a small “nudge” years in advance will add up to a much larger change in position than a larger shove shortly before impact. Another intriguing possibility is the “tractor” method in which a spacecraft repeatedly flies by, causing a small gravitational nudge each time. Over a number of years this can add up to enough to avert a collision, but a good deal of time (at least a decade, preferably more) is needed.

However, for objects on the smaller side (which are believed to be a more frequent threat), there is another option called “kinetic deflection,” in which a spacecraft crashes into the object and transfers its energy and momentum to the object. This method is believed to be effective for objects in the ~100 meter scale (so, Tunguska-ish impacts, maybe even Meteor Crater).

This is where the Double Asteroid Redirection Test (DART) comes in. DART was launched in November 2021 and will encounter the double asteroid system Didymos/Dimorphos in September 2022. The object will be to crash into the smaller object, Dimorphos (which is effectively a “moon” of Didymos), and see how much its orbit around Didymos is changed by observing it over the following months and years.

Didymos is roughly 780 meters in diameter, while Dimorphos is 160 meters in diameter. Note that these are estimates, as we don't have high-quality imagery of either; DART will provide this for the first time in the last few weeks before impact. Suffice it to say, we know very little about Didymos, and even less about Dimorphos, other than that their orbital period is about 12 hours. This latter fact is found from studying small variations in brightness as one object eclipses the other in their regular orbits, which is about the only information you can glean from something which appears as nothing other than a pinpoint in even the largest telescopes.

DART was launched on a SpaceX Falcon from Vandenberg Space Force Base in November 2021, and its route to Didymos and Dimorphos will take roughly 10 months, with a scheduled impact on or about September 26 (plus or minus a few days depending on what exactly we learn from those first observations). This impact date was chosen since Didymos/Dimorphos will be fairly close to earth at that time, enabling more detailed observa-

tions by ground-based observatories. Shortly before impact, DART will release a small cubesat called LiciaCube, which will take some images of the impact itself, which will provide some closer-range imaging, albeit not as capable as the main telescope (8" aperture) on DART itself.

What do we hope to learn? After all, this seems like a simple physics problem: momentum equals mass times velocity, and kinetic energy equals  $\frac{1}{2}mv^2$ . So we just get some freshman physics student to calculate these things, and we're done, right?

Well, for one, there is the practical aspect. Can we actually do this? Can we actually hit this object, with the limited information we have available? And if we do, can we collect the data required to determine whether the collision was successful in changing the trajectory enough to avert collision?

Secondly, we don't really have a good handle on the composition of asteroids. We usually think of them as solid rocks, but in fact most asteroids are more like a “rubble pile” of smaller pieces loosely bound together. What happens when you hit such an object? Think of kicking a rock, versus kicking a pile of dirt. Moreover, this impact is explosive, and will kick up a large stream of ejecta from the impact site; the recoil from this ejecta will tend to increase the effectiveness of the collision. This is parametrized by a factor called “beta,” which is essentially a multiplier on the effectiveness relative to the naïve Physics 101 calculation. Or, an alternate scenario is that the asteroid breaks into smaller chunks, some of which may still be on a collision course with the earth. One good experiment is worth a ton of theory.

John then gave a detailed rundown on what will happen as DART approaches its final impact. About 30 days prior to impact, DART will be able to detect Didymos for the first time with its 8" main telescope. Starting about 10 days out, the Deep Space Network will establish continuous radio communication between earth and DART so last-minute commands can be sent and received continuously. Somewhere in this interval the LiciaCube cubesat will be released, and can use its two cameras (named Luke and Leia). Around 4 hours before impact, DART will enter autonomous mode, in which it uses its own onboard controls to guide it toward Dimorphos. One hour before impact, DART will finally be able to resolve the surface of Dimorphos, from a distance of 15 miles. Over the final hour, LiciaCube will watch as DART makes its final approach and impact into Dimorphos, and will observe the resulting plume.

Unfortunately, LiciaCube's best resolution of the surface will be about 2 meters per pixel, which is insufficient to really see close detail. Toward that end, a follow-up mission called Hera is planned, to be operated by the European Space Agency (ESA). Hera is planned to launch in 2024 and arrive at Didymos in 2026 to conduct high-resolution mapping of the surfaces of both objects.

Finally, John issued a challenge to amateurs: Didymos can be detected photographically in scopes as small as 8 inches, although it will be in the far southern sky when DART meets it. Will any amateurs be able to photograph this object?

Many thanks to John Conrad for, as always, an engaging and accessible, yet thorough, discussion of the DART mission, and the threat of asteroid impacts in general.



## Photos

**Star Party at BMVO!** An impromptu star party was held at Blue Mountain Vista Observatory (BMVO) near New Ringgold in early July, with members of DVAA and ChesMont in attendance.

Seen here are Jeremy Carlo's 10" "red, white, and blue" scope, Al Lamperti's 22" Obsession beast, Jan Rush's 8" SCT, and several large Dobbs belonging to ChesMont members.

Photo credit: Fred DeLucia, ChesMont Astronomical Society.



### ***Would you like to get involved with this newsletter?***

We are currently looking for people interested in serving on the editorial board for the *Delaware Valley Amateur Astronomer*.

Generally this would involve being the "lead editor" for approximately 2 issues per year. (You choose which months!) For the rest of the year, you participate in discussions and provide advice/feedback to the lead editor for that month.

Editing is done in Microsoft Publisher (the Club will get you a copy if you don't have one!), and all distribution is through the club website (no printing / folding / mailing / licking stamps)!

If interested, contact us at [newsletter@dvaa.org](mailto:newsletter@dvaa.org)!

# Show Your Enthusiasm! DVAA Toolkits

## Al Lamperti [email](#)



Besides participating in various star parties around the area, one can also inspire and awe folks about our hobby by giving talks to a classroom of children or a group of adults. You can contact science teachers in grade and high schools, activities persons in local libraries and retirement residences. They welcome opportunities such as this.

Even if you have never done public speaking before, not to worry; they truly appreciate the different and very educational experience. You never know what spark you may light in an individual of any age by introducing them to some aspect of the universe.

Topics could be anything you feel comfortable talking about, your favorite nighttime observing object, your experiences in getting started, etc. so the opportunities are truly endless.

Listed below are seven Toolkits the DVAA has along with a short description of each. They were sent to us gratis by the Night Sky Network and funded in part by NASA. You can use those parts of the toolkit you feel would be beneficial to the audience and you would be most comfortable using yourself.

### 1. Life in the Universe

Aliens are a favorite topic for many visitors to public astronomy events. This toolkit is designed to take science fiction questions and direct them toward scientific facts and exciting new discoveries being made in the search for life outside Earth.

### 2. Our Magnetic Sun

This Toolkit provides activities and demonstrations that explore the Sun and its powerful magnetic fields, how these fields generate the features we observe, and how the Sun's magnetic activity affects our way of life and technologies here on Earth.

### 3. Space Rocks

Our smallest Solar System neighbors are often overlooked when we think of objects in our solar neighborhood. But in fact, asteroids and comets have had dramatic effects on Solar System bodies,

including Earth. Impacts are not just a part of history. The Earth is hit all the time with literally tons of space rocks. This Toolkit explores some of our smallest neighbors, asteroids, and their significance for us here on Earth. There is even a sampling of meteorites and meteor-wrongs. Using the provided magnet, one can discern the iron meteorite. Kit also includes a 20' DVD "Cosmic Collisions."

### 4. Telescopes: Eyes on the Universe

This Toolkit provides hands-on activities to answer common questions at the telescope: Why don't I see any color? Why is the image upside down? What power is your telescope? Why doesn't it look like the photos? Can you see the flag on the Moon?

### 5. Shadows and Silhouettes

Hands-on activities on Moon phases, lunar and solar eclipses, transits, and Venus phases. Features NASA's Kepler Mission and provides activities to explore searching for planets orbiting in the habitable zone around other stars.

### 6. Supernova!

The SUPERNOVA! Toolkit tells the story of the lives of stars, cosmic radiation, and how Earth is protected from that radiation. Using marshmallows and macaroni, explain nuclear fusion and the radiation generated from a supernova explosion. Use balls in an activity that illustrates what happens when a star explodes. Find the stars in the night sky likely to go supernova. Discover the importance of supernovae in the universe.

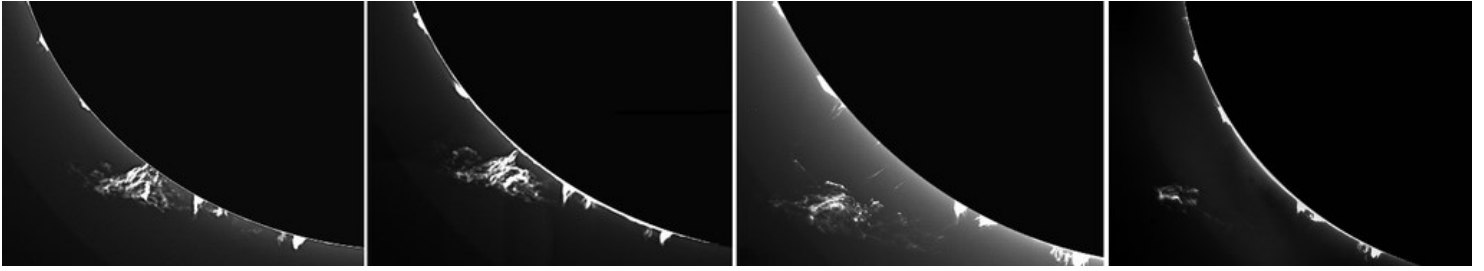
### 7. Big Astronomy

This set of 7 activities and demos will engage visitors with dark skies, color filters, sky legends from around the world, and the people who make astronomy happen.

Please contact any DVAA Board member if you are interested in doing this most beneficial service or if you have any further questions about taking your "first step."



## Astrophotos—The Dynamic Sun!

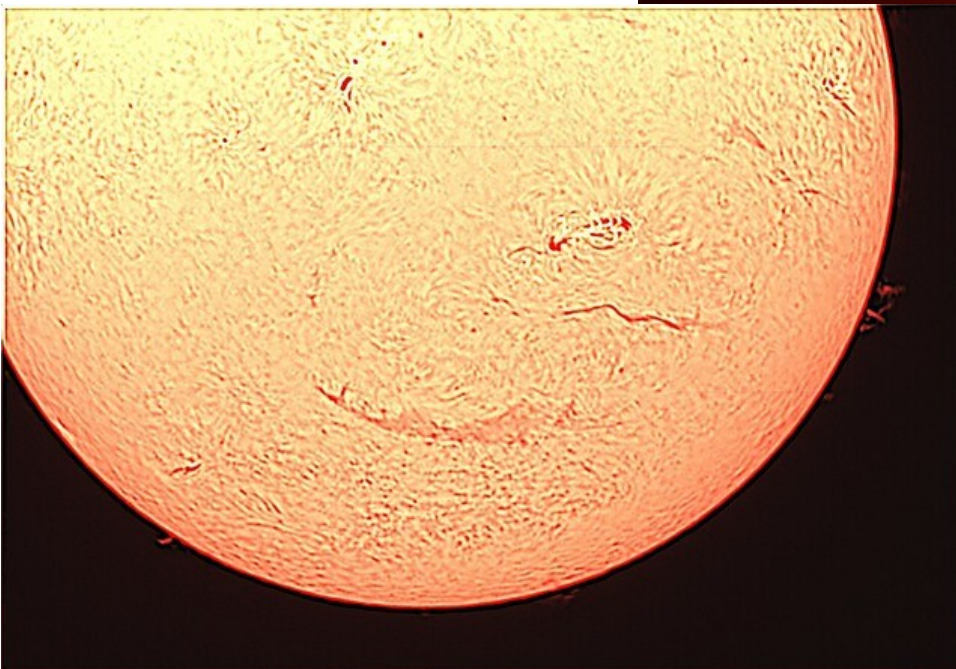


*(above) Tom Nolasco captured these images, showing the time evolution of a prominence breaking free of the sun on July 14th.*

*(right) Full-disk hydrogen-alpha view of the sun taken on July 14 by Tom Nolasco, showing a number of active features overing the entire disk, as well as several prominences around the limb.*

*Both of Tom's photos were taken using a Lunt 60 mm hydrogen alpha telescope and a ZWO ASI174MM camera.*

*(below) Hydrogen alpha image of the sun taken by Prasad Agrahad on July 11, also using a Lunt LS60THa, with a ZWO ASI224MC camera.*





## More Astrophotos

*(right) The Northern Lagoon (top), Bubble Nebula (center), and open cluster M52 (lower left) in Cassiopeia, imaged by Doug Lentz. Wide-field view covering 1.5 degrees x 1.5 degrees, taken from Monson, Maine on July 3. Taken with a William Optics Z61 refractor, with a ZWO ASI533 OSC camera, using 25 frames of 240 sec each.*

*(below) A trio of galaxies in the Virgo cluster - NGC 4222 (upper left), NGC 4216 (center), and NGC 4206 (right), taken by Dick Steinberg using a Celestron C8 SCT at f/6.7, with an Orion Parsec cooled CCD camera.*





# Artemis 1: A Trip Around the Moon - and Back!

David Prosper



This article is distributed by NASA Night Sky Network

We are returning to the Moon - and beyond! Later this summer, NASA's Artemis 1 mission will launch the first uncrewed flight test of both the Space Launch System (SLS) and Orion spacecraft on a multi-week mission. Orion will journey thousands of miles beyond the Moon, briefly entering a retrograde lunar orbit before heading back to a splashdown on Earth.

The massive rocket will launch from Launch Complex 39B at the Kennedy Space Center in Florida. The location's technical capabilities, along with its storied history, mark it as a perfect spot to launch our return to the Moon. The complex's first mission was Apollo 10 in 1968, which appropriately also served as a test for a heavy-lift launch vehicle (the Saturn V rocket) and lunar spacecraft: the Apollo Command and Service Modules joined with the Lunar Module. The Apollo 10 mission profile included testing the Lunar Module while in orbit around the Moon before returning to the Earth. In its "Block-1" configuration, Artemis 1's SLS rocket will take off with 8.8 million pounds of maximum thrust, even greater than the 7.6 millions pounds of thrust generated by the legendary Saturn V, making it the most powerful rocket in the world!

Artemis 1 will serve not only as a test of the SLS and the Orion hardware, but also as a test of the integration of ground systems and support personnel that will ensure the success of this and future Artemis missions. While uncrewed, Artemis-1 will still have passengers of a sort: two human torso models designed to test radiation levels during the mission, and "Commander Moonikin Campos," a mannequin named by the public. The specialized mannequin will also monitor radiation levels, along with vibration and acceleration data from inside its mission uniform: the Orion Crew Survival Suit, the spacesuit that future Ar-

temis astronauts will wear. The "Moonikin" is named after Arturo Campos, a NASA electrical engineer who played an essential role in bringing Apollo 13's crew back to Earth after a near-fatal disaster in space.

The mission also contains other valuable cargo for its journey around the Moon and back, including CubeSats, several space science badges from the Girl Scouts, and microchips etched with 30,000 names of workers who made the Artemis-1 mission possible. A total of 10 CubeSats will be deployed from the Orion Stage Adapter, the ring that connects the Orion spacecraft to the SLS, at several segments along the mission's path to the Moon. The power of SLS allows engineers to attach many secondary "ride-along" mission hardware like these CubeSats, whose various missions will study plasma propulsion, radiation effects on microorganisms, solar sails, Earth's radiation environment, space weather, and of course, missions to study the Moon and even the Orion spacecraft and its Interim Cryogenic Propulsion Stage (ICPS)!

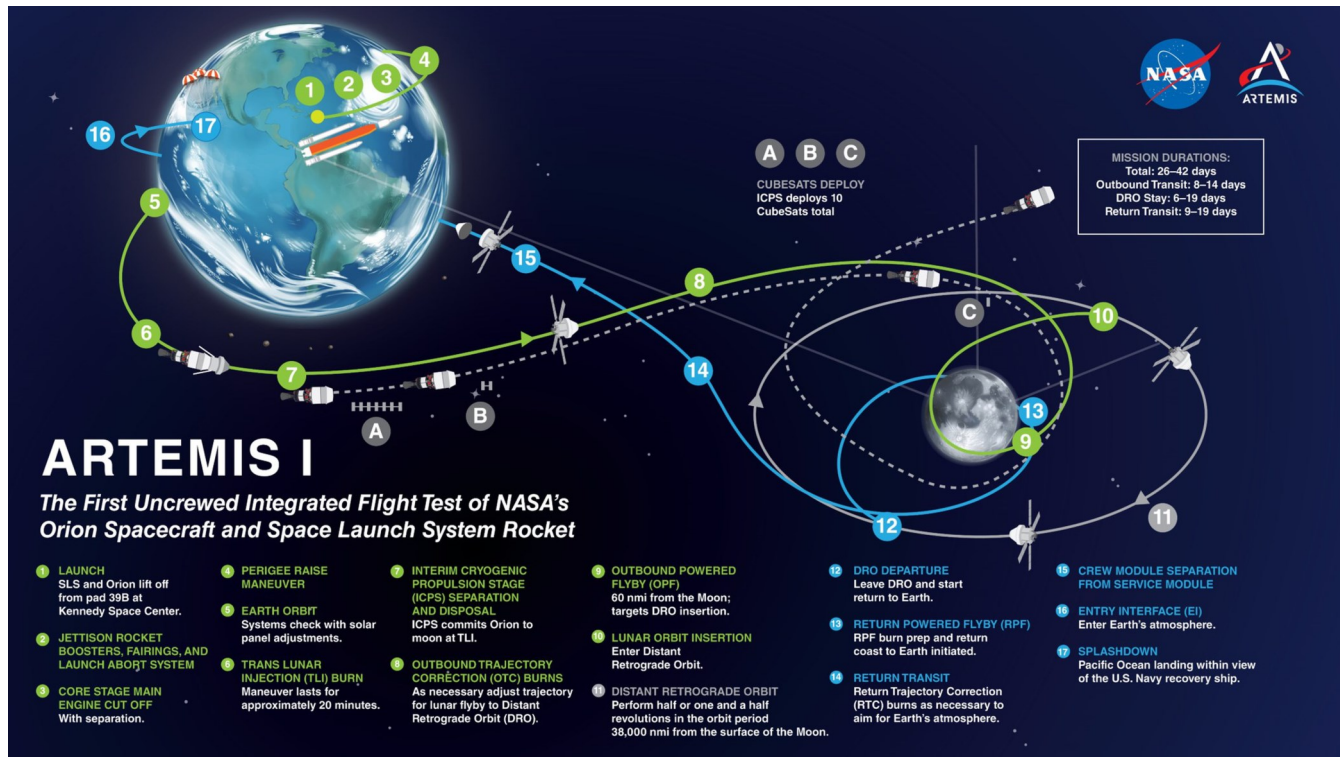
If you want to explore more of the science and stories behind both our Moon and our history of lunar exploration, the Night Sky Network's **Apollo 11 at 50 Toolkit** covers a ton of regolith: [bit.ly/nsnmoon](https://bit.ly/nsnmoon)! NASA also works with people and organizations around the world coordinating **International Observe the Moon Night**, with 2022's edition scheduled for Saturday, October 1: [moon.nasa.gov/observe](https://moon.nasa.gov/observe). Of course, you can follow the latest news and updates on Artemis 1 and our return to the Moon at [nasa.gov/artemis-1](https://nasa.gov/artemis-1).

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.

(Continued on next page)

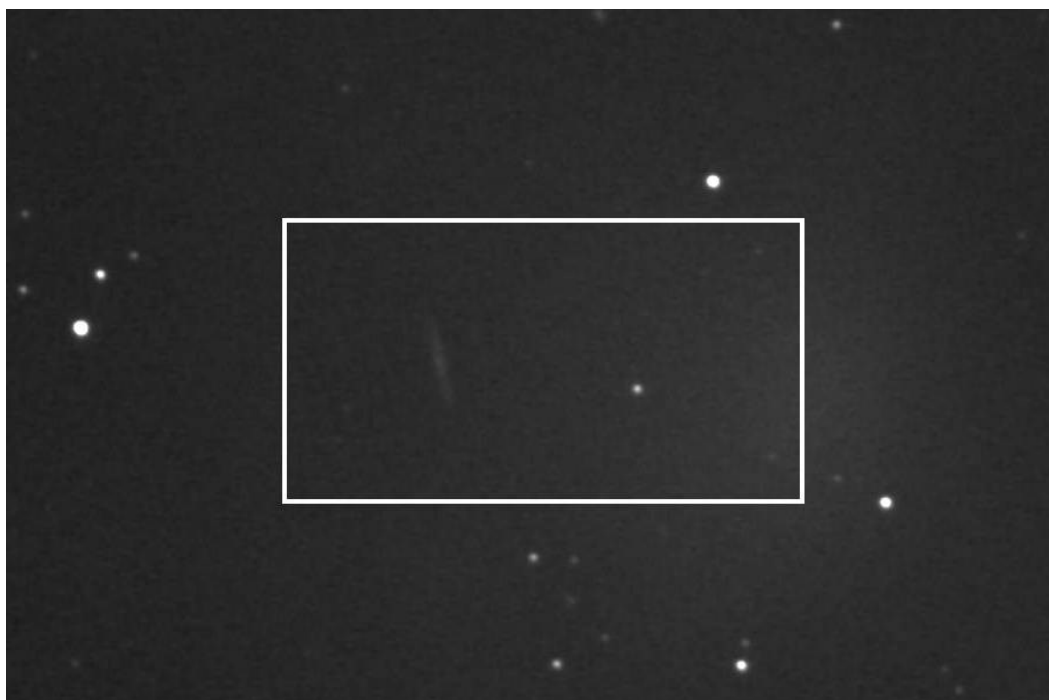
# Artemis 1: A Trip Around the Moon - and Back! (cont.)

(Continued from previous page)



Follow along as Artemis 1 journeys to the Moon and back! A larger version of this infographic is available from NASA at: [nasa.gov/image-feature/artemis-i-map](https://nasa.gov/image-feature/artemis-i-map)

## Even More Astrophotos



(left) Can you see the quasar?

The box contains the 16.6 magnitude galaxy UGC7604 (at left), and the quasar Tonantzintla 618 (or Ton 618 for short, at right).

This quasar lies on the border between Canes Venatici and Coma Berenices, and is estimated to be 10.85 billion light-years away; its light has been traveling to us for 79% of the time since the Big Bang!

Photo by Dick Steinberg using a Celestron C8 with an Orion Parsec cooled CCD camera.



# STARFEST

## 2022



Hosted by **The ChesMont Astronomical Society**

**DATE: SATURDAY – AUGUST 20<sup>TH</sup>**

**RAIN/CLOUD DATE: SUNDAY – AUGUST 21<sup>st</sup>**

### HOPEWELL FURNACE NATIONAL HISTORIC SITE

2 Mark Bird Lane - Elverson, PA 19520 (Route 345 and Hopewell Road)

For directions go to: <http://www.nps.gov/hofu/planyourvisit/directions.htm>

GPS Location Coordinates of Park Entrance: Latitude: 40.20667 Longitude: -75.767660

***Come out and see  
the wonders of the  
Universe through  
many different  
telescopes!***

- **Fun**
- **Educational  
activities for the  
kids**
- **Guest Speakers**
  - **Astronomy  
Presentations**

***Bring a blanket, a  
lawn chair or even  
a picnic dinner!***

***Food and drink  
concession***

#### TENTATIVE SCHEDULE OF EVENTS

**6:00 pm Gates open for solar observing and telescope set up.**

**7:00 Opening Comments:  
Hopewell, ChesMont and POLC**

**7:30 - 8:00** Children's author **Julia Kregenow** will read from her book "Twinkle, Twinkle, Little Star, I Know Exactly What You Are", and will have activities for children

**8:00 – 9:00 KEYNOTE SPEAKER**

**Dr. Jason Wright will talk about his work  
studying exoplanets, life in the universe  
and his work with SETI (Search for  
Extraterrestrial Intelligence)**

**9:15 GRAND PRIZE DRAWING OF TELESCOPE**

**DARKNESS**

**LET THE OBSERVING BEGIN!!**

**FUNDING FOR STARFEST COMES FROM YOUR GENEROUS SUPPORT!  
ADMISSION AND PARKING ARE FREE!**

## Regional Star Parties

### Black Forest Star Party

At Cherry Springs State Park, Potter County, PA

BFSP 2022 IS SCHEDULED FOR  
SEPTEMBER 23RD – 25TH!!

MAIL-IN REGISTRATION WILL OPEN ON JULY 20TH AND ONLINE ON JULY 27TH.

<http://www.bfsp.org>

### Almost Heaven Star Party

August 26-30, 2022  
Spruce Knob, WV

*Unfortunately, registration is  
already full. :-)*

SkyShed Pod PA is proud to  
sponsor the  
**York County Star  
Parties** now scheduled

**ATTENTION !  
PLEASE NOTE:**

**Two star parties:**  
CAMPING FEES INCLUDED!

-----  
**2022 DATES:**

-->-->-->-->-->-->-->-->

SkyShed Pod PA

**Spring party**  
June 22-26, 2022

-----  
**Fall Party**  
September 21-25, 2022

YCSP info: <http://www.skyshedpodpa.com/>

### LVAAS Mega Meet

Sponsored by the Lehigh Valley  
Amateur Astronomers' Association

August 19-21, 2022

Pulpit Rock  
Astronomical Park

[More Info](#)

### South Jersey Star Party



The [South Jersey  
Astronomy Club](#)  
hosts two annual  
Star Parties.

The **2022 Fall Star  
Party** is scheduled  
for October 27<sup>th</sup> –  
30<sup>th</sup> on the recrea-  
tion field in Bel-

leplain State Forest. This is a rain or shine  
event.

### Kopernik AstroFest



### ASTROFEST 2022

September 30 / October 1

Dark Skies! Excellent speakers & workshops  
20-inch RC, C-14 EDGE HD, 6-inch Astro-Physics APO  
Camping/RV sites available

Kopernik Observatory & Science Center  
698 Underwood Rd., Vestal NY 13850





## 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**, now returning to face-to-face meetings in Radnor, and available on [YouTube](https://www.youtube.com).

**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).

