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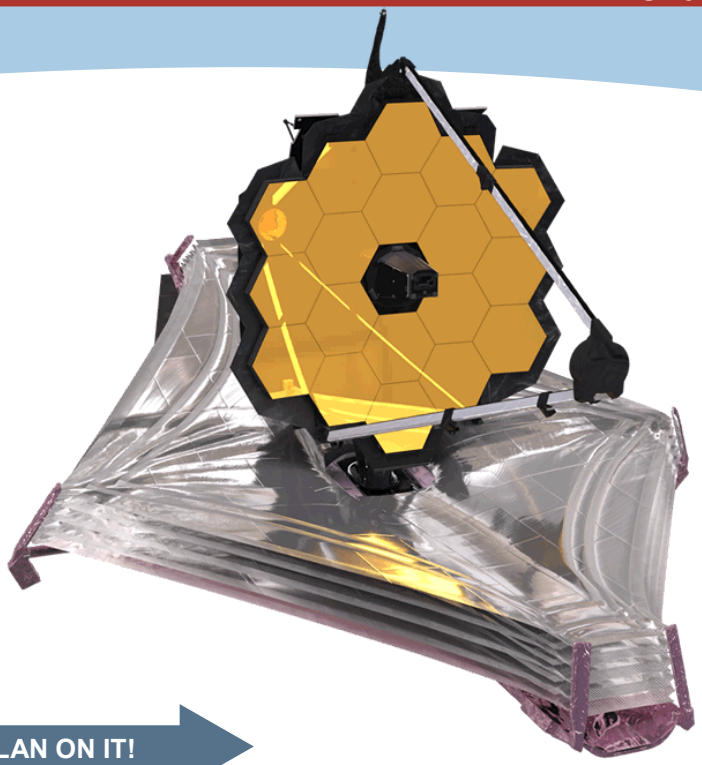
sharing the wonder and science of astronomy



JWST: The Wait is Almost Over!

After nearly 6 months at L2, the James Webb Space Telescope is aligned and operational, and will release its first science images in July. An interpretive event will be held at Penn State Abington; see p. 10 for details!

Public domain image courtesy of Wikipedia.

PLAN ON IT!

June 29–July 3 Green Bank Star Quest Sponsored by the Central Appalachian Astronomy Club. More Info.

July 8-9 STEM Youth Explorer Academy Moon Watch.

July 9 (8:30 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.

July 12 (7:30 pm) Star Party at Anderson Farm Park See p. 4 and DVAA website for info.

July 15 (7:30 pm) In-person General Meeting at the Radnor Township Building. Details Page 4.

July 20 (10:30—11:30 AM) North Wales Area Library Solar Observing. See p. 4 and DVAA website for info.

July 24 JWST "First Light" Event at Penn State Abington. See p. 10 for more information...

July 28-31 New Moon Weekend Stellafane star party and ALCON; see p. 17 for details.

August 6 (8:00 pm - 11:00 pm) Public Star Party at Valley Forge National Historical Park model airplane field.

FOR ALL EVENTS, SEE THE DVAA WEBSITE www.dvaa.org FOR ADDITIONAL INFORMATION AND UPDATES.

A link to Dave Mitsky's Celestial Calendar can be found at dvaa.org on the Home Page.

Welcome New DVAA Members!

Brian Crozier (Philadelphia)
Richard C. Torrance (Philadelphia)
Utkarsh P. Singh (Audubon)
Aalap Verma (Philadelphia)

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

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Vice-President	Jan Rush	veep@dvaa.org
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Welcoming	Brian Lee	welcoming@dvaa.org
Women of DVAA	Jan Rush	women@dvaa.org

Mark Your Calendars!

Upcoming Monthly Meetings

Friday, July 15, 2022: John Conrad, NASA/JPL Solar System Ambassador. Details on p. 4.

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.

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

Upcoming Meeting Dates: (all Friday evenings): July 15, 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 website (www.dvaa.org) for updates.

Public Star Party dates for 2022 (all Saturday evenings): **Jul. 9** (8:30), **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 website, or dial the hotline, for the final weather call.

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 — 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.

Follow the DVAA on Facebook and YouTube!

DVAA Facebook group
DVAA Photo Enthusiasts
YouTube Channel

Constellations I'd Like To See

Harold Goldner email

Ask yourself, when is the last time you actually saw a water bearer? How many of you would recognize a lyre if you were hit over the head with it? Have any of you run across a centaur while walking through any of Pennsylvania's state forests? I didn't think so.

While watching the recent extraordinary webinar that the DVAA Astroimagers sponsored given by Agapios Elia from his back porch in Cyprus I was struck by how hard astronomy is. Certainly cloud watching would be a far easier hobby and requires considerably less expensive equipment.

Another reason this stuff is so hard is that the stars and constellations have these obscure names and representations that have no meaning for any of us in a contemporary twenty-first century world. It is just impossible to learn all that stuff and keep it organized inside one brain in any effective way. I am not even going to start to address the challenge of naming the craters on Mars and the Moon. Can we just stop for a moment and explore why craters are named at all? It isn't like they come when they're called, or like any one of us is going to end up on a call that sounds like this:

"Hello, OnStar? We're lost!"

"Where are you?"

"Well, we just turned left out of Mare Imbrium, heading south towards Kepler and we must have made a wrong turn."

"What does your GPS app say?"

"We can't get a signal, why do you ask?"

"Turn left at the next Waffle House."

Arcturus, Denebola, Mizar. There, I think that's a spell from the Harry Potter series that may have just turned my cat into a cucumber. These star names just do not resonate with me. What do they mean? What is a Spica? I know Castor has oil, but what does a Pollux do? These are just nonsense words to me. They do not evoke mnemonics that spark further thought, like "Ahhh, Denebola! That's the mnemonic for "Don't eat nougat ever but offer Lactaid always." What do I do with that information?

What we need are constellations and naming schemes that we can relate to. I would like to humbly offer a few suggestions. I will leave it to you intrepid members to connect the dots, uh, er, stars, as it were:

Shopping Cart: A circumpolar constellation that has one wheel always stuck and wobbly.

Traffic Light: This constellation has one red supergiant, one yellow star, and a greenish planetary nebula.

Credit card: This small constellation in the northeast occasionally maxes out after which it is completely invisible.

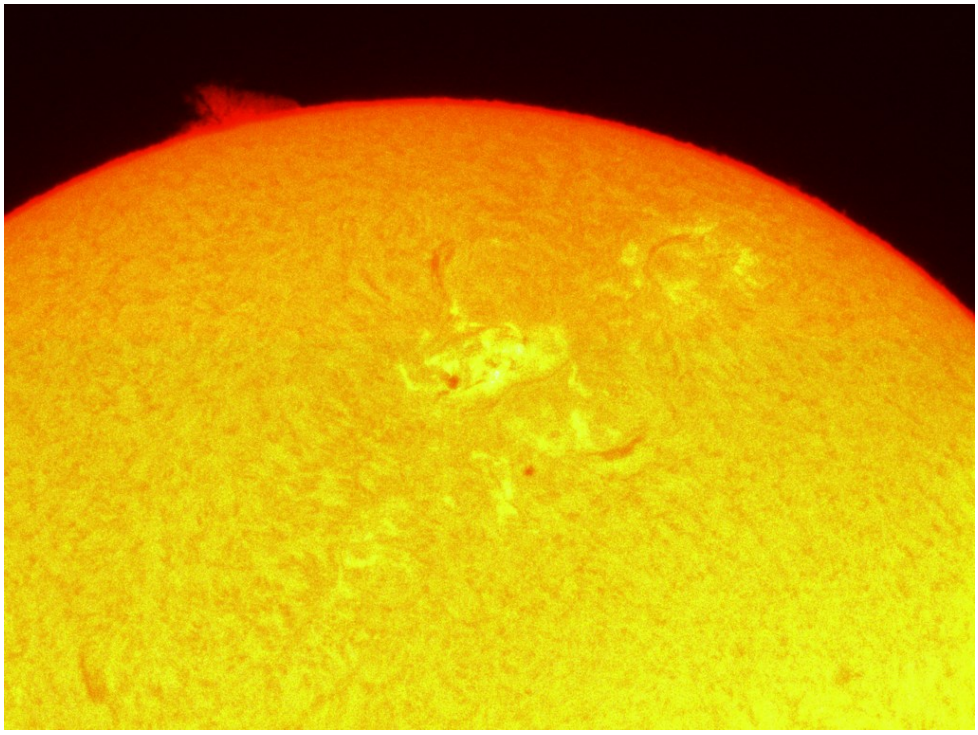
Tesla: This constellation shaped like a car occasionally bumps into other constellations without warning.

Deer-in-the-Headlights: The twin stars Ren and Stimpy, each of which are also double stars, highlight this constellation which looks just like what one would ordinarily encounter during a dawn drive from Cherry Springs State Park.

Attorney-at-Law: This constellation which takes over far more space than necessary has the uncanny ability to look like different things depending upon what the viewer wants to see. It is my personal favorite, for obvious reasons.

Imagine how many more children we could turn on to astronomy if we had constellations they could relate to. Libra? Delphinus? Corona Borealis? Who even encounters scales that look like that? A dolphin? And whatever that crown is supposed to look like? Who can even find these constellations let along understand what they are? Leo is simply the backwards question mark; Sagittarius is just a teapot. It should not be this hard to learn the sky.

Take up my cause. We have to start somewhere.



Have you checked out the Sun lately? Solar activity is on the upswing!

(left) Hydrogen-alpha photo of the sun, captured June 2022 by Prasad Agarwal. ZWO ASI224MC camera through a Lunt LS60THa single stack solar scope. 1.519 millisecond image processed using ASICap software.

Next Monthly Meeting July 15, 2022

John Conrad, NASA/JPL Solar System Ambassador

Do Look Up: DART - the world's first asteroid deflection test

NASA's DART spacecraft is on the way for the first live demonstration of *kinetic deflection.* Leading the world's efforts to develop our Planetary Defense against NEOs, NASA is coordinating earth-based observers (large telescopes and small – maybe yours!) to witness this event in late September. We'll review the Planetary Defense program, including the latest on our inventory of NEO threats, and highlight the role of DART in preparing us for the future.

The meeting will be held in-person at the Radnor Township Building.
Informal gathering at 7:00, program begins at 7:30pm.
The meeting will be live-streamed on the DVAA YouTube Channel:
www.youtube.com/DelawareValleyAmateurAstronomers

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)

Topics are still being set up, but will include: planning for the 2024 solar eclipse, astrophotography, observing equipment, Celestron gadgets and gizmos

Upcoming Outreach Events

July 12 Anderson Farm Park Public Star Party
(Tuesday, 8:30 - 10:00 PM)
499 Hopwood Rd, Collegeville, PA 19426
Contact: Al Lamperti for more info.

July 20 North Wales Area Library Solar Observing
(Wednesday, 10:30 - 11:30 AM)
233 S. Swartley Street, North Wales, PA 19454
Contact: Jan Rush for more info.

Cherry Springs Star Party 2022 Report

Bill McGeeney email

A scenic four+ hour drive to God's Country reveals a number of attributes in a person. First, *commitment*. If there ever could be a loyalty test for amateur astronomy, without a doubt it'd include driving during the most productive daytime hours of one's life to stand all night in a wet, soggy field in the abject middle of no where, only to be greeted by chattering owls echoing among the tall pines and melodic toads serenading the night away.

Undoubtedly, most reading this are thoroughly aware that Cherry Spring State Park (CSSP) resides atop a wooded plateau outside of the quiet community of Galeton, PA. The park sits hunkered in the Susquehannock State Forest, a brilliant working forest always in demand to meet America's lumber and oil demands. Contrary to the name, the park neither consists of a spring, nor cherries, though numerous delicious well water spigots can be found at the end of each "street." The park's usable space consists of two grassy nighttime observing fields and a modest number of primitive camping sites. The observing field uses tend to be dictated by their perspective audiences. Which brings me to number two, *well-found sanity*.

In a corollary to how hunters utilize the State Game Lands, the astronomy observing field retains uses by only those who willingly subscribe to being locked into a field with any number of strangers for the duration of one whole night. Meanwhile, as State Game Lands often lend their lands to casual hikers and nature lovers, the public viewing area attracts people from all over the world who simply wish a chance to take in the Milky Way, which most never witnessed previously.

At this point, I'd like to point out that I'm *quite committed* and perhaps exercising *questionable sanity* (which may in turn lend to the former). I spent one week making Harold proud, lavishing in the luxuries of tent life, complete with a steady diet of bacon (since the Galeton grocery story didn't have any protein except for steak and bacon), the one shower every 3 days rule ($4 buys you the chance to push a button of flowing water every 30 seconds!), and the option to continually work on my tan (I don't tan).

I signed up for the Cherry Spring Star Party, hosted by the Astronomical Society of Harrisburg (ASH) that officially ran on Thursday, June 2nd to Sunday, June 5th. For those curious as to the difference between a star party and a regular night out at CSSP, think of the star party as an industry expo event – complete with daytime speakers, individuals willfully flaunting both their creativity and the size of their disposable income, and, my personal favorite, freshly baked 2 AM chocolate chip cookies. (Did I say 2AM? That's what they told us at sign in. However, they actually started sales around 10 PM, selling out a short while thereafter – good thing we didn't wait!).

Patience therefore tends to be a superb quality to any observer willing to spend time on the observing field. The hours between dinner to sunset exhibit a hurry up and wait character to the likes of which my 10-year-old self on Christmas eve could relate.

At the onset of the afternoon, I set up my observing station consisting of a EQ6 mount holding my Vixen 80mm EDsf and my Canon 6D angled below. Meanwhile, my Skywatcher 12" Dobsonian telescope, with trusses extended out, stood ready for action at any given moment.

The workstation consisted of a black aluminum camp table where I housed my laptop in a $5 IKEA clothing cube to shield my neighbors from its light. My jumbo edition of Pocket Sky Animals...er *Pocket Sky Atlas*, a couple of cigar boxes housing my eye pieces, my iPad, and sketch books for my visual astronomy activities sat pieced around my laptop cube. Oh…and how could I forget, as did a pencil with an end wrapped with glow-in-the-dark tape for easy locating at night!

Once set, I made dinner to the tones of a lingering magnificent blue hue of dusk. On the disappointing chance of rain, Kaitlyn and I brough boardgames and enjoyed a couple rounds of Ticket to Ride (both the Pennsylvania and UK Expansion Editions) in the Pavilion. We also set up a makeshift canopy between our cars.

Congeniality may be the most important attribute in the condition you find yourself, namely that aforementioned situation of being locked on a field with complete strangers. Each night, as people arrive and depart, you find yourself next to new neighbors. If you're lucky enough, you may even find them enjoyable human beings!

Note that folks on the field come in two breeds, the transients and the field mice. For anyone who's hiked the Appalachian Trail, rule 1 of camping always includes: hang your bag at the lean-tos for fear that the locals (mice) will decimate all that you own. Similarly, CSSP houses repeat offenders (observers) who you'll find scattering themselves across the field every new moon for the duration of the summer…for years on end. Luckily, they haven't developed a taste for metal yet.

Don't be mistaken, while you shouldn't rely on any neighbor for help, more often than not, if your neighbor happens to be imaging, you and that person may bond together in common misery. The shared experience that something – anything – one thing, simply isn't working becomes just another unsung joy of a star party! You or that person may require an additional set of eyes if only to commiserate and fully evaluate their level of *commitment*, *sanity*, and *congeniality*.

As with all festivals, daytime activities often showcased a passionate side that many non-obsessed fans may never fully realize, and even for those of us in the know.

First, Larry McHenry provided a thoroughly insightful talk on Arp's valiant but failed attempt at upending the Big Bang. Arp observed many merging galaxies, or so he believed. Without going too far into details of his research, science eventually proved him wrong and his strident attempts to upend the Big Bang failed.

In another talk, we learned of the Oil City club's plans for

Cherry Springs Star Party 2022 Report (cont.)

a new observing site; I'm sure your anticipation level runs high for that.

However, most impactfully, a talk given by our DCNR overlords helped bring optimism to future CSSP experiences. The work on the new entrance (from the side street adjacent to the field) begins in August of 2023. They intend to move and replace both current entrances for CSSP, building a berm to prevent stray light from the public viewing area. The rangers also spoke to the sizable number of interlopers who essentially squat on the field because they can't obtain a campsite. Such remedies include an expansion of the public rustic camping area to help alleviate such issues.

Now, onto observing. Thankfully, I missed out on the legendary "Cherry Springs Dew." I owe a great debt to the great maker for this. We experienced two rainy and cloudy days (Wednesday and Thursday), with all other days remaining clear. The transparency and seeing really didn't pop though until the last night when migrating clouds created a new take on imaging roulette.

I spent my nights catching on up on my most favorite places in our night sky, namely Virgo, Leo, and Coma Bernices. After spending an additional night galaxy chasing in Ursa Major and Canes Venatici, I decided I wanted to go on an adventure.

Quality five, *determination*. By this point. I found myself satisfied at what I accomplished on the previous nights. Rightfully, I began to search for carbon stars. Using a combination of my *Pocket Sky Atlas* and *Stellarium*, I hunted down no lfewerthan six carbon stars. These vibrantly red hued stars shine like no others in the sky. In doing so, I found myself falling completely in love with the act of stargazing again.

Some stars, such as T Lyrae, require a good bit of navigating right in the middle of a dense milky way. Any number of times, I turning back to my first guide star as my sole point of reference. In a day and age when Google will navigate you anywhere, star hopping feels quite liberating, presenting itself as a cross between a scavenger hunt and route finding.

You truly learn to appreciate all the small things, including star colors and angular arrangements. For instance, take an asterism of an arrow I came across that sits directly above Vega. This asterism points perpendicular to a region housing some faint stars where T Lyrae resided. From that asterism, follow two parallel, and rather evenly spaced, sets of white stars down to a singular crescent shaped line of stars. No rush, all the while your camera clicks away collecting data of the Veil Nebula or Bode's Galaxy.

To sum up, maybe it does take a certain type of person to fully appreciate the nighttime sky. It certainly requires *commitment*. You tend to go to amazing lengths to find an applicable nighttime arrangement, no doubt questioning your *sanity* all along the way. *Patience* rules the day, once you weather the weather (no pun intended, I think), you may find yourself fumbling over right ascensions and declinations searching for every little detail. You remain *determined* in your resolve to find either 'that object' or fix that 'oh what the hell could possibly be wrong now!' problem. But lest you ever need a helping hand, simple *congeniality* can extend your evening many hours up to dawn.

Clear Skies.

Scenes from the June Public Star Party at Valley Forge National Historical Park. *Photos by George Keighton.*

The June Monthly Meeting

Jeremy P. Carlo email

DVAA President Harold Goldner opened up the June 2022 DVAA meeting at the Radnor Township Building in Wayne, PA. For the first time, we were able to live-stream the in-person meeting on YouTube, which drew about 16-17 additional attendees! For a variety of reasons mostly relating to internet security policies with the public wi-fi at the Township Building, our previous attempt to live-stream a meeting was unsuccessful, but this workaround did the trick!

Harold gave a brief update on upcoming events. The first 2022 York County Star Party will be held the following weekend, June 21-25, at Susquehannock State Park in southwestern Lancaster County, with another scheduled for late September. It's a reasonably dark site (comparable to Blue Mountain) with a friendly crowd. Penn State Abington will be hosting an event to discuss the first images published by the James Webb Space Telescope; see the more detailed announcement on p. 10 in this newsletter. The ChesMont club will be making a trip to Cherry Springs in late July and invited DVAA members to tag along; see updates in the DVAA groups.io email forum.

Moving on to committee reports, Welcoming Chair Brian Lee reported one new member. Harold gave an update on astrophotography activities, including a Zoom workshop featuring Agapios Elia from Cyprus the previous Wednesday; a recording of this session is available on the DVAA Youtube page.

DVAA Observing Chair Andrew Hitchner then presented his observing report for June, focusing on the constellation of Lyra. Lyra is a small but distinctive constellation forming an attractive parallelogram shape which lies high overhead for much of the summer and fall months, just askew of the Summer Milky Way which stretches straight up and across the summer sky. Its alpha star, Vega, is one of the brightest stars in the sky with a magnitude very close to zero, and is the brightest of the three stars comprising the Summer Triangle, which looms high overhead in the summer and even into the fall. Interestingly, Vega was once close enough to the North Celestial Pole to serve as the "North Star," although the Pole has since drifted away and towards the current pole star, Polaris (Alpha Urase Minoris). But in 20-something thousand years, Vega will once again be the North Star.

Lyra contains a number of other notable stars. Beta Lyrae (Sheliak), which is the prototype for a class of closely-orbiting eclipsing binaries. Epsilon Lyrae is the famous "Double Double," a double star easily split in binoculars, but each of its elements is itself a closely-separated double star with a separation of 2-3 arc-seconds. Bart Fried talked quite a bit about the Double Double in his talk last month; it's a system which shows different detail in a variety of instruments ranging from small binoculars to large scopes, and splitting the individual elements is a good test of atmospheric seeing and optical quality. Lyra also contains "the other Double Double," composed of Struve 2470 and Struve 2474. This system is a bit dimmer than the "original" Double Double, but the elements are more widely separated, and also have a nice color contrast.

Andrew then talked about a number of deep-sky objects in Lyra. Of course this list starts with the famous Ring Nebula, M57, one of the most famous planetary nebulae in the sky. A planetary nebula forms when a star similar in size to the Sun reaches the end of its life and puffs its outer layers into space, forming a ring-like or disc-like expanding nebula. Lyra also hosts the loose globular cluster M56, although it is overshadowed by larger and brighter globulars in the summer sky. The very tight open cluster NGC 6791 forms an interesting contrast with M56, straddling that grey area between open clusters and globular clusters. Finally, while Lyra isn't a very promising area for galactic observations (which are best seen in the spring and fall when the night sky faces out of the galactic plane), there are a couple of galaxies including NGC 6702 and NGC 6703.

With committee reports completed, Programs Chair Jeremy Carlo then introduced the evening's speaker, Dr. Jeremy Carlo of Villanova University. Jeremy remarked that Jeremy is highly regarded by him and has been a pivotal influence in the development of his career… but enough of that!

Jeremy's topic for the evening: "Fermi Questions: Thinking Like a Physicist." Enrico Fermi was a mid-20th century physicist renowned for his strong grasp of a broad array of physics topics, and for his uncanny ability to very quickly "size up" a problem: is something feasible? About how big or small should some quantity be? Over the years, "Fermi Questions" have come to encapsulate this notion of quick, back-of-the-envelope calculations and rough estimates which can be used to quickly sketch out rough answers to a complicated problem, or break a complex problem down into smaller, solvable parts.

A classic Fermi-style question: How many dentists are there in Pennsylvania? You could of course fire up the Google machine and find the actual answer, since this is one of those things that somebody out there (such as the American Dental Association or an analogous state association for dentistry) would keep track of, but there are lots of other questions for which this cannot be done. How could we estimate this number? We can quickly guess the population of Pennsylvania as 10 million. PA has 17 or so Congressional districts, and each district holds something like 600k to 700k people. Alternately, divide the US population of 400 million by 50, since there are 50 states. Then round up a bit since we know Pennsylvania is one of the larger states. Then we estimated the each of these people sees the dentist, on average, twice a year, for a total of 20 million dental visits. An average dentist might see 10 patients a day, 250 days a year, for 2500 annual patient visits per dentist. Divide 20 million dental visits by 2500 visits per dentist to come up with our estimate, 8000 dentists. An internet search reveals the actual number to be on the order of 6000 to 7000. Not bad!

(Continued on next page)

The June Monthly Meeting (continued)

(Continued from previous page)

Often these types of calculations are known as "back of the envelope" calculations, since they're typically done on whatever piece of scrap paper is readily available. They involve a number of simplifying assumptions, sometimes derisively called "spherical cow" approximations (after the joke involving physicists who determine the properties of a cow by first assuming it takes the simplest shape, a sphere). We're generally making rough, order of magnitude estimates, dealing with large amounts of uncertainty. Dare to be imprecise! Be aware that your estimates come with large uncertainties!

And now for something a little less amenable to Google. What is the mass of Mount Everest? Some useful data: Mount Everest's height is about 29,000 feet, which is about 5.5 miles or 8.5 km. (The advantages of the metric system will soon become apparent.) Of course, mass is volume multiplied by density. First, let's consider the volume. Let's assume Mount Everest to be a cube 8.5 km on a side. The volume would then be about 500 cubic kilometers. We can round that down to 200 cubic kilometers, since we know Everest is sort of conical, which we can consider as a cube with half or more of the "upper" part removed. Doing some unit conversions, that comes to 200 billion cubic meters, since a cubic km is 1000 m x 1000 m x 1000 m, or a billion cubic meters. Now, density. Water, for example, has a density of 1000 kilograms per cubic meter. This is rather surprising. A cubic meter of water (a box about 3 feet on a side), if filled with water, would weigh a ton! That's a lot more than most people would guess (and might make you a little nervous the next time you get in the bathtub). Rock is obviously denser than water (since rocks sink!), so we guessed that rock is about 3x denser, corresponding to 3000 kg per cubic meter. Multiply volume times density to get an estimated mass of Mt. Everest of 600 trillion kilograms, which is about 1.5 trillion pounds. We then looked at some estimates from the internet (probably based on similar calculations, albeit with a bit more care taken), and they were all within about a factor of 10 of our estimate. Not bad!

An astronomy question: Suppose there are 100 extraterrestrial civilizations in our Galaxy (with a diameter of 100,000 light-years). On average, how far away is the nearest one? To tackle this problem, assume the civilizations are located on a regular "grid" dotting the galaxy. If there are 100 civilizations, that's a 10 x 10 grid. The distance between individual grid points is therefore 100,000 light-years divided by 10, or 10,000 ly. This can be generalized to any number of civilizations N; the distance to the nearest civilization is 100,000 / sqrt(N) light-years.

As a corollary, suppose SETI reports that they received a signal from an extraterrestrial civilization 1000 light-years away. This would imply N is at least 10,000! If the civilization were 100 light-years away, N would be at least a million! Hence the overwhelming paradox of the search for extraterrestrial life: either the universe is devoid of life, or it's absolutely teeming with it!

That latter point underscores an important observation: human beings are absolutely terrible at dealing with very large numbers. The federal debt, how many tons of pollution we put into the atmosphere - our eyes sort of glaze over, and unscrupulous folks out there know to take advantage of that fact. The same applies for very small numbers, most notably in terms of evaluating risks and rewards. Innumeracy is a societal problem at least as important, and much more prevalent, as illiteracy. Getting a good feel for large (and small) numbers provides us a sort of defense against these attacks.

This naturally led into a discussion of scaling: how does one physical quantity scale in relation to another? We're most familiar with linear scaling: if I can drive 60 miles in one hours, how far can I drive in three hours? However, many quantities scale differently. For example, the number of tiles needed to cover a floor scale as the square of the room's dimensions. And an object's mass scales as the cube of its diameter or dimension. The number of bacteria in a Petri dish, or the number of cases of a rapidly-spreading disease, scale exponentially with time. Human beings are generally atrocious at estimating quadratic, cubic, and exponential scaling. This is exemplified by the parable of the teenager who mows his neighbor's lawn for one penny, and each week thereafter for twice what was paid the previous week. This sounds like a steal, having your lawn mowed for a month for less than 20 cents, but within a few months the teenager owns the house.

Scaling applies widely in physics. For example, the lift provided by a bird's wings scales roughly with the wing area, which goes as the square of the bird's dimension (i.e. length). But its mass (how much it needs to fight gravity to maintain flight) scales as the cube of the dimension. As a bird gets larger, the weight-to-lift ratio increases, making flight more difficult. As a result, larger birds need larger wings, relative to their body size, and the largest birds can't fly at all! Similar scaling arguments apply to limb strength (which scales as the cross-sectional area of the limb); this is why you can't simply scale up a creature. Sci-fi movies about giant people would be rather anticlimactic, as the giants' legs collapse under their enormous weight. We need to be careful getting our science from Hollywood!

The talk closed with a number of other examples of Fermi questions. Rather than supply answers, I'll simply list them, in the hopes of stimulating discussion on the e-mail forum!

How many musical notes are played on a radio station in a year?

How many US Presidents (past, current, and future) are alive right now?

How many carbon atoms are there in the human body?

If you stacked up every hamburger sold by McDonalds in a year, how high would that stack be?

How much does it cost to cover a car with postage stamps?

How many playing cards are equal to the weight of a school bus?

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The June Monthly Meeting (continued)

(Continued from previous page)

How many photons are emitted per second by a light bulb?

What is the power output of a microwave that boils a cup of water in one minute?

What volume of snow lands in Pennsylvania over the course of a year?

If you made all that snow into a giant snowball, what would be its diameter?

How big of a room would be needed to store all of Jeff Bezos' (or Elon Musk's) money in pennies?

When you take in a breath, how many of those atoms were breathed by Abraham Lincoln while delivering the Gettysburg Address?

Okay, I can't resist. The answer to the last question is on the order of a hundred. Not that many, but a lot more than you might have thought. We are indeed all connected, as the famous Pale Blue Dot photo showed.

Speaker Jeremy Carlo at the June Monthly meeting.

(right) Pretending to be a mouse, who can get around on wiry little legs thanks to its small size. Wouldn't work for an elephant!

(bottom) Deep in thought about something or other. Deep in something, anyway.

Photo credit: Mitch Berger

JWST "First Light" Event at Penn State Abington

The DVAA is invited to attend a program at Penn State Abington to interpret the James Webb Space Telescope's first release images.

These images will be released in mid-July and an interpretive program will be held on July 24, 2022, 2-4 pm, at Penn State Abington, 1600 Woodland Rd, Abington PA 19001.

"Unfold the Universe: Images from NASA's Webb Telescope and more"

- Learn what Webb's new images will teach us about the universe.

- Family-oriented demonstrations and activities.

- Questions answered by NASA Solar System Ambassador and Penn State faculty.

From the organizers: "We plan a presentation to interpret the images which have not been released yet (drumroll....) and we plan to have related demonstrations suitable for school age children, or adults who are interested. This is a community event so all are welcome....no matter if they are an "adult kid" or school age."

List of JWST first-light events: *https://webbtelescope.org/news/first-images/events#section-68c461bb-3332-4838-86c8-dd0339029576*

More scenes from the June Valley Forge Star Party, courtesy of George Keighton.

This Fuzzy Object is Not In Any Star Chart!

Al Lamperti email

Besides contributing data while observing meteors, the amateur astronomer plays a key role in discovering comets. For some individuals, hunting comets is an enjoyable obsession and the discovery of one or more comets is only one reward for the many hours at the eyepiece. These individuals have a defined plan to scan sections of the sky and know the star fields quite well to recognize an object that may not belong there. On occasion, an amateur will chance upon an unknown object while looking for a known deep sky object. Both types of observers enjoy what they do see in the eyepiece, whether they pass by a familiar double star or encounter a member of the NGC family.

Methods of scanning the sky for comets vary with the observer. Using a low power eyepiece with at least a three-quarter of a degree field of view, one can scan horizontally or vertically. One usually starts a careful search within 90 degrees of the sun in the evening or dawn. This region tends to produce results since the comet may have been hidden for some time in the glare of the sun and since the comet may appear brighter being relatively close to the sun. Knowing the rise and set times of the sun and moon are additional factors to consider when planning an observing session. Some observers suggest spending one hour hunting comets on each of ten nights rather than 10 hours on one night. Most comet hunters would say that patience, skill and luck are also requisites. Robert Burnham was quoted " If you hunt for comets long enough, sooner or later you will find one."

If you do encounter a suspected object that does not appear on detailed star charts, a careful examination of the star field, or even a rough sketch will help you determine if movement has occurred. Examination of the region an hour or two or even the next night, if it is clear, would be valuable information to report.

Reports are sent to the Central Bureau for Astronomical Telegrams, Smithsonian Astrophysical Observatory, 60 Garden Street, Cambridge, MA 02138. Other methods include telegrams (TWX 710-320-6842) or e-mail (Marsden @CFA.harvard.edu). Information they would need would be the coordinates of the position of your object in right ascension and declination, direction of motion, approximate magnitude, diameter, length and shape of the tail, date, time, address and phone number.

Searching select regions of the sky may not produce a comet for you. However, while cruising the celestial neighborhood, you will encounter familiar Messier objects and perhaps not so familiar NGC objects. You undoubtedly will see satellites and meteors buzz by your field of view. Most importantly, you are accumulating time at the eyepiece that adds to your overall experience and knowledge.

(above) The 1.3% illuminated crescent Moon, captured by Bill McGeeney on May 31.

More Astrophotos

(left) Interacting galaxies NGC 3690, captured by Frank Colosimo back in 2013. Frank used a 12.5" Hyperion at his Blue Mountain Vista Observatory. 5 exposures of 10 minutes each through RGB filters.

(below) NGC 6188, "The Fighting Dragons of Ara," imaged by Dan Stern. NGC 6188 is an emission nebula located about 4,000 light-years away. It is a star forming nebula scultpted by the massive, young stars that have recently formed there; some are only a few million years old. Also visible is NGC 6164 at top right. 30.4 hours of integration time. This is a southern object, imaged remotely through a rental scope in Australia. Equipment: SharpStar 140 mm f/4.8, SBIG STXL16200 FW8G camera. Imaged through LRGB, H-alpha, S-II, and O-II filters. Field of view is 138 x 110 arcmins.

Even More Astrophotos

Spring Galaxy Roundup: All images on this page by Dick Steinberg.

Images taken June 3-6, 2022, using a Celestron C8 at f/6.7 on a Skywatcher EQ6-R Pro mount at his home in Penn Valley by stacking 30-second exposures.

Camera: Orion Parsec cooled CCD camera with Kodak 8300M chip (8.3 million pixels).

Images acquired and processed with Maxim

(above) M81, Bode's Galaxy in Ursa Major. Magnitude 6.9, relatively nearby at 12 million light-years.

(left) M109, another galaxy in Ursa Major. M109 is 83 million light-years away, making it the most distant Messier object.

(right) NGC 3718 (Arp 214; center right), a spiral galaxy deformed by interactions with nearby NGC 3729 (at upper left). A group of background galaxies can be seen at lower right, below NGC 3718.

If you would like to participate in DVAA's active astrophotography community, visit the Astrophotography Resource Page on the DVAA website.

Find Hercules and his Mighty Globular Clusters

David Prosper

This article is distributed by NASA Night Sky Network

Hercules is one of the standout heroes of Greek mythology, but his namesake constellation can be surprisingly hard to find - despite being one of the largest star patterns in our night skies! Once you find the stars of Hercules, look deeper; barely hidden in the space around his massive limbs and "Keystone" asterism are two beautiful globular star clusters: M13 and M92!

Since the constellation itself is relatively dim but bordered by brighter constellations, you can find the stars of Hercules by looking between the bright stars Vega and Arcturus. They are fairly easy to identify, and we have tips on how to do so in previous articles. Vega is the brightest star in the constellation Lyra and one of the three stars that make up the Summer Triangle (*June 2020: Summer Triangle Corner: Vega*). Arcturus is the brightest star in the constellation Boötes, and can be found by "arcing to Arcturus" from the handle of the Big Dipper (*May 2021: Virgo's Galactic Harvest*). You may be able to Hercules's "Keystone" asterism first; this distinct pattern of four stars is traditionally shown as the torso of the great hero, though some illustrators prefer marking the Keystone as the head of Hercules. What pattern do *you* see in the stars of Hercules?

Globular star clusters appear "fluffy," round, and dense with stars, similar to a dandelion gone to seed, in contrast to the more scattered and decentralized patterns of open clusters. Open clusters are generally made up of young stars that are gradually spreading apart and found inside our Milky Way galaxy, while globular clusters are ancient clusters of stars that are compact, billions of years old, bound to each other and orbit around our galaxy. Due to their considerable distance, globular clusters are usually only visible in telescopes, but one notable exception is M13, also known as the Great Cluster or Hercules Cluster. During very clear dark nights, skilled observers *may* be able to spot M13 without optical aid along the border of the Keystone, in between the stars Zeta and Eta Herculis - and a bit closer to Eta. Readily visible as a fuzzy "star" in binoculars, in telescopes M13 explodes with stars and can fill up an eyepiece view with its sparkling stars, measuring a little over half the diameter of a full Moon in appearance! When viewed through small telescopes, globular clusters can appear orb-like and without discernable member stars, similar in appearance to the fuzzy comae of distant comets. That's why comet hunters Edmund Halley and Charles Messier discovered and then catalogued M13, in 1714 and 1764 respectively, marking this faint fuzzy as a "not-comet" so as to avoid future confusion.

While enjoying your view of M13, don't forget to also look for M92! This is another bright and bold globular cluster, and if M13 wasn't so spectacular, M92 would be known as the top celestial sight in Hercules. M92 also lies on the edge of naked-eye visibility, but again, binoculars and especially a telescope are needed to really make it "pop." Even though M92 and M13 appear fairly close together in the sky, in actuality they are rather far apart: M13's distance is estimated at about 25,000 light years from Earth, and M92's at approximately 27,000 light years distant. Since M13 and M92 appear so close together in our skies and relatively easy to spot, switching between these two clusters in your scope makes for excellent star-hopping practice. Can you observe any differences between these two ancient clusters of stars?

(Continued on next page)

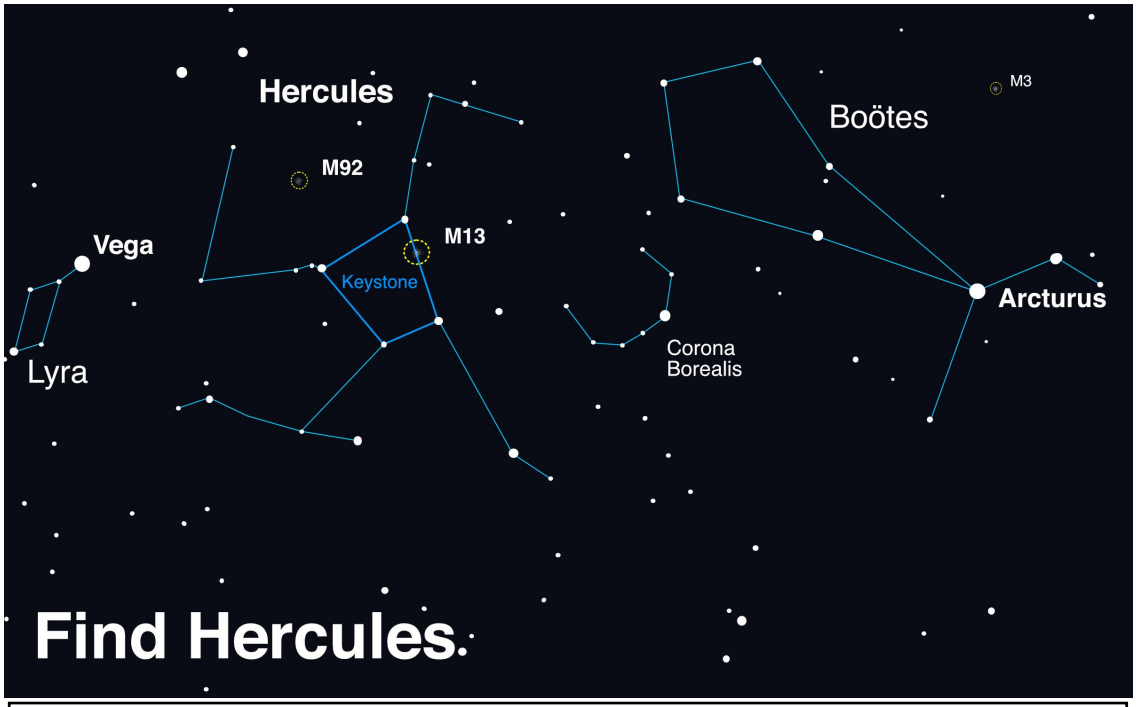
Find Hercules and his Mighty Globular Clusters (cont.)

(Continued from previous page)

Globular clusters are closely studied by astronomers for hints about the formation of stars and galaxies. The clusters of Hercules have even been studied by NASA's space telescopes to reveal the secrets of their dense cores of hundreds of thousands of stars. Find their latest observations of globular clusters - and the universe - at nasa.gov.

(right) Composite image of the dense starry core of M92 imaged in multiple wavelengths. While your own views of these globular clusters won't be nearly as crisp and detailed, you might be able to count some of its member stars. How far into their dense cores can you count individual stars? Credits: ESA/Hubble & NASA; Acknowledgment: Gilles Chapdelaine. Source: https://www.nasa.gov/feature/goddard/2017/messier-92

(below) Look up after sunset during summer months to find Hercules! Scan between Vega and Arcturus, near the distinct pattern of Corona Borealis. Once you find its stars, use binoculars or a telescope to hunt down the globular clusters M13 and M92. If you enjoy your views of these globular clusters, you're in luck - look for another great globular, M3, in the nearby constellation of Boötes. Image created with assistance from Stellarium: stellarium.org



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.

We are very excited to announce that the third annual **Capture the Dark Photography Contest** presented by **Visit Utah** is now open for submissions! It's free to enter and open to entrants of all skill levels worldwide. So, show us what you've got!

This year, there are a total of 9 contest categories, including Connecting to the Dark, International Dark Sky Place, The Impact of Light Pollution, The Bright Side of Lighting, Creatures of the Night, Deep Sky, The Mobile Photographer, Youth, and Utah Dark Skies. Please note that we only accept one entry per category per person.

Winners of each category will receive a prize package that includes a feature in IDA's Nightscape publication, the IDA blog and social media, an IDA membership, IDA and Visit Utah swag, and a Peak Design Field Pouch. Additionally, one photograph will be presented with a "People's Choice Award" based on votes by the public. This winner will receive a prize package that includes a $250.00 gift card to B&H, a feature in IDA's Nightscape publication, the IDA blog and social media, an IDA membership, and IDA and Visit Utah swag. We'll let you know once the public voting for the "People's Choice Award" is open.

Want to know more? Head to **capturethedark.darksky.org** for category descriptions, submission instructions, and more.

We are accepting submissions through July 21, so be sure to get your entry in before then.

Regional Star Parties

http://www.stellafane.org

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**

2022 DATES:

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

SkyShed Pod PA

ATTENTION !
PLEASE NOTE:

Two star parties:
CAMPING FEES INCLUDED!

Spring party
June 22-26, 2022

Fall Party
September 21-25, 2022

LVAAS Mega Meet

August 19-21, 2022

Pulpit Rock
Astronomical Park

The South Jersey Astronomy Club hosts two annual Star Parties.

The 2022 Fall Star Party is scheduled for October 27th – 30th on the recreation field in Belleplain 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

ALCON 2022

July 28 – 30

EMBASSY SUITES HOTEL

1000 Woodward Pl. NE
Albuquerque, New Mexico 87102
https://alcon2022.astroleague.org/
(Website available by January 14, 2022)

Hosted by:

The Albuquerque Astronomical Society

www.TAAS.org

DVAA Telescope Rentals

Celestron NexStar 5SE

Orion 6” Dosonian

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 under the OBSERVING tab. To rent one of these scopes, contact Joe Lamb at 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**.

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.

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. 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.