VILLAGES STAR

Newsletter of The Villages Astronomy Club

Volume 5, Number 9
September 2024

Club Website:
http://vlgastroclub.org/
Facebook:
https://www.facebook.com/groups/vlgastroclub/

Club Officers & Directors

President	Mark Graybill
Vice President	Ken Katta
Secretary	Randy Gilbert
Treasurer	Linda Meng

Newsletter Contact
saundby@gmail.com
(please include TVAstro in subject line)

Annual Membership Dues

September is the beginning of a new year for The Villages Astronomy Club, so annual dues of $15 are...due. Dues may be paid at our General Meeting on September 17th, or at Space Academy beginning with our October meeting on October 7th.

Your dues not only allow us to provide the benefits of membership in The Astronomical League as a member society, but also to cover the operating costs of our club. This includes our storage unit, used for our pop up, educational materials, Solar Walk, and temporary storage for donated telescopes. Likewise costs for the materials consumed by educational events such as Camp Villages, Scouting, and local youth events. We appreciate everyone's contributions through their dues and donations to allowing our club to have the support necessary to conduct our active schedule of events and outreach with quality materials.

The Veil Nebula in Cygnus
Image by member Randy Gilbert

UPCOMING EVENTS

Space Academy, September 2nd, 6:30pm

This month's space academy will feature a panel of astronomers to answer your questions about space, time, cosmology, astronomy, and spaceflight. Bring your questions for our panel to answer.

Meeting begins at 6:30pm at Truman Rec Center, 2705 Canal Street.

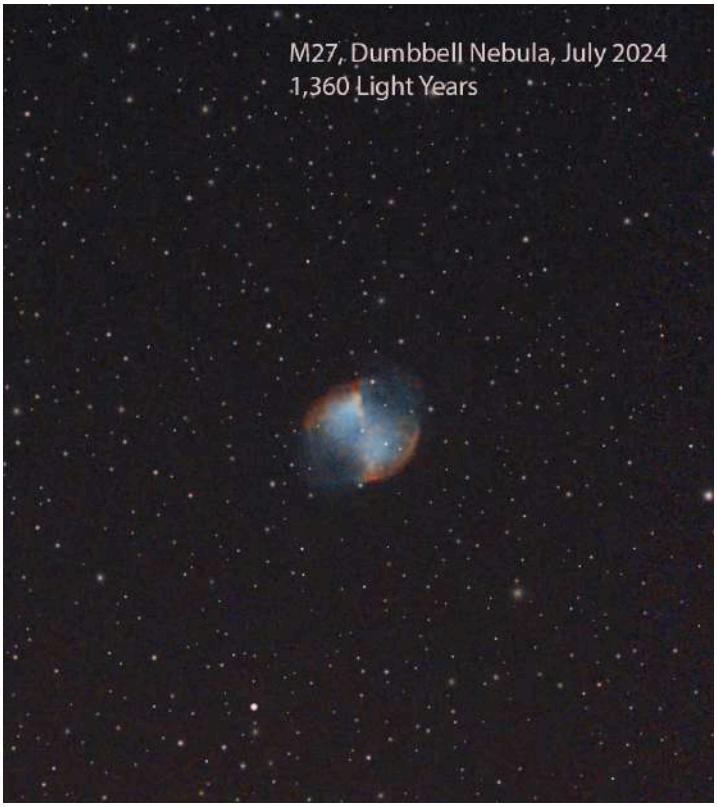
Telescope Workshop, September 2nd, 8pm

Join us to learn how to use or select a telescope, share your knowledge, or get a look at the sky, weather allowing. In the event of thunderstorms, this event will be moved inside to the Studebaker room, to commence after the completion of Space Academy.

EAA Meeting, Sept 4th, Homestead Astronomy Park, 7:30pm

Join us at Homestead Astronomy Park for an evening of observing with smart telescopes! Owners of smart scopes or scopes with smart controllers are welcome as are those who are interested in learning more about the options to get started in Electronically Assisted Astronomy (EAA).

We will open the park before sunset for setup, and open late if weather permits.



M-27, the Dumbbell Nebula in Vulpecula. Image by member Joan Laubmeier. Captured using a ZWO Seestar S50, processed in Siril.

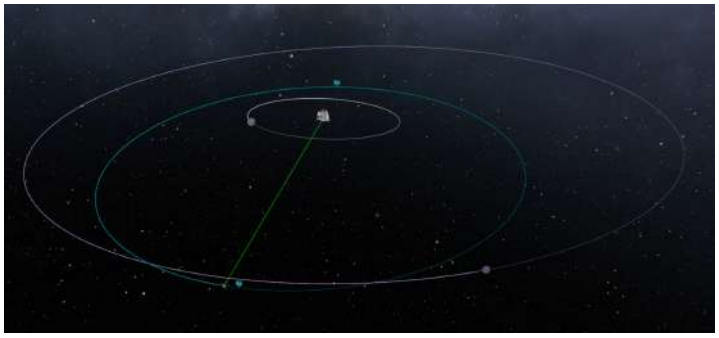
Exec Directors' Meeting, Sept 6th, 11am

All members are welcome at our Executive Directors' Meetings, where our directors plan and prepare for future events and meeting. We have a busy schedule planned for the new year including Starry Starry Nights in December. The executive directors' meetings are held at Fishhawk Recreation Center, 2318 Buttonwood Way, in the card room, from 11am to 12pm.

General Meeting, Sept 17th, 6:30pm:

Join us at Laurel Manor Recreation Center, 1985 Laurel Manor Drive, for this month's presentation, "From the Ground Up: The Unexpected Surprises of Space Navigation" by Mark Graybill.

Learn how space vehicles actually get to orbit, then move in orbit, and travel to other worlds with practical demonstrations using a video game as a simple spaceflight simulator that uses the same physics models as NASA used to get to the Moon.



You will see demonstrations that show why our intuition of how things move in space is often wrong, but also how easy it is to understand the actual mechanics--without any math!

See why timing of maneuvers is important, and how even complex maneuvers can be broken down into easy steps to get from Earth to the Moon or the planets.

September 21st, 5pm:
Fruitland Park Astronomy Group

The Fruitland Park Astronomy Group meets for an evening of observing and talk on the third Saturday of the month every month, conditions allowing. The meeting is at the Cales Soccer Field in Fruitland Park at 300 Shiloh Road (at the corner of Shiloh Road and Dixie Avenue, north of the Fruitland Park water tower.) The Villages Astronomy Club members and the public are welcome. Gate opens at 5pm

Scopes can be set up directly off of tailgates onto pavement, or taken further into the park to avoid lights. Bring power if needed.

Calendar: https://vlgastroclub.org/calendar/

NEWS

NASA Moves Starliner Crew to Dragon

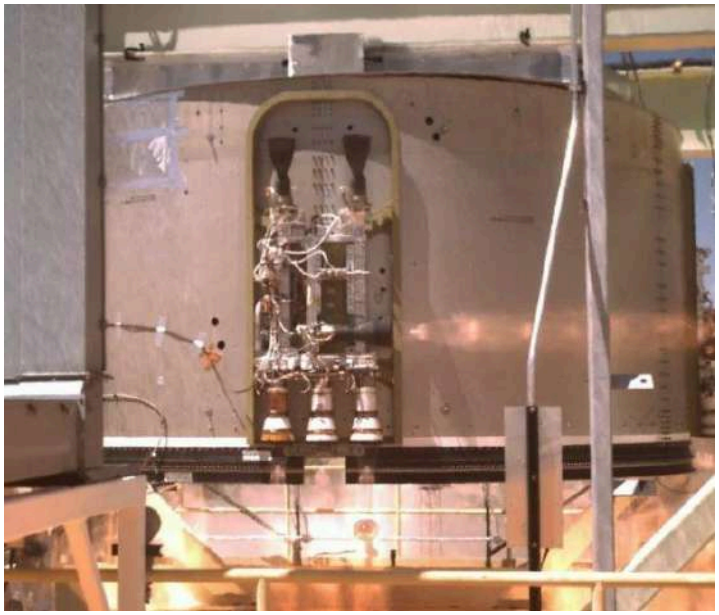
After much study and deliberation, NASA has chosen to return astronauts Butch Wilmore and Suni Williams aboard a SpaceX crew Dragon capsule rather than aboard the Starliner spacecraft that brought them to the ISS.

The specific reason for the change is uncertainty in the problem that is causing the OMAC thrusters (Orbital Maneuvering and Control) of the Starliner to lose thrust in space. During flight, multiple OMAC thrusters were taken offline by software when they were detected to be developing too little thrust. Later, in manual testing of the engines, all but one of the thrusters behaved normally.

Inside the "Doghouse" of Starliner
The Larger Engines are OMAC Engines
Boeing Image.

The issue had not been seen in any ground testing of the engines. Without knowing the cause, and the effects of the problem, NASA and Boeing engineers could not properly assess the safety impact of the problem.

Further testing of the engines was conducted on the ground at Aerojet's rocket test facility at White Sands, NM. They sought to recreate the problem as it was seen on orbit, unsuccessfully until late July.



Test Firing of OMAC Engines. Aerojet image.

During one test, they saw the same effect as they had seen in orbit--a loss of thrust due to diminished oxidizer flow to the engine. The engines use MMH (Monomethyl Hydrazine) as a fuel, and N204 (Nitrogen Tetroxide) as an oxidizer. The two propellants burn on contact, so the safety of the engine is enhanced by eliminating the need for an ignition system. The same propellants were used in orbital thrusters for the Gemini, Apollo, and Space Shuttle.

The propellants need to be mixed in proper quantities in order to generate the full thrust of the engine. Any imbalance causes incomplete combustion, the restricted propellant creates an overabundance of the other propellant that is ejected from the engine without burning, reducing thrust.

Analysis of the key test showed that a Teflon seal in the oxidizer flow valve had distorted, partially blocking the flow of oxidizer. The distortion was caused by high temperatures, and up to a point once the seal cooled, it returned

to its normal shape. But if overheaded too much, the distortion would be permanent, making the engine inoperable like the one that couldn't be recovered aboard Starliner at the ISS.

It turned out that the key element of the test that finally recreated the problem was that sunlight was striking the engine during the test at White Sands, heating it more than it would normally be heated, causing the failure in the ground test.

Starliner Diagram. NASA Image.

While the engines in space are under a cover of the "doghouse" that the engines are clustered in, they are subject to heating by the other engines they are near, and the enclosed environment of the doghouse.

It appears that normal testing on the ground is not performed with the cover in place. On the ground, engines will receive additional cooling from atmospheric convection, which doesn't happen in space--all cooling in space occurs through radiation of heat and conduction through the physical structure of the spacecraft.

While this difference was certainly believed to be accounted for in ground testing, it may be that the ground tests of the OMAC thrusters weren't of sufficient fidelity to recreate the thermal environment they would experience in space.

One design feature of the OMAC thrusters versus their predecessors is that they use less expensive materials than earlier thrusters. A change to Teflon seals on the valves is one of those changes, where earlier engines have used materials like gold in their seals to get the correct combination of properties to both seal a line when closed and not stick when a valve is opened.

Teflon may yet be fine for this application, if the temperatures it is exposed to don't go up to the point where it causes distortion in the seals. It remains to be seen whether Boeing and Aerojet will make changes that allow the Teflon seals to be used, or change to a different seal material, or change the mechanical design of the seal to prevent distortion.

The OMAC engines are 1500 lb thrust engines used to control the orbital maneuvers of the Starliner. They control both its approach to the ISS, and its departure and re-entry to Earth's atmosphere. These maneuvers need to be completed with adequate thrust within specific measures of time in order to be successful.

Astronaut Musical Chairs

The problem with the OMAC thrusters actually has a very small chance of causing a problem on the return of Starliner. However, the chance is there. The issue is that as engines fail, other engines then have to take up the extra work, and that can cause a series of problems as each additional thruster overheats and goes offline.

If the problem were thoroughly characterized and a solution in hand, such as modifications to the flight software to prevent overheating of the engines by shortening firings or doing round robin firings to avoid overheating of

any one engine, then the risks associated with bringing the astronauts home aboard Starliner may be acceptable. However, they are not well characterized.

Coupling that with the fact that a known alternative return vehicle is readily available drives the decision to return the crew aboard a Dragon rather than aboard Starliner.

That decision is not without its risks, however.

Starliner Docked at ISS. NASA image.

Astronauts on board the station need to have a 'lifeboat' to come home in case a debris strike or system failure renders the ISS uninhabitable. Until Starliner departs, Starliner will continue to be Butch and Suni's lifeboat. It's still safe enough to use in an emergency--it's not as if is suddenly became completely unsafe. It's just no longer the preferred ride to come home.

After Starliner detaches from the space station to begin its solo return to Earth, Butch and Suni will be in an interesting position until the arrival of the Dragon capsule for Crew 9. That period will be about two and a half weeks.

For that time, their lifeboat ride will be riding in the cargo area of the Crew 8 Dragon. They won't have the protection of pressurized space suits during such a re-entry, because they won't have available seats and connections for the space suits they have. So they will rely on the pressure vessel of Dragon.

This lifeboat plan is considered low risk, on the basis that an evacuation of the ISS hasn't happened yet in its years of operation, and that the period is only a few weeks. Hopefully that comes to be the case. But it's worth stressing that the decision to not return aboard Starliner introduces risks of its own.

Once the Crew 9 Dragon arrives, it will have Dragon suits for both Butch and Suni. Both astronauts have worked on the Crew Dragon program in the past, and have suits as well as measurements for SpaceX to make up new suits if required. SpaceX's Crew 9 Dragon will now launch with 2 crew rather than 4, with Butch and Suni taking the place of the 2 crew for the ISS Expedition 72, returning with that crew in February, 2025 if all goes according to schedule.

Not the First Time

This will not be the first time that astronauts have arrived at the ISS on one vehicle, and returned on a different vehicle.

When Shuttle was the US crew vehicle, it was normal for Expedition crews to arrive one one flight of the Shuttle, then return on a different Shuttle flight. While the Shuttle was docked to the ISS the total crew aboard was increased to as many as 13, then a pair of astronauts would remain behind for the full duration of the Expedition, with a Soyuz capsule on hand as a lifeboat.

Ken Bowersox' Ride Home: Soyuz TMA-1

Since the Soyuz capsules had a limited lifetime, NASA was paying Russia to keep them circulating to maintain a ready lifeboat for the

NASA crew. This was the source of opportunities for the space tourist flights that Russia conducted. Later NASA protests over this practice resulted in a change to flying ESA astronauts who might otherwise not have a mission to perform short trips to the ISS to build Europe's base of experienced astronauts beyond those chosen for longer duration flights and Shuttle servicing missions.

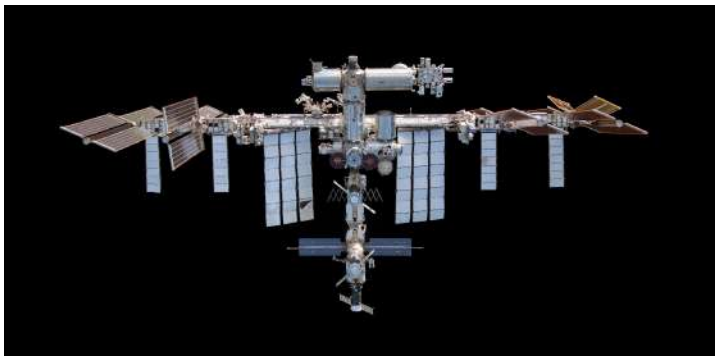
NASA's current Associate Administrator for Space Operations, Ken Bowersox, has had a hand in the current Starliner decision making and is no stranger to hopping between spacecraft himself. Following the Columbia disaster, when Shuttle was grounded, Bowersox was aboard the ISS without a Shuttle to ride home on.

He came home aboard Soyuz, acting as flight engineer for the descent. In that instance the ability to take a different route home proved critical to his safety.

ISS Expedition 6 Crew Aboard Soyuz TMA-1 Ken Bowersox at Right. NASA image.

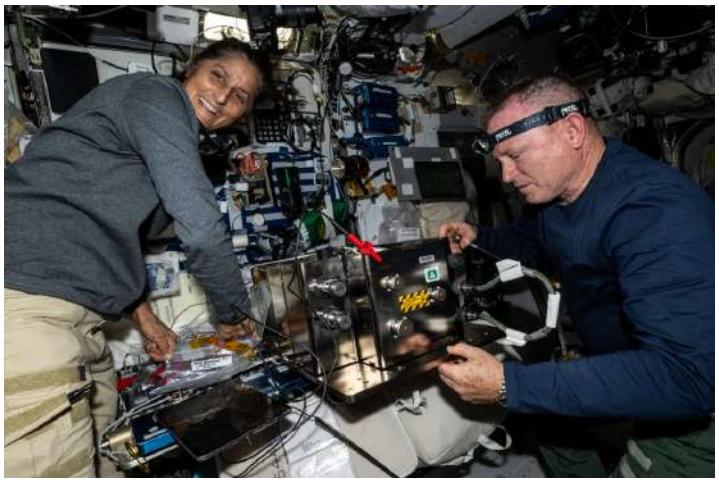
Unofficial word is that over the week prior to the decision to move the astronauts from Starliner to Dragon, a sense of calm spread through the ranks thanks to the availability of a second option to avoid the risks of an unknown and poorly characterized issue with Starliner's thrusters.

NASA has stated that they remain committed to the Starliner program and expect it to reach certification and have the current issues corrected before the next flight. They have shifted the schedule for that flight back to late next year to provide plenty of time for testing and modification of the next Starliner and its service module.



For Butch and Suni, this flight will likely form a capstone for their careers as members of the Astronaut Corps. Suni has worked on the Commercial Crew program since its inception with vigor. Delays to the program have moved this flight later in her career, seemingly taking away the option to serve aboard another ISS Expedition. However, Starliner's issues might be seen as Providence handing both her and Butch the chance to serve a full duration mission aboard the ISS.

It will be interesting to see where their experiences and abilities take them next.



Butch and Suni Work on Experiments Aboard ISS NASA Image

For more information:
https://www.nasa.gov/news-release/nasa-decides-to-bring-starliner-spacecraft-back-to-earth-without-crew/

Polaris Dawn Mission to Set Records

Polaris Dawn is the first in a series of commercial space missions intended to extend the capabilities of commercial spaceflight in a way similar to how NASA's Gemini missions expanded the capabilities of human spaceflight prior to Apollo.

Polaris Dawn will take a commercial crew aboard the SpaceX Dragon capsule to an altitude higher than any other non-governmental crewed spaceflight has ever reached--870 miles (1,400km), and higher than any human has travelled since Apollo 17's journey to the Moon in 1972. It will be the highest Earth orbital crewed flight ever flown, exceeding Gemini 11's 850 mile altitude record set in 1966.

Anna Menon, Kidd Poteet, Rook Isaacman, Sarah Gillis, crew of Polaris Dawn. SpaceX image.

The flight will also include the first commercial spacewalk ever. Mission commander Jared "Rook" Isaacman has worked with SpaceX to develop an advanced version of SpaceX's Dragon IVA (Intra-Vehicular Activity) suit capable of use outside the spacecraft. During the spacewalk the entire capsule will be evacuated (similar to Apollo, Gemini, and Soyuz) with all crew in EVA suits for protection. Two of the astronauts will then exit the capsule and perform a number of spacewalk activities. They will be live streamed on video using both internal and external cameras, including a free-flying external camera known as LLAMAS, built by a student team at Embry-Riddle Aeronautical University for this mission.

As of this writing, Polaris Dawn is scheduled to launch at 3:38am on August 28th. It will then ascend to a high orbit, higher than any humans have flown since Apollo 17's flight to the Moon in 1972, to 870 miles in altitude. This will make it the highest orbital flight by humans. All higher flights left Earth's orbit to go to the Moon during Apollo. The current record-holder for a high orbit is Gemini XI, which set a record of 850 miles in 1966.

The mission also will be performing medical tests on humans flying through the Van Allen belts, to better characterize the effects using modern instrumentation and medical knowledge. No human has flown through the Van Allen belts since Apollo, and we've learned a lot since then.

A Spacewalker Emerges from the Dragon Capsule SpaceX image.

The craft's orbit is specifically designed to pass through especially active parts of the belts, notably the South Atlantic Anomaly, an area where the belts come lower toward Earth than elsewhere.

The crew will be wearing monitors and will perform tests to see if the belt affects their ability to work in space.

This is a mission with many firsts. Aside from the first spacewalk, using a newly designed space suit, in a craft that hasn't been exposed to vacuum while in space before, this will also be the first flight of SpaceX employees.

Sarah Gillis is a lead space operations engineer at SpaceX, and had a major role in designing the new space suit. Anna Menon is a Lead Space Operations Engineer at SpaceX, and serves as the Dawn mission's medical officer. While thousands of SpaceX employees have worked to launch others into space over 15 crewed missions, no SpaceX employee has ever had the opportunity to fly along.

All four members of the crew will have a chance to do a spacewalk, according to mission commander Isaacman. They will cycle between pairs, with one pair including a spacewalker and a support astronaut, with the other pair remaining in the capsule to support the spacewalking pair. That way they will get the widest range of responses to the operation of the suit, and the support structure for the spacewalker to gain knowledge for future missions.

The Polaris Dawn Crew Has Maintained a Training Program to Prepare for the Flight for 2-1/2 Years, Including Flight Training & Mountain Climbing

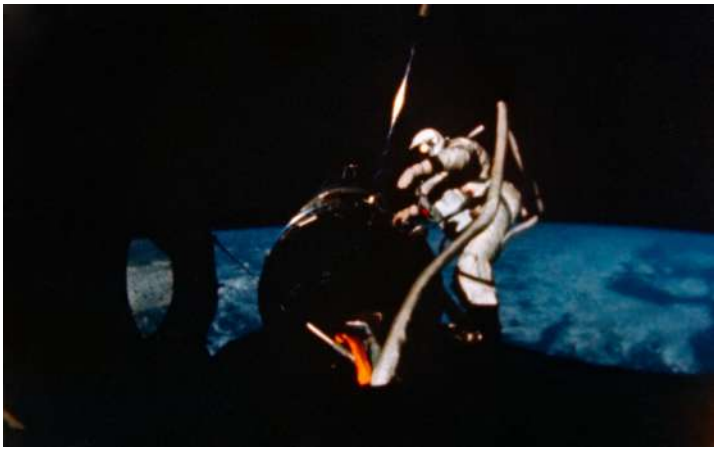
The spacewalker will retain at least one point of contact with the vehicle at all times. They won't be floating free in space at the end of an umbilical. Instead, they'll be using a device they jokingly call the "Space Walker", designed to provide handholds and foot restraints for the spacewalker.

Isaacman said, "I think that's the way Buzz Aldrin showed us it's supposed to be done," referring to Aldrin's spacewalk aboard the final Gemini flight where he was able to accomplish more on a spacewalk than on all prior spacewalks combined. He did this using handholds and foot restraints he specified to be added to the Gemini capsule to avoid the fatigue and overheating that plagued earlier walks such as Gene Cernen's failed attempt to use the free-flying Astronaut Maneuvering Unit in Gemini IX's service module. The mission marked a turning point for our understanding of how to do work in the vacuum of space, and laid the path for performing construction in space such as the spacewalks performed to assemble the ISS.

The Astronaut Maneuvering Unit. Flown on Gemini IX, it remained untested because mobility and space suit issues prevented astronaut Gene Cernan from being able to operate it safely. NASA image.

The launch time for Polaris Dawn is limited to 3 specific times within the window from 3:30am to 7:30am Eastern Time to avoid space debris resulting from an exploded upper stage from a

recent Chinese Long March 6 launch. During the spacewalk, the Dragon capsule will be oriented to shield the spacewalkers with its open nose cover, and oriented with the nose toward Earth to provide the best orientation to protect them against debris strikes.



Buzz Aldrin's Historic Spacewalk on Gemini XII By adding handrails and foot restraints to the Gemini and Agena target spacecraft, Aldrin was able to complete more work in one spacewalk than had been performed in all prior spacewalks combined. NASA image.

Here is the Polaris Dawn mission website: https://polarisprogram.com/dawn/

IN THE SKY THIS MONTH

Please also refer to the sky map on the last page of the newsletter.

The Moon:
New Moon, September 3rd
1st Quarter, September 11th
Full Moon, September 18th
Last Quarter, September 24th
New Moon, October 2nd

Saturn will reach opposition on September 7th and 8th, where it is directly opposite the Sun in the sky. It shines at magnitude -0.6, and its moons will also shine relatively brightly making this month a good time to try to spot the dimmer moons that you may not have seen before. The rings are relatively flat, at only 3.5 degrees inclination, reducing their glare to make it easier to spot dim satellites. The rings will seem to 'disappear' during the ring crossing next year, when Earth will be positioned in line with the plane of Saturn's rings, but the illumination of Saturn and its satellites will not be as favorable.

Oppositions of the outer planets are not sudden events, where if you miss the specific night you've missed the show. The brightness from this opposition can be appreciated at least two weeks before and after the specific date of the event.

This is also a good time to watch for transits and occultations of Saturn's moons, most notably giant Titan. The moons closer to Saturn can be seen to disappear behind Saturn (occultation) and reappear frequently, or to pass in front of Saturn's disk. But farther satellites, like Titan, can only be blocked by or pass in front of Saturn when the Earth is in line with the plane of its orbit around Saturn.

Saturn will be occulted by the Moon this month, but it will not be visible from The Villages. If you know someone in the western United States or Canada, tell them that they can see a special show if they get up before 4am on September 17th. The Moon will cover Saturn at 4:06am, and it takes about a full minute for the Moon to fully cover Saturn. It's worth getting up and breaking out a telescope or binoculars!.

Saturn rises in Aquarius shortly after 8pm at the start of the month, and shortly after 6pm at month's end. It will remain a bright star in our evening sky through the rest of the year.

Saturn finder chart:
https://in-the-sky.org//data/object.php?id=P6

Astrophotographer Damian Peach's guide to observing Saturn:
https://www.damianpeach.com/sat_best.htm

Neptune rises at shortly after Saturn, nearby in the constellation Pisces the Fish. It also reaches opposition this month, on the 21st. Like Saturn, its opposition will make it brighter than usual for weeks on each side of the date, so if you

haven't spotted Neptune in your scope or binoculars, this is the time!

Neptune will also be occulted by the Moon this month, but alas, also not visible from The Villages! Instead, we'll see a near miss of the Moon sweeping past Uranus at about 4am on the 18th. The brightness of the Moon will rob the event of any excitement, though, as it makes dim Neptune nearly invisible near the full Moon.

Neptune finder chart:
https://in-the-sky.org//data/object.php?id=P8

Uranus and Jupiter are in Taurus, with Uranus in the body of the Bull, near the Pleiades, and Jupiter between the horns of the Bull. Uranus rises first, at about 11:30pm at the start of the month, and 9:30pm at month's end. Jupiter rises a bit after 1am at the start of the month, then joins our evening sky in midmonth, rising before midnight, and finally rising at 11am at month's end.

Uranus shines at magnitude 5.7 this month, making it a good target for binoculars or a small scope. The wide field view of binoculars may be able to capture both the Pleiades and Uranus in the same field of view.

Jupiter is a magnitude -2.3 beacon in the sky, and will be with us in the evening through the rest of the year. Binoculars will reveal its Galilean moons, and telescopes can capture even more of its many moons.

Jupiter observing information:
https://in-the-sky.org//data/object.php?id=P5

Online finder chart for Uranus:
https://in-the-sky.org//data/object.php?id=P7

Mars rises at 1:40am at the start of the month, and at 12:45am at month's end. It's a 7 arcsecond disk this month, twice its smallest size, shining at magnitude 0.6, so we can begin to see more features on Mars again. Mars will get bigger and brighter as it approaches opposition on January 16th of 2025, when its disk will be 14.5 arcseconds, over twice its current size.

While this is far below its best appearances at opposition (about 25 arcsec), it's still big enough for details to come out on its surface for observers with scopes that provide sub-arcsecond resolution (generally 8 inches or more, though photographic techniques can bring out fine detail in smaller scopes.)

Online observing information for Mars:
https://in-the-sky.org//data/object.php?id=P4

Mercury shifted from the evening sky to the morning sky last month. This month early rises will be able to see it in the predawn sky at the start of the month until it dives back down toward the Sun again. You have to be quick to catch Mercury! Mercury shines at magnitude 0.5 and shows an 8.2 arcsec disk.Even with large scopes, Mercury shows little detail beyond some generally darker areas against its ruddy disk.

Look for it next to the sliver of a Moon on the morning of the 1st at 5:50 to 6:10am. Both will be challenging to see before the light of the Sun washes them out of view!

Mercury will rise too late to view by the 15th of the month, and won't reappear again until it rises into evening dusk in November.

Mercury online viewing chart:
https://in-the-sky.org//data/object.php?id=P1

Venus sits as a low evening star this month, moving from south to north over the course of the month, and only slightly west to east. It is magnitude -3.9, so it is very bright, and sitting as low as it does at sunset, behaving in a seemingly odd fashion compared to the outer planets, expect a few UFO reports from it.

Its phase will be gibbous (over half illuminated) through the month.

Venus online finder chart:
https://in-the-sky.org//data/object.php?id=P2

More information on sky events this month:
https://in-the-sky.org/

Resources
from the August 2024 Astronomy Club Resources Round Table Meeting

Club-Related Resources

General Meetings, 3rd Tuesday of the month, Laurel Manor, 6:30pm

At our general meetings we cover club business before a presentation each month on a subject related to astronomy or space exploration. In the past 12 months, we have had the following talks:

The James Webb Space Telescope by Ken Katta

Cosmology of the Universe by JB Smith

High Energy Universe by Toni Graybill

Exoplanets Crash Course by NASA Ambassador Anne Holland

The Chemistry of Life in the Universe by Pauline Schwartz

Electronically Assisted Astronomy by Randy Gilbert et al.

Cecilia Payne-Gaposhkin by Linda Meng

White Dwarves and Cataclysmic Variables by Ken Katta

The Life and Death of Stars by Mike Petersen

SpaceX Starship and Other New Space Vehicles by Mark Graybill

In addition, we have had two round tables where members share their interests in astronomy and the resources they use to enjoy and expand their knowledge within the hobby (our July and August meetings.)

Space Academy, 1st Monday of the Month, Truman Rec Center, 6:30pm

Space Academy meetings range more widely, with an emphasis on beginner level astronomy intermixed with some of the latest news and research in astronomy. Space Academy began in May 2023 and has been very popular ever since. Some of our past subjects of discussion:

The History of the Speed of Light/ A Grand Tour of the Cosmos

Bright Objects in the Night Sky/ M-87's Supermassive Black Hole

Dark Matter Stars/Glorious Total Eclipses

The Total Eclipse of 2017/Afterglow of the Big Bang

Astronomy 101 by Frank Ancona and Ken Katta

The Sun by Frank Ancona

Stellar Cores--Atom Factories/Supermassive Black Hole Discoveries

Astrophotography for Mere Mortals by Mark Graybill

X Ray Astronomy by Toni Graybill

Measuring Distances in Space/Chandra X-Ray Observatory Update

Space Academy Meeting. By Jeff Kahler.

Starry Starry Night

Starry Starry Night is the twice a year event where we share views of the night sky with the community. When the event is held within The Villages, we invite residents of The Villages and guests with guest IDs, when we hold it at sites outside The Villages, we invite the community as a whole.

Last year, we held both Starry Starry Night events at Truman Recreation Center's picnic pavilion area. The first was held in November 2023, the second in February 2023. In December, we drew 500 attendees to look through the scopes of 9 of our astronomers.

In February of this year, we drew over 800 Villagers and guests, looking through the telescopes of 12 of our astronomers. There would

have been more, but we overran the parking space at Truman!

This year, our first Starry Starry Night will be held on December 7th at Everglades Recreation Center's multi-use field and basketball court area, on the north side of the Everglades Recreation complex, near the platform tennis courts.

Starry Starry Night. Image by Jeff Kahler.

Astronomy Day

Astronomy Day is our daytime observing activity for non-members, incorporating solar scopes, our Solar Walk, and information at our booth for attendees. This last year, we had two solar eclipses that fell near our Astronomy Day dates, so we made the eclipses our Astronomy Days.

Volunteers Randy Gilbert and Toni Graybill provide solar glasses and information. By Jeff Kahler.

The first was in October 2023, where we had an eclipse of a bit over 65%. We had about 500 attendees at our event at Homestead Recreation Center. We gave out about 300 pairs of solar glasses, gave over 200 people a tour of the Solar System, and everyone had a great time.

The most recent eclipse, in April, coincided with "The Great American Eclipse", where the path of totality crossed a very populous strip of the United States to the north of us. Here in Florida, it was very similar to the October eclipse, being about 65% coverage of the Sun. But, because of the coverage that the eclipse received for being totality elsewhere, we had a much larger turnout at our event at Homestead. Over 1000 attendees came to see the eclipse, and the 14 volunteers from our club as well as the wonderful staff of The Villages Recreation and Parks, saw to it that we had a great and safe event in spite of overrunning the Homestead Recreation Center.

Attendees Look Through Solar Scopes. Image by Jeff Kahler.

We handed out over 600 pairs of solar glasses, showed views through multiple solar scopes, EAA scopes, and solar binoculars. We gave over 250 people tours of the Solar System, and showed livestreamed video of the eclipse from the path of totality inside the rec center.

Telescope Workshops

Our monthly Telescope Workshops are held in coordination with our Space Academy meetings on the 1st Monday of the month. At these meetings, you can talk to experienced observers to help you select the right telescope

for you, learn how to use your telescope, learn of any accessories you may need to get the most out of your scope, or learn observing techniques to find interesting objects to view.

Members share tips and prepare for viewing at a Telescope Workshop. By Jeff Kahler.

These are also good opportunities to do some observing if you want to bring out your telescope, and to share views with interested onlookers. We often get people visiting us after Space Academy meetings let out, interested in a look at what's in the sky.

Whether you are interested in naked eye, binocular, or telescopic observation this meeting is a resource for you.

Dark Sky Observing/EAA Meetings

This last year our club began working to take greater advantage of the Homestead Astronomy Park. We started by looking for clear evenings (a rare occurance last fall and winter) to open the park late for observers. We had 3 Dark Sky observing events at the Astronomy Park, where astronomers were able to come out to observe at the park while the sky conditions were favorable. During this time the club was working to develop a plan for regular meetings for observing at the park, with the park kept open late for our members.

During this time, amateur tools for Electronically Assisted Astronomy (EAA) advanced dramatically, with the advent of two new low-cost smart telescope devices--the Dwarflabs Dwarf II and the ZWO Seestar S50. These all-in-one devices gave the convenience of earlier all in one observing solutions like the Unistellar and Vaonis smart telescopes in an economy package. The interest in these devices spread through our club members, and soon we had a group of astronomers observing with them, looking to share information and techniques.

While our Telescope Workshops are an appropriate forum for this (and you will find multiple users of smart telescopes at our Telescope Workshops), we saw this as an opportunity to make more use of the Homestead Astronomy Park.

Secretary Randy Gilbert has taken on the task of organizing these new monthly events for our club. Held on a Wednesday near the New Moon at Homestead Astronomy Park, we welcome anyone with an EAA device, an interest in EAA, or just in observing at Homestead as well (we won't send you home if your telescope isn't electronic, we promise!) EAA covers a broad range of devices, not just the all-in-one devices like the Seestar, Dwarf, Vaonis and Unistellar devices. Traditional go-to scopes with a smart controller like an ASIAir, StellarMate, Mini-PC with Nina, etc. all qualify as well.

The Villages Media captures Glenn MacKinnon's Vaonis Hestia EAA device. By Jeff Kahler.

We discuss the different approaches to EAA, astrophotography, image capturing and processing, dealing with software, features such as polar alignment, tracking, etc.

If you are doing EAA, or are just curious and want to see what others are doing, you are welcome to join us at our observing sessions at Homestead Astronomy Park each month.

Youth Outreach

This past year we held nine educational outreach events for youth. This includes our two sessions for Camp Villages, where we provided solar scope observation and hands-on activities like making meteor craters, Newton's disks, and a black hole simulation. We held an Astronomy Merit Badge class and star party for local Scouts, solar and evening observing session for a local school, and two sessions of observing for Girl Scouts. We are planning many more such sessions in the upcoming year, with two more Scout activities, a community outreach star party, and more Camp Villages sessions already in planning.

Members John Keller, George Dubrasky, and Randy Gilbert (background) teach youth at Camp Geneva about the sky. By Jeff Kahler.

This year we began assisting local camp retreat Camp Geneva at their youth camps, providing star parties for middle and high school groups. Our astronomers and volunteers turn out to give views of the sky, information and sky lore, at their group camps.

Villages Outreach

Each year our club participates in the Outdoor Expo, a two day event held by The Villages Recreation for residents to find active new clubs and interests. Our volunteers spoke with about 500 attendees to the Expo each day, telling them about our club and our activities. Our booth included solar scopes, EAA devices, traditional telescopes, astronomy books and informational posters and cards for attendees to take with them with contact and meeting information for our club.

Volunteers Mark Graybill and John Keller telling Villagers about the Astronomy Club. By Jeff Kahler.

We have also been featured in The Villages media many times of the past year, everything from feature articles in The Daily Sun to a video about the club on The Villages' website. This month, our astrophotographers are the topic of an article in The Villages magazine. Our members and volunteers graciously share their time and thoughts with our local media to help make this happen. The video of our club was in production by The Villages Marketing Department for about a year. The astrophotography article involved contacts, interviews, and photography sessions by The Villages Magazine staff over the course of several months. Smaller items such as event announcements can usually be covered in a

phone call or two combined with archive photos of our group, but they are still an important part of helping people in The Villages discover our activities, and we appreciate the time that our members spend assisting reporters and photographers.

The Villages Media interview President Mark Graybill at the Eclipse Event. By Jeff Kahler.

Of special mention is our PR director, Jeff Kahler, who has developed a network of contacts for getting the word out about our eclipse and Starry Starry Night events. It is his efforts that have brought awareness of our events to The Villages through the radio station, the paper, and Recreation News to make them grow to be the largest and most successful they have ever been.

Vmail video of The Villages Astronomy Club:
https://www.thevillages.com/whats-new/recreation/stargazing-with-astronomy-club/

Some recent articles on our club and the Fruitland Park club:
Villages Club Inspires Passion for Astronomy
https://www.thevillagesdailysun.com/news/villages/villages-club-inspires-passion-for-astronomy/article_57ebf77e-9495-11ed-90ee-171832ca37f7.html

Astronomy Group Calls All Stargazers
https://www.thevillagesdailysun.com/news/in_todays_daily_sun/astronomy-group-calls-all-stargazers/article_9a7bf6e6-c521-11ec-98e5-afd0bf1badd8.html

Villages Astronomy Club Brings the Stars Closer
https://www.thevillagesdailysun.com/news/in_todays_daily_sun/villages-astronomy-club-brings-the-stars-closer/article_3977197c-c57c-11ee-838f-5b1e9ec5378a.html

Villages Astronomy Club Observes Rare Solar Eclipse
https://www.thevillagesdailysun.com/news/in_todays_daily_sun/villages-astronomy-club-observes-rare-solar-eclipse/article_7b2de8fc-6d69-11ee-85ce-bf0e9ae7ef04.html

The Villages Astronomy Club Hosts Stargazine Soirees
https://www.thevillagesdailysun.com/news/in_todays_daily_sun/the-villages-astronomy-club-hosts-stargazing-soirees/article_0f00b26a-0a6b-11ee-ad22-e70b38107350.html

The Villages Astronomy Club Helps Local Scout Troop Achieve Astronomy Merit Badge
https://www.thevillagesdailysun.com/news/in_todays_daily_sun/the-villages-astronomy-club-helps-local-boy-scout-troop-achieve-astronomy-merit-badge/article_58484732-ce1d-11ee-b562-eb0dc171b187.html

Community Outreach

We join our sister organization, the Fruitland Park Astronomy Group, at their observing site in Fruitland Park's Cales Soccer Field. At this site all public are welcome to attend, and our members not only get a chance to observe under Bortle 5 skies (most of The Villages being Bortle 7 or worse), and to set up their telescopes right off their tailgate, but we get to spend time sharing the sky with local families. This year we had 9 shared events, with 3 being cancelled due to weather.

The Fruitland Park events are held on the 3rd Saturday of each month, weather permitting. Beside being a great community outreach event, they give our astronomers a good communal observing opportunity.

OUT & ABOUT IN THE VILLAGES

Try This Today: Gain a New Perspective With The Villages Astronomy Club

Expand your knowledge of the cosmos with The Villages Astronomy Club. The group helps Villagers, their guests and the local community with the ability to learn more about space. Membership in The Villages Astronomy Club is open to residents of The Villages and yearly membership dues are $15. The club will join with the Fruitland Park Astronomy Group at 5 p.m. next Saturday at Cales Memorial Soccer Field for an outing. For more information, check out their website at vlgastroclub.org.

— Greg Hughes, Daily Sun

Bill Mitchell | Daily Sun

All members of The Villages Astronomy Club are invited to attend these meetings. Gates open at 5pm and stay open till we're all done or the sky closes up.

Observing Opportunities

To summarize from above, our Telescope Workshops and EAA meetings are observing opportunities for our astronomers on a regular monthly basis, as are the Fruitland Park meetings. That's 3 times each month to bring your scope out or to come and have a look at what our astronomers are looking at. In addition, we have our two Starry Starry Night events. We invite any of our astronomers who feel capable of locating a few objects in the sky like the Moon and bright planets to participate as astronomers at these events--you don't have to be a super-observer with a super-scope.

Chiefland Astronomy Park is a dark sky site about 90 minutes from The Villages that many of our members take advantage of. They have observing events on the weekend nearest the New Moon each month. https://chieflandastro.com/

Homestead Astronomy Park is a site within The Villages that gives Bortle 5 views (The Bortle Scale: https://en.wikipedia.org/wiki/Bortle_scale). Our club is able to check out the key to the park to keep it open late for observing. The site has skies as dark as any that can be found within The Villages. However, there are several things observers should be aware of:

The mosquitos are terrible through most of the year. Powerful insect repellent, long sleeves and pants, and mosquito netting on hats are highly recommended from spring until the first winter freeze. And even then, mosquitos can be a serious problem into winter.

The site is accessed by a long path, with no vehicles allowed. Provide yourself with carts, wagons, or hand trucks for moving your equipment in and out. There is a vertical component to the path, so don't expect to load heavily.

The long path into Homestead Astronomy Park It's uphill on the way out. By Bob Averitt.

Remain on pavement at all times. Fire ants are throughout the site due to the surrounding preserve area. Also, crossing the site off the path puts walkers in danger of tripping hazards in the

dark, including corn toss pits and fire pits near the pavilion.

The horizon of the site is quite high, ranging from 20 to 35 degrees above the horizon. The site is surrounded by closely encroaching preserve with tall trees. Some pads have overhanging branches.

Members gather for an EAA Meeting at Homestead Astronomy Park. Note the trees in the background. Image by Jeff Kahler.

So plan your observing appropriately. Objects near the horizon will not be visible. If you need a direct view of Polaris to align your telescope, then only the south side pads will give you a line of sight, or the junction of the sidewalks on the central south side. Pads on the north side will give the best views to the south, of course, but you will need to be able to align without a direct view of Polaris (most EAA devices and smart controllers provide the ability to polar align using other parts of the sky.) Our magnetic declination is -6 degrees, 32 minutes (West) if you use a compass for alignment.

Unofficially, our members have reported several sites they use for personal observing around The Villages. The club does not hold events at these sites, but if you happen to live nearby, these may be good places for you to take out a pair of binoculars, a camera, or a telescope:

First Responders Rec Center

Near the fenceline on the outskirts of Brownwood

Village of Caroline Mail Center

Behind the tennis courts at Seabreeze Rec Center

North side of Big Cypress Rec Center

Behind Collier Mail Center

Hogeye Preserve Walking Trail

Lake Miona Walking Trail

When choosing a place to observe, please keep safety in mind at all times. Stay off of multi-use trails while observing, stay clear of water and wildlife. Don't misuse facilities like golf courses and closed facilities or areas. Don't trespass, and be respectful of others.

The Astronomical League

Our club is a member society of The Astronomical League, a national league of astronomy clubs. The Astronomical League publishes a quarterly newsletter, delivered to club members in physical form, and available online for free at the League's website.

https://www.astroleague.org/

Reflector Magazin online:

https://www.astroleague.org/reflector/

The League also provides us with discounts at many retailers and manufacturers of astronomy equipment.

https://www.astroleague.org/celestial-savings/

The League has information on observing each month, including finder charts, information on special astronomical events, and a book on observing:

https://www.astroleague.org/navigating-the-night-sky-guides/

And the League has observing programs, where observers can get recognition for their observing. The programs include all types of observing and photography, at all levels from beginner to expert. There are literally hundreds of programs, many of which give certificates and access to recognition pins for the work:

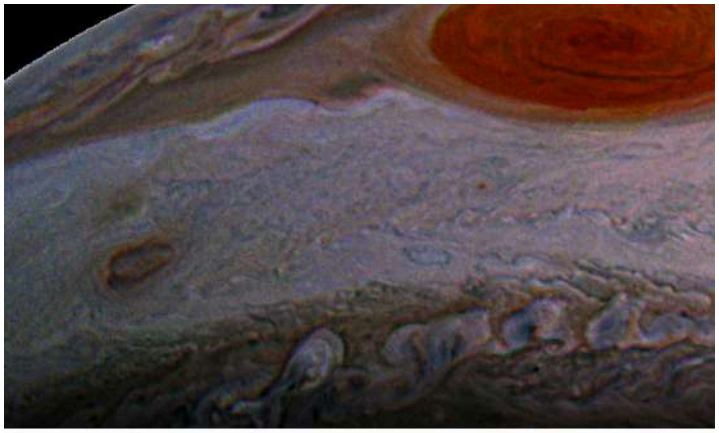
https://www.astroleague.org/alphabeticobserving/

Online Club Resources

Our club has an email list via Google Groups that we use to distribute our newsletter, event reminders, and occasional special event notices of interest to our members including unique launches and landings of space vehicles, eclipses, conjunctions, novas, supernovas, etc. If you're not a member but wish to be on the list, send an email with the subject "Astronomy Club Email List" to our president at saundby@gmail.com.

We also have a very active Facebook group where members post their astrophotos, links to online resources outside the club, event reminders, and engage in general discussion of our hobby.

https://www.facebook.com/groups/vlgastroclub



Finally, our club has a website with our club calendar, all back issues of our newsletter, information about our events and sites, club videos, links to useful resources, etc.

https://vlgastroclub.org/

Science Book Club

Though not formally a part of the Astronomy Club, our group supports it and there is a large overlap in membership between the two clubs. The Science book club reads and discusses a book and the concepts it presents. Often ranging into the speculative or hypothetical, the group reads a diverse selection of books. To learn more about the club and joining their regular Zoom meetings, contact our Vice President Ken Katta at: kkatta@aol.com

Non-Club Resource Listings

Please note that a listing here does not constitute an endorsement by The Villages Astronomy Club. These resources were provided to us by our members, and we have listed them as a service to our members to provide access to items that your fellow members have found useful. We are not able to investigate these resources fully, nor take responsibility for their content or conduct. Please treat these simply as recommendations of "you might have a look at" as if given in casual conversation with other group members.

Print Resources

The Villages Media

As mentioned in the Club Resources section, our club's activities are frequently featured in The Daily Sun. Thursday's Recreation News will list our Space Academy and General Meetings prior to that meeting. Look for Space Academy under the Truman Rec Center listing, and the General Meeting under Astronomy Club on the Laurel Manor Rec Center listing. Telescope Workshops and EAA meetings are not covered in the Rec News or paper's daily recreation events, however, because they occur at sites that are not listed (Truman Picnic Pavilion and Homestead Astronomy Park.) Watch our website and email list for announcements about those meetings.

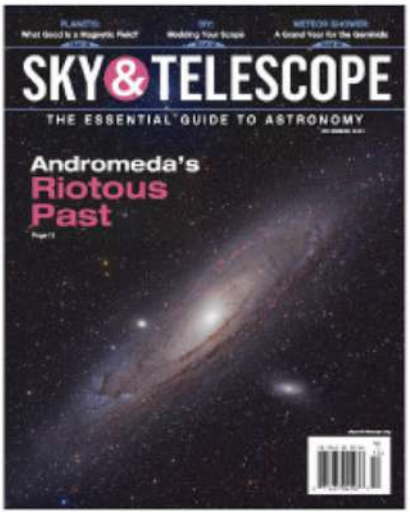
365 Starry Nights by Chet Raymo, ISBN: 0671766066

365 Starry Nights is a naked-eye astronomy book that gently takes the reader through the stars and constellations one night at a time. There is a page for each night of the year, so the reader can simply open the book to today's date and learn about what they can see up that night. Each month has a theme and a section of the sky that it covers. Binocular highlights get an occasional sidebar, and there are comments about interesting telescopic objects in the areas described as well.

Sky & Telescope Magazine

Monthly magazine of space and astronomy, including regular features on astronomical events, space exploration in our solar system, amateur astronomy, monthly star charts and detailed information on solar system observation each month, as well as regular events such as minimal of Algol. The magazine's website also provides a wealth of information and observing tools.

https://skyandtelescope.org/



Astronomy Magazine

Monthly magazine of astronomy, with regular news about research and discoveries, professional astronomy sites and instruments, lunar observing, naked eye and binocular observation, etc.

https://www.astronomy.com/

Old Farmers' Almanac

Source of information about astronomical events, sky lore, etc.New edition annually. Available from most book retailers or online at: https://www.almanac.com/

Education

Australian National University School of Astronomy and Astrophysics

$200 for 4 courses, including homework, tests, and math. Professor Brian Schmidt's course on Basic Astronomy has been recommended.
https://rsaa.anu.edu.au/

Petersen Academy

$450/year access to all courses. Homework and tests optional. Certifications under development. Introduction to Cosmology course by UCSD Professor Brian Keating.
https://petersonacademy.com/

Citizen Research

Many science organizations accept amateur reports and research work. Observation time on instruments is often very limited, and current amateur equipment in many ways matches or exceeds the capabilities of professional equipment of just a decade or two ago.

Also, many institutions don't have the resources to maintain their own equipment and observation staff. You can assist these organization in their science research:

Association of Lunar and Planetary Observers

ALPO coordinates the observations of solar system bodies and phenomena and publishes work in its own journal for presentation to the greater scientific community. ALPO is a resource for professional astronomers to obtain access to systematic observing patrols of interested amateurs seeking to contribute to scientific work. ALPO is organized into 15 sections, each specializing in a specific body, group of bodies, or phenomena, and led by an accomplished observer in the field. For example, leading comet hunter Don Machholz led the Comet section until his recent demise.

Amateurs will have an opportunity to challenge and develop their observational skills while contributing directly to the advancement of science.
https://alpo-astronomy.org/

American Meteor Society

The AMS is the American branch of the International Meteor Organization, a group that specifically studies meteors and their relationship to their parent bodies and interactions with other bodies in their orbits. AMS members provide data that allows mapping of the dust streams that form meteor showers, changes to those streams, and data to provide predictions of meteor storms. Data collected from many amateurs adds up to powerful information for scientific analysis.

Introductory requirements are very minor, and any amateur can submit reports whether a member or regular contributor or not.
https://www.amsmeteors.org/

American Association of Variable Star Observers

The AAVSO is a long-established organization that brings together professional and amateur astronomers to conduct studies that reveal much of what we know about the inner workings of stars. Since the work of Henrietta Leavitt first opened the field of cosmology through the study of variable stars a century ago, the

AAVSO has been organizing coordinated study of variable stars in the pursuit of international science, initially under the Harvard Observatory, for use by the general scientific community.

The AAVSO maintains and publishes data on observations of variable stars, and coordinates connections between professionals and amateurs to obtain data for specific studies.
https://www.aavso.org/

Also see below, under Software, Apps and Online Resources, where many citizen science apps are listed.

Video and Livestream Resources

Dr Becky

Cambridge UK astrophysicist with a specialty in black holes who covers astronomy news and research in a friendly, easy to understand way. Monthly sky updates, weekly research updates.
https://www.youtube.com/@DrBecky

Galactic Hunter

Astrophotography techniques, smart telescope reviews, astronomy travel. In depth step by step techniques for astrophotography at all levels from DSLR to specialized equipment, from city lights to dark sites.
https://www.youtube.com/@GalacticHunter

Cuiv, The Lazy Geek

Telescope and accessory reviews, astrophotography techniques and software, smart telescope reviews and use techniques, detailed tutorials in astro image processing.
https://www.youtube.com/@CuivTheLazyGeek

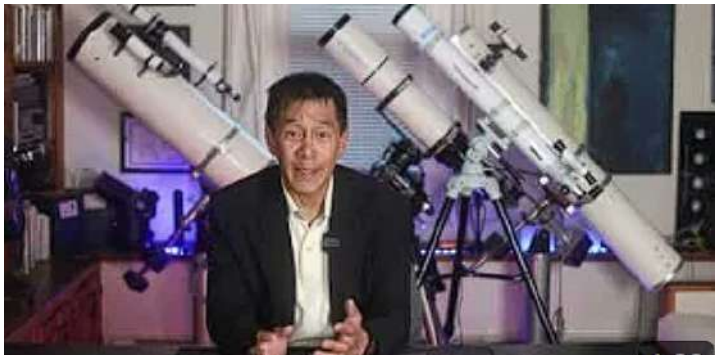
Smarter Every Day

Deep dive videos on a range of science subjects, including the construction and operation of JWST, how astronauts prepare for spacewalks, Apollo computer construction and operation. Friendly, personable tone, gently introduces and walks through each subject while interviewing experts and visiting important sites. Excellent explanatory animations.
https://www.youtube.com/@smartereveryday

Nebula Photos

Astrophotography how-to videos ranging from the most minimal equipment (DSLR and tripod) to more involved setups. Equipment comparisons, descriptions of unique objects that can be photographed without expensive setups, detailed guides to camera settings and use.
https://www.youtube.com/@NebulaPhotos

Ed Ting



General telescope use tips, engaging reviews of telescopes both new and old. Telescope comparisons and practical hands-on use tutorials. Teaches how to assess optics, mounts, and sites for observing.
https://www.youtube.com/@edting

Dylan O'Donnell

Astrophotography basics, simple setups, low end equipment reviews, techniques, tutorials for beginners.
https://www.youtube.com/@DylanODonnell

Spaceflight Now

Traditional style reporting of space events and news. Live coverage of spacecraft launches,

movements, and other operations. Top notch coverage of NASA press briefings and conferences. No fanboyism, highly professional.
https://www.youtube.com/@SpaceflightNowVideo

Scott Manley
A physicist reporting on spaceflight and technology, deep dive videos on space technology, history, and specific spacecraft and engines. Has a large library of videos on subjects such as nuclear spacecraft, control systems, navigation, etc. Weekly spaceflight roundup videos, monthly answers to viewers' questions.
https://www.youtube.com/@scottmanley

LabPadre Space
Live views of the launch pads, test stands, and SpaceX's factory in Texas. Multiple cameras with different viewpoints. Highlights videos each week. Watch launches and test firings live.
https://www.youtube.com/@LabPadre

NASASpaceFlight
Live views of launch facilities in Florida and Texas, coverage of Vandenberg launches as well as test flights at White Sands, NM. Multiple regular news programs on launches, manufacturing, new vehicles, etc. Very 'fannish' attitude and many inside jokes and references.
https://youtube.com/@NASASpaceflight

The Everyday Astronaut
Space enthusiast channel that covers major launch events and has had many in depth interviews and tours with leaders in the space industry including Elon Musk (SpaceX), Jeff Bezos (Blue Origin), and Tory Bruno (United Launch Alliance).
https://www.youtube.com/@EverydayAstronaut

Marcus House
Reporting on space news and development, weekly news video and many deep dive videos into the issues of interplanetary and lunar flight, construction of space stations, and human biology in space.
https://www.youtube.com/@MarcusHouse

Small Optics
Information on getting started in astronomy observing, using small and inexpensive telescopes effectively, maintenance and repair of telescopes, common questions answered, using the Dwarf II smart telescope, objects that look good in small scopes, solving problems with equipment.
https://www.youtube.com/@smalloptics753

Kalamazoo Astronomical Society
Club video postings with tutorials on the basics of observing, telescope use, locating objects in the sky, personal reports of observation experiences, binocular observing, livestreamed observing

sessions, presentations on subjects in astronomy and cosmology including the Theory of Relativity, Mars exploration missions, etc.
https://www.youtube.com/@KalamazooAstronomicalSociety

Fireside Chat with Gwynne Shotwell
Gwynne Shotwell, CEO of SpaceX, discusses space travel, Falcon, Starship, and Starlink at a networking conference.
https://www.youtube.com/watch?v=66a8XFet4ac

Brian Greene on String Theory
A discussion of String Theory, an approach to developing a mathematical model for the structure of the universe. While string theory is largely superseded in current theory, understanding the model provides insights into the universe's structure that cosmology is seeking to describe.
String theory - Brian Greene

Nebula Streaming Service
Paid streaming service with no preroll ads and downloading of videos. Multiple science channels on a variety of subjects. $5/month or $50/year.
https://nebula.tv/

NEBULA

Software, Apps, and Online Resources

Stellarium

Stellarium is a planetarium program for multiple platforms--web, desktop, and mobile devices. It can be used on mobile devices to identify sky objects and find constellations. On desktop, it can be configured to give views matching your telescope, finder, or binoculars to plan observing. The desktop and web versions are free, as is the very highly featured basic version on mobile. A paid version on mobile adds additional features, and payments help support development of the software:
https://stellarium.org/

The Sky Live
The Sky Live is a comprehensive information site about what's up in the sky right now. It includes the Moon, planets, comets, the Sun, top-down views of the solar system, stars, and other events.
https://theskylive.com/

Astrospots
Astrospots is an online map with information about many observing locations across the world. The information is populated by its users, who provide site information for locations in their area. Membership is free.
https://astrospots.com/AstroSpots/Index

Cloudy Nights
Cloudy Nights is a forum and review website for astronomy discussions. It includes equipment reviews, forums for discussion of observation, software, books, equipment, questions and answers, and other astronomy-related discussions. While the forums do have the occasional "internet expert" who is willing to argue to the bitter end about something

they're wrong about, in general the discussions are congenial and helpful.

Free accounts are required to post. Viewing the site is free, with some minor limitations. Includes buying and selling among users.

https://www.cloudynights.com/

SkyView Lite

App for Andriod and iOS. Locate objects in the sky, get predictions for ISS passes. Identify objects in the sky. Get viewing highlights for tonight. Premium version has enhanced features for $2.

blackholefinder.org Citizen Science

App for web and mobile devices. Citizen science app to assist astronomers in locating and identifying black holes.

https://www.blackholefinder.org/

Chandra X-Ray Observatory Home Page

Information about and images from the Chandra X-Ray observatory. Notices of current research, brief articles on studies performed with Chandra, technical information about Chandra's capabilities, and information about the Chandra team.

https://chandra.harvard.edu/

Zooniverse Citizen Science Projects

Multifacted citizen science site and mobile apps for iOS and Android. Participate in actual science studies in a wide range of disciplines. This site became the first great citizen science breakout project as "Galaxy Zoo" when it was used to classify a wide range of galaxy types and discover many new galactic structures. Its incredible success resulted in its purview being expanded to include everything from literary reconstruction projects to biology to subatomic physics.

Most projects involve a brief (5-15 minute) interactive training session to understand what the participant is expected to classify. Then participants can connect whenever they have a few moments to participate in their projects, performing classifications, interpretations, and other actions to apply the most powerful computers in the universe (the human brain) to valuable science work.

https://www.zooniverse.org/

JunoCam Citizen Science Image Processing

You can work for NASA! The JunoCAM project posts unprocessed images from the Juno spacecraft orbiting Jupiter. It is able to take high resolution images that can see features deep into the Jovian atmosphere. Citizen scientists are invited to download and process these images then upload them for use by the Juno team.

JunoCam image processed by Jackie Branc

The Juno mission reduced its costs to taxpayers by planning to have citizen scientists process JunoCam imagery. So if you've seen Jupiter images in the media, chances are they were produced from the raw data by ordinary citizens turning the raw images into gorgeous

breathtaking images of the largest planet in the solar system. Visit the JunoCam Imaging site to learn more.
https://www.missionjuno.swri.edu/junocam/processing

AstroMart Classifieds

Classified ads for all varieties of astronomy equipment, services, and accessories.
https://astromart.com/classifieds

Facebook Marketplace

Facebook Marketplace is a general for sale service of Facebook, that provides listings of all sorts of items for sale. The usual care should be taken when purchasing (or selling) used equipment through an online venue. It an be set to provide local listings for specific items, such as telescopes or cameras, to locate locally sold items useful for astronomy. For example, search listings for “Telescope” then filter results by “Nearest First”. Facebook mixes advertisements with the classifieds in a confusing way, so beware. Facebook account required.
https://www.facebook.com/marketplace/

Facebook Astronomy Marketplace Group

This is a group within Facebook, run and maintained by a number of astronomy enthusiasts for other members of the group. The listings here will generally be of higher quality equipment than for the general Facebook Marketplace listings, but will be geographically spread out, usually requiring shipping.
https://www.facebook.com/groups/1085173251600610/

Nextdoor For Sale and Free

Similar to Facebook’s Marketplace, Nextdoor’s classified listings are general listings of objects for sale. Like Facebook, it can be a good place to find equipment from local buyers. The usual buyer beware warnings apply to purchasing or listing here as anywhere else online, but with care some good deals can be found. Searches for particular subjects can be made (e.g. “Celestron Telescope” or “Canon DSLR”) then organized by distance from your location.
https://nextdoor.com/for_sale_and_free/

Launch Viewing

While we can view launches from many of our homes here in The Villages, sometimes we like to get a closer look. For example, Artemis launches, Falcon Heavy launches, and Return to Launch Site (RTLS) launches of Falcon 9, where the first stage returns to Cape Canaveral Space Force Station to land, rather than to a barge at sea.

Here are some of our member’s favorite sites to watch launches and landings.

Port Canaveral

The area of Port Canaveral near the docks and large parking structures includes several restaurants with a front row seat for rocket watching. Hear the roar of the rocket engines, feel the impact of the sonic booms as boosters return. All from the comfort of a restaurant table over a nice meal.

You also have an opportunity to see the SpaceX Fleet--drones and recovery ships--when they’re not at sea. You have a better than even chance of seeing a returned Falcon 9 booster as well!

A Returned Booster, Landing Ship, and Fairing Recovery Vessel at Port Canaveral. By Mark Graybill.

There are three restaurants in the area, off of Highway A1A and King George Blvd in Port Canaveral. **Fishlips Waterfront Bar & Grill** is well known to SpaceX enthusiasts. Elon has been there for several SpaceX celebrations, and bought out the upstairs for SpaceX employees during the Falcon Heavy test flight.

Next door is **Rusty's Seafood and Oyster Bar**, and further down the road is **Gator's Portside**. Arrive about an hour before launch time for most launches, for special launches you will want to arrive earlier. If you are not able to get a table with a direct view of the launch (upstairs, outside, or at a window) then don't worry, you can take an indoor table then just go out to watch the launch and return. They'll even hold your order for you if you ask. They are all very used to rocket enthusiasts coming to see the show and appreciate the business.
https://www.fishlipswaterfront.com/
https://www.rustysseafood.com/
https://www.gatorsportside.com/

Further down King George Blvd is **Jetty Park**. It doesn't have all the comfort and amenities of a restaurant, but it does provide an excellent viewing location. There is a day use fee for the park, and limited space that fills up early when there's a big launch. Note that normal hours of park opening are limited, but they are sometimes extended for special events. Contact the park for details. Reservations must now be made online, they can no longer be made on site.
https://www.portcanaveral.com/jpc

Rotary Riverfront Park

Rotary Riverfront Park is a county park located on the banks of the Indian River with an excellent view of the launch and landing areas to the east.
https://brevardfl.gov/ParksAndRecreation/ParksByCity/ParksInTitusville/Rotary

Kennedy Point Park

Kennedy Point Park gives direct views of the landing zones with a line of sight past the rocket garden of the Kennedy Space Center, making it a favorite of launch and landing photographers.
https://brevardfl.gov/ParksAndRecreation/ParksByCity/ParksInTitusville/Kennedy

Brevard County Image

Kayaking During Launches

Member Annette Marie let us know that watching launches while kayaking on the local rivers is a treat not to be missed! Here is a site that gives information about the experience!
https://www.kayakingksc.com/

Equipment and Vendors

Replacements for Orion, Meade, and Coronado

As of July 2024, it looks like Orion, Meade, and Coronado have closed for good. Someone may end up buying the stock and trademarks at some point, but at present it appears they have gone out of business for good.

For those who bought new equipment from them that has not been shipped, the good news is that their practice was to only charge on shipping. So any unshipped orders should not cost you anything other than the trouble you went to place the order. At this time some of their websites are still up and others are now down. For sites that are still up (meade.com) I am unaware if the automated system permits order cancellations,

but if so it would be a good idea to cancel any orders to protect yourself from any unexpected charges in the future. Also, you may wish to contact your credit card company or bank to deny any charges from the company.

Adding to the bad news is the OPT Telescopes is going out of business. They have been a pillar of astronomy retail since 1947. But now, they are closing their doors.

And this on top of other closures in recent years.

So, where to go instead?

Sky-Watcher USA

Dobsonian telescopes, Newtonians, small refractors, mounts, and a range of accessories. Telescope packages are available in a variety of mix and match packages to couple the type of scope you want with the mount and accessories for typical use types (visual observing, astrophotography, base setups for accessorizing, etc.)

US distributor. Based in British Columbia, Canada. Owned by Synta Optics, Taiwan. Manufactured in Shenzhou, PRC.
https://www.skywatcherusa.com/

William Optics

Small refractors, astrophotography scopes, grab and go scopes. Considered upper tier commercial quality. Full telescopes packages available, also mounts, tripods, accessories. Full astrophotography packages. Offers used and refurbished systems on their website.

US owned (owner has US & Taiwan citizenship), based in USA, parts manufactured in Taiwan and China to order for William Optics, assembled in US and Taiwan.
https://williamoptics.com/

Celestron

Full line astronomy manufacturer, supplier and retailer. Telescopes, mounts, eyepieces, smart telescopes, binoculars, mounts, accessories, go-to mounts, etc. Packages and subassemblies. Headquarters in USA. Owned by Synta Optics, Taiwan (also owner of Sky-Watcher USA.) Manufactured in Shenzhou, PRC. Assembled in US and China.
https://www.celestron.com/

StellarVue Telescopes

Manufacturer and retailer of supreme quality telescopes, mounts, eyepieces, and accessories. All their equipment and optics are manufactured and assembled in-house in Auburn, CA, USA. Sells telescopes, bundles, accessories, mounts of their own manufacture and from others including Losmandy, Celestron, and others.

Provide lifetime support for their equipment, will buy back their scopes or do trade-ins/trade-ups, and will work with customers looking to purchase used scopes to be sure their scopes are in excellent condition.
https://www.stellarvue.com/

TeleVue

Manufacturer of top quality eyepieces and excellent telescops. Based in New York, USA. Some manufacturing is performed in Japan and Taiwan. Full US ownership. Sold through all major astronomy equipment retailers (see below.)
https://www.televue.com/

ZWO Astro

ZWO is a company based in the People's Republic of China, known for their easy to use line of astrophotography cameras, harmonic drive mounts, and the ASIAir smart telescope

controller. Their products are very popular and competitively priced.

Several of their products integrate products normally sold separately or requiring user integration of components from multiple manufacturers. For example, their MC2600Air camera integrates a cooled astrophotography camera, guide camera, and ASIAir Mini controller into a single unit.

Downsides of ZWO are that they do not support equipment other than their own in their smart controller (smart controllers from other vendors will accept any equipment that has standardized drivers available, so mounts, cameras, focusers, guiders, etc. from different vendors can all be used together.) And that they do not properly follow open software licensing agreements--they use software such as Stellarium, KStars, PHD, and Astrometry in ways that violate the open software license and do not support the developers or the open software community. They also claim proprietary ownership over software that does not belong to them.

These issues aside, their products are generally very good and easy to use. The only practical constraint is when using a ZWO ASIAir controller that will not recognize products from other vendors (aside from common go-to mounts and top brands of DSLR camera.)

Their SeeStar S50 smart telescope has brought together many features at a price that many amateurs find very attractive, and very easy to use as a simple grab-and-go astrophotography/live viewing device.
https://www.zwoastro.com/
https://www.seestar.com/

SVBony

SVBony is a Hong Kong based manufacturer of telescopes, mounts, and accessories including filters. They are known for competitively priced products of solid quality in most cases. They have become one of the most well known budget brands for astronomy equipment, with their astrophotography filters being well known among astronomers. Mechanical fit and finish of their products is generally considered good, and their products a good value for the money. They sell directly, but are also one of the most-sold manufacturers of astronomy equipment on Amazon. Manufacture and assembly is performed in the PRC, ownership in Hong Kong, PRC.
https://www.svbony.com/

Retailers:

Agena Astro (U.S., California)

Full line retailer of astronomy and related goods from a broad range of manufacturers and suppliers.
https://agenaastro.com/

High Point Scientific (U.S., NJ)

Full line retailer of astronomy equipment and supplies.
https://www.highpointscientific.com/

Woodland Hills Telescope (U.S., California)

Astronomy arm of the famous camera retailer. Full line.
https://telescopes.net/telescopes.html

Adorama (U.S., NYC)

Full line retailer of telescopes, binoculars, and photography equipment. Stocks smart telescopes. Sells used equipment, provides customer advice and after sale support on the phone.
https://www.adorama.com/

Amazon

The omnipresent online retailer. Sells a plethora of astronomy equipment both good and bad. A lot of bad. But also the storefront for many smaller manufacturers. Be very careful of details when ordering astronomy equipment from Amazon, as Amazon does not directly verify the seller listings.

Things to watch out for:

Plastic housings and bodies for parts that appear to be metal in images.

Brand names that are not from astronomy manufacturers (e.g. Scientific American, National Geographic, etc.) these are licensed names placed on equipment which is typically junk.

Junk brands: Bushnell, Jason, etc. Some Bushnell binoculars are acceptable quality for general use, but NONE of their telescopes has been worth buying for over 30 years.

Spotting scopes on cheap photo tripods sold as astronomical telescopes. They are completely inadequate for astronomy, incapable of being pointed properly, kept on target, or used with the supplied finders. If it looks like a spotting scope, it's not an astronomical scope.

Proper name brands can be found on Amazon. Beware of other vendors who are selling name brand products without being the actual company and able to provide proper support or verify that the product is complete, intact, or warranteed. For example, for Celestron products, make sure the seller is Celestron's Amazon store (https://www.amazon.com/stores/Celestron/page/731B9B53-6304-491B-AD1B-983A018B2E4B), and the same for other companies such as SVBony, ZWO, etc. If you are in doubt whether an Amazon seller is the actual company, contact that company directly to be sure, because you're correct to doubt it. There are many sellers on Amazon reselling products while masquerading as the official company or manufacturer (and usually delivering the products in inadequate packaging so that it's broken in transit, then a contact with the manufacturer turns up that you didn't actually buy from them because they don't even have an Amazon storefront! This is COMMON.)
https://amazon.com/

Club Calendar

Yellow marks special events hosted by The Villages Astronomy Club
Blue marks events that are not hosted by The Villages Astronomy Club
Green Marks Volunteer Events for other groups.

August 2024
2 Exec Meeting
5 Telescope Workshop 8pm/Space Academy 6:30pm (possible alternative date for astrophotography wkshop.)
7 EAA Meeting 8pm Homestead Astro Park
17 Fruitland Park Observing Cales Field Fruitland Park
20 General Meeting: Round Table: Your Astronomy Resources. Members share their astronomy resources--favorite video/news channels/vloggers, magazines, books, websites, software/apps, etc.
27 Camp Geneva Volunteer Star Party

September 2024
2 Telescope Workshop 8pm/Space Academy 6:30pm
4 EAA Meeting 7:30p?
6 Exec Meeting 11am Fishhawk
8 *Saturn at Opposition (no event)*
17 General Meeting: TBD, Laurel Manor 6:30pm
17-18 *Partial Lunar Eclipse, 8:41pm to 12:47am, peak 10:44pm barely in Umbra. (No Event.)*
21 Fruitland Park Observing

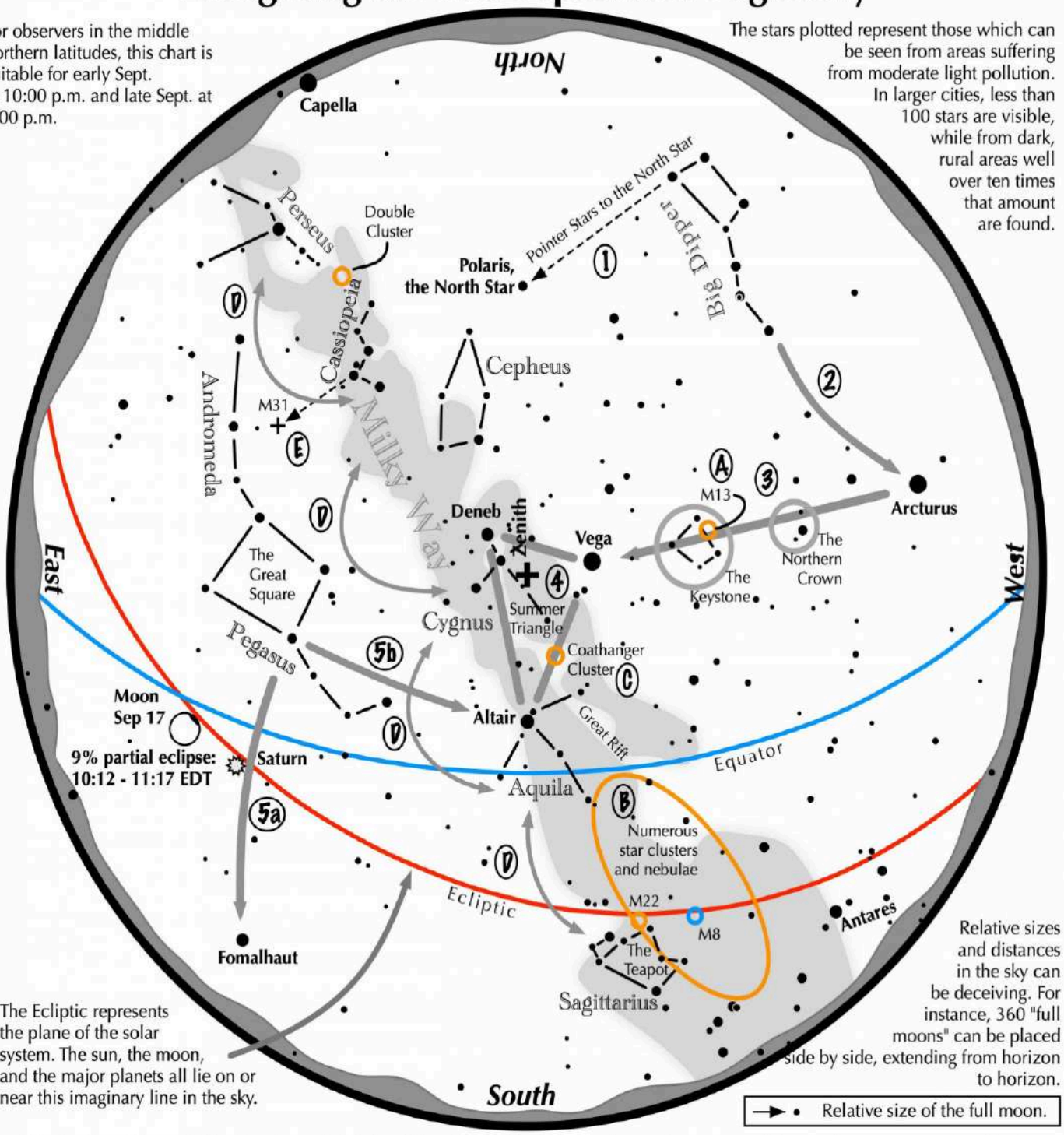
Club Calendar on the web:
https://vlgastroclub.org/calendar/

Whirlpool Galaxy, M51. Image by Craig Henry Seestar S50, 575 10s subframes. Processed with Siril, GraXpert, GIMP and Luminar Neo.

Navigating the mid September Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Sept. at 10:00 p.m. and late Sept. at 9:00 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

Navigating the mid September night sky: Simply start with what you know or with what you can easily find.

1. Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
2. Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the September evening sky.
3. Nearly overhead shines a star of similar brightness as Arcturus, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
4. The stars of the summer triangle, Vega, Altair, and Deneb, shine overhead.
5. The westernmost two stars of the Great Square, which lies high in the east, point south to Fomalhaut. The southernmost two stars point west to Altair.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
D: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.
E: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.

Astronomical League *www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.*