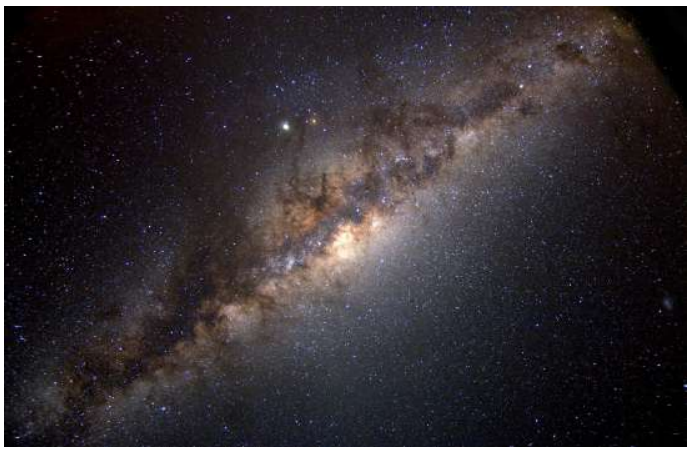
VILLAGES STAR

Newsletter of The Villages Astronomy Club

Volume 6, Number 9
September 2025

Club Website:
http://vlgastroclub.org/

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



Annual Resources Issue!

See resources shared by your fellow club members starting on page 12!

UPCOMING EVENTS

Space Academy, Sept 1st, 6:30pm
Truman Rec Ctr, 2705 Canal St.

This month we will learn How Big Can a Star Get?, information about Exoplanets--planets that orbit other stars, plus discussion of current astro news.

Observers' Workshop, Sept 1st, 8pm
Truman Rec Ctr Pavilion, 2705 Canal St.

The workshop will be held at the Truman Rec Center picnic pavilion starting at 8pm. Come learn to observe with our experienced astronomers, whether you want help with a telescope, binoculars, or visual observing and learning the constellations. If you want help with a telescope or binoculars, bring them to the meeting for assistance and advice.

NGC 6709, Open Cluster in Aquila imaged by member John Rourke with a Seestar 30. NGC 6709 is 3500 light years away, has about 60 members, and is only 315 million years old. It is about the same age as the Pleiades, but much farther. It has been studied and compared to the Pleiades to understand the dynamics of young stars.

Executive Directors' Meeting, Sept 5th, 11am-12pm, Fishhawk Rec Center, 2318 Buttonwood Run

All members welcome to our monthly planning meeting. This month we'll planning our fall event schedule including the binocular workshop for October and Starry Starry Night in November.

General Meeting, September 16th, 6:30pm: Jim Laurent: Nancy Roman and the Nancy Grace Roman Space Telescope

Join us at Laurel Manor Rec Center, 1985 Laurel Manor Drive, at 6:30pm a presentation on

astronomer Nancy Grace Roman and the new space telescope that bears her name. Learn about Roman's important contributions to modern astronomy and her role at NASA as well as the dramatic changes between Hubble and the new space telescope with similar optics but with a very different view of the universe!

Fruitland Park Astronomy Group, Sept 20th, 5pm, 300 Shiloh Rd, Fruitland Park

Join us for an evening of observing and astronomy talk with the Fruitland Park Astronomy Group! Come to Cales Soccer Field in Fruitland Park, 300 Shiloh Road (at the corner of Shiloh Road and Dixie Avenue, north of the Fruitland Park water tower.) Enter on Shiloh Road (some GPS's will guide you to the Dixie Avenue entrance.) Gate opens at 5pm. We will stay as late as conditions permit and people are interested in observing. Bring power if required. You can set up off your tailgate.

Public is welcome to this event, no Villages ID required! Bring family and friends to view the evening sky with our astronomers!

EAA Meeting, Homestead Astronomy Park, Sept 24th, 7pm, 6227 Meggison Road

Our EAA (Electronically Assisted Astronomy) meeting is focused on using smart telescopes, telescopes with smart controllers, and astrophotography both traditional and live-stacking. If you want to know more about how smart controllers can put your astronomy in "easy mode", come and see what current devices can do!

Visual observers are also welcome to come and take advantage of the Astronomy Park while we have it open after hours. Whether you're using binoculars or a traditional type of telescope, you are welcome to set up and observe while we are there. Skies are Bortle 5.5, with high horizons due to the surrounding trees.

Long pants, long sleeves, and mosquito spray recommended, as we are near a preserve that doesn't get sprayed to control insects.

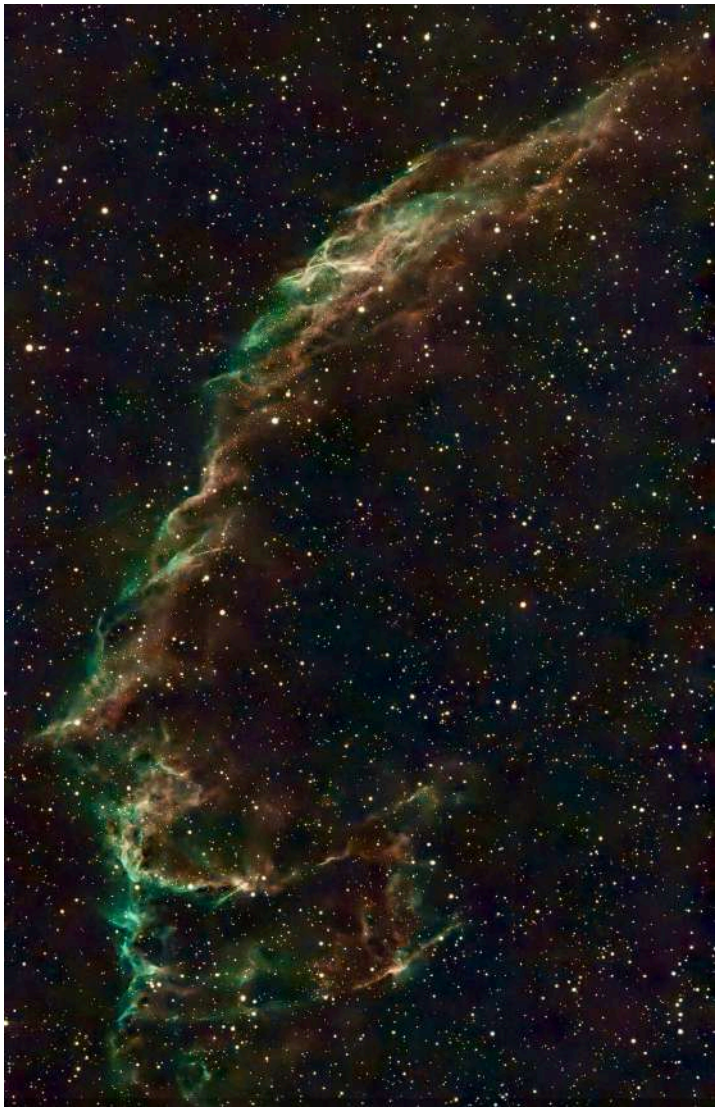


Image by member John Keller. Eastern Veil Nebula in Cygnus. Seestar 50.

Your Club Officers & Directors

President	Mark Graybill
Vice President	Ken Katta
Secretary	Randy Gilbert
Treasurer	Linda Meng
Space Academy	Toni Graybill
Public Relations	Jeffrey Kahler, Sr.
Directors	Craig Henry
	John Roarke

Newsletter Contact: saundby@gmail.com

See Calendar at End of Newsletter, before star chart.

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

Upcoming Special Events:

October Binocular Workshop, October 6th

Grab those binoculars you've got sitting in a drawer or closet and come out to our Binocular Workshop!

Learn to use your binoculars to view the sky. You don't need a telescope to do astronomy! Learn simple techniques to hold your binoculars steady, how to find star clusters, nebulas, galaxies, and planets with your binoculars.

We will be dedicating October's Observer's workshop to binocular astronomy, and opening it up to anyone in The Villages with a resident or guest ID, not just club members.

We will also have astronomers available for those who want help with their telescopes. So if you have a scope you want assistance with, you're still welcome to bring it.

Location & time: Truman Recreation Center Picnic Pavilion, 2705 Canal Street, 7:30pm-8:30pm. The picnic pavilion is behind the recreation center, follow the sidewalk around the pool.

Starry Starry Night, November 22nd

Come see the sky with our astronomers this fall! On November 22nd, we will be holding our fall Starry Starry Night event. This event is open to all who have Villages resident and guest IDs.

Come look through our astronomers' telescopes and see the sky! We will be viewing the Moon, Saturn, stars, double stars, star clusters, nebulas, and galaxies!

We will be at Everglades Recreation Center, behind the pickleball courts on the north basketball court and the soccer field. Stargazing starts at 6:30pm and goes until 8:30pm.

Recreation will be shutting off the entire center complex for us to provide more parking places for attendees of Starry Starry Night. We will have additional parking at the baseball fields, about another 150 spaces.

We still recommend carpools and carts to those who plan to attend. We expect 800-1000 attendees in November, and the available parking spaces are about 400.

We are investigating the costs and options for a shuttle service, which will certainly be necessary for February's Starry Starry Night event, but we haven't decided if we will be doing it for this fall's event.

Objects We'll See

There will be a 3 day crescent Moon visible at the outset of observing that will set shortly after 7pm. Saturn, Uranus, and Neptune will be in the sky, There will be many star clusters, nebulas, and some bright galaxies to view at this event, conditions permitting.

Instruments

We will have visual telescopes, binoculars, and Smart Scopes at the event to show things to our guests. Visual scopes and binoculars give a personal connection to the object you're viewing, while electronic scopes bring out details our eyes can't see in Florida skies.

Astronomers

If you are interested in bringing an instrument to show the sky, we'd love to have you help us out. The more astronomers we have, the shorter the lines will be! Please contact Mark Graybill at saundby@gmail.com if you are not already on our astronomer mailing list. We welcome astronomers of all experience levels.

Our Observer's Workshop this November will be focused on showing the sky at star parties, so whether you are an experienced star party veteran or new to the experience, please plan to join us on Monday, November 3rd at 7pm to either learn or teach the skills for star parties. Don't be shy! You only need to know a few objects in the sky (even if you only practiced finding them the night before the star party!)

NEWS

Launch of Starship Integrated Flight Test 10 from Starbase, TX. SpaceX photo.

Starship Flight 10 Successfully Deploys First Payload and Lands

On August 26th, SpaceX conducted their 10th flight test of the full stack of the Starship launch vehicle. This was a critical test of their new Version 2 or V2 version of Starship after repeated failures on prior attempts, which either failed to reach their intended velocity, causing an early re-entry, or failures that prevented them re-entering Earth's atmosphere in a controlled attitude.

After many successes of the original V1 Starship, the launches of V2 have delayed testing of many vital elements of Starship, most notably its heat shield, which has stalled development of a heat shield that is intended to be rapidly reusable without the months-long refurbishing that the Shuttle Orbiter heat shield required. Without controlled re-entries of the Starship vehicle from orbital velocities, the team designing the heat shield doesn't have real world performance data that shows where the design needs to improve.

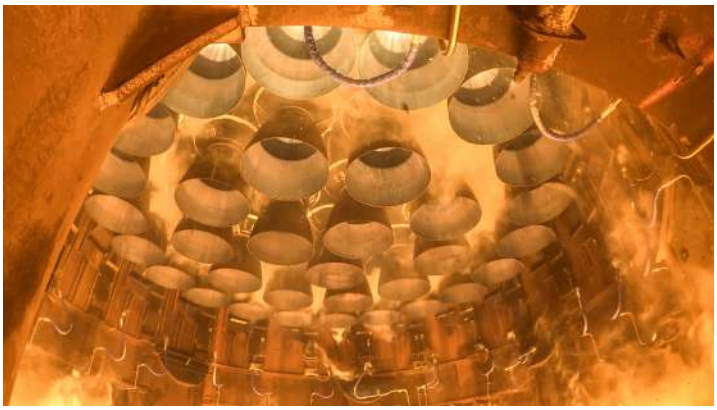
Other tests that have been on hold are tests to deploy satellites, and to perform in-space firings of the Raptor engine to simulate a de-orbit burn. This capability was demonstrated once on a

V1 test flight, but has not been tested since. Another V1 flight, Flight Test 3, had the payload bay door open and close in space, but it did not have any payloads to deploy.

Several Starships since then have had either the deployment tests or the Raptor firing test cancelled because of propellant leaks inside the ship, or attitude control problems that cancelled the tests.

Lucky Number 10

Flight 10, however managed to buck the trend of problems and bad luck that have plagued flights of the enhanced Version 2 Starship, and it successfully completed all its test objectives.



33 Raptor 2 engines on Booster 16 produce 17 million lbs of force at liftoff. SpaceX image.

Booster Testing

Since successfully capturing the booster multiple times, and reflying Booster 14 on Flight Test 9 after it had been previously flown on Flight 7, SpaceX decided to push the booster to see how much they could punish it before it broke on re-entry. On Flight 9 they intentionally brough Booster 14 back on a stessful flight profile, and it suffered the breakage of its major internal propellant transfer tube, resulting in an explosion of the booster at high altitude.

For Flight 10, SpaceX planned to bring Booster 16 in at a less stressful angle, to see the effects on the booster. Booster 16 successfully flew back to its target area, hovering at a full stop above the Gulf, before shutting off its engines to fall and destroy itself. There is no desire to retain the current boosters because the new version of Starship coming soon has a new version of the Booster.

The test demonstrated the limits to which the Booster can be pushed without failing.

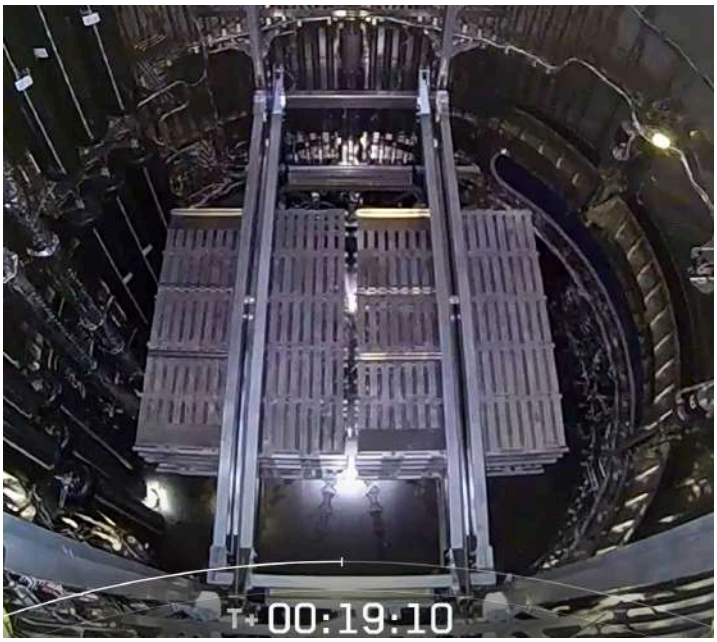
The booster also demonstrated an engine-out capability when making its approach for a catch. The team intentionally shut off one of the center 3 Raptor engines, then had software activate one of the middle ring of 10 Raptors to compensate for the engine loss. The test went perfectly, demonstrating an ability that will make the Booster far safer.

Hot Staging of the Ship from the Booster. A blocked section of the hot staging ring helps direct the Booster in its flip prior to boosting back toward the Texas coast, saving propellant versus a random flip direction. SpaceX image.

Ship Testing

The ship, the second stage of Starship, had many test objectives to fulfill. First was to successfully reach orbital velocity (on a suborbital trajectory) while maintaining attitude control throughout its flight. Next was deploying simulated satellites, dummy satellites built to be mechanically similar to the future Starlink V3 communication satellites that will vastly improve the bandwidth and carrying capacity of the Starlink system with fewer bigger satellites. Then

would come the test to re-fire the Raptor engine in space, duplicating the test performed on Flight 7. Then would be the re-entry test, which would not only test Starship's heat shield, but would also test its ability to perform a precise landing no matter what effects the heat shield caused.

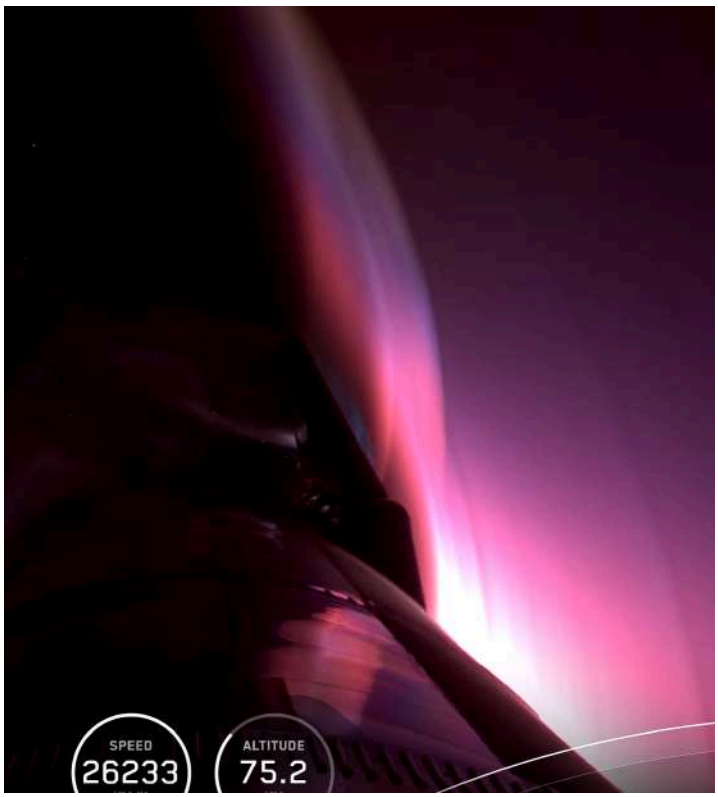


Inside Starship's payload bay. The payload bay door is open at right. This mechanism slides out the simulated Starlink V3 satellites like pizza boxes. 8 satellite simulators were deployed using the mechanism, known as the "Pez Dispenser." SpaceX image.

On this flight, there were no propellant leaks or engine failures that prevented subsequent tests or that prevented the Starship from controlling its attitude in space. At 19 minutes into the flight SpaceX began the test to deploy the a payload from Starship for the first time. After first evacuating the payload bay, then opening the payload bay door successfully, they started the run of the Starlink V3 deployment mechanism. It deployed the satellites at a rate of about one per minute. Once Starship begins carrying actual Starlink satellites, it will take about an hour for the full load of satellites to be released.

One satellite bumped the edge of the payload bay door on its way out, but other than that, all the satellites were successfully released into space. These satellites were released into the same sub-orbital trajectory as the ship itself, so they re-entered over the Indian Ocean in the designated disposal area to avoid creating space junk.

Later, the ship briefly re-lit one of its center Raptor engines to demonstrate the ability to do so as a de-orbit burn. The burn time was a short "blink and you'll miss it" burn, but it was performed successfully, potentially clearing the way for Starship to go into orbit in future missions.



Plasma generated along the side of Starship as it re-enters at 16,300 MPH, or Mach 21. SpaceX image.

Finally, with all systems still functional, Starship began its re-entry at a controlled angle. At 47 minutes into the flight, a small explosion was seen in the engine bay section of part of the engine skirt that covers the engines. No word has been released yet on the cause, but the explosion did not hamper the performance of the Starship during re-entry and landing. Conjectures include missing tiles removed as part of the test, clogging of an oxidizer vent line, and thermal stresses as

re-entry heating started near the flap next to the engine skirt.

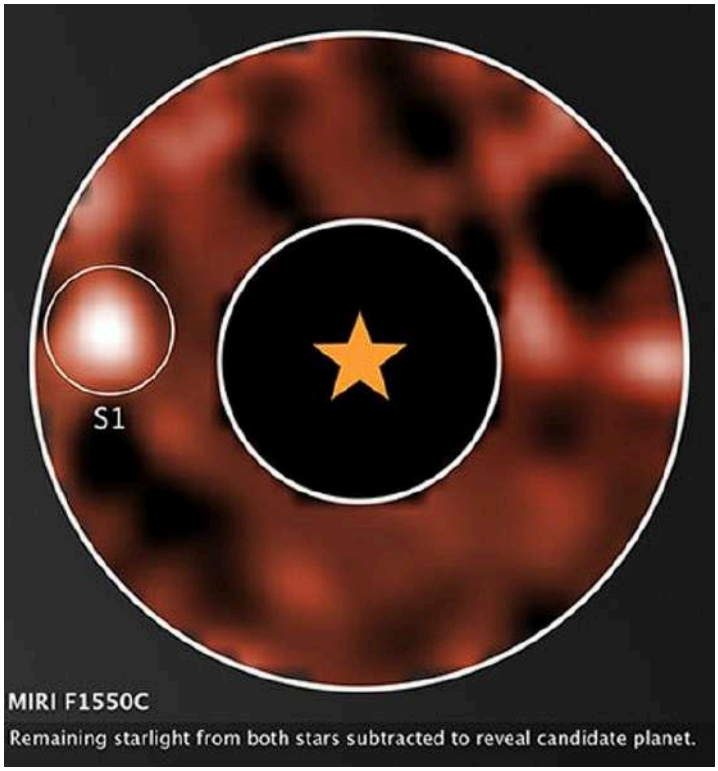
Despite the damage, Starship was seen to perform maneuvers during re-entry to put itself on target in the Indian Ocean. It was seen to vary its pitch angle, and to steer crossways in the upper atmosphere.

It came in using Starship's "Belly Flop Maneuver" to slow itself in the lower atmosphere, then flipped itself to a vertical attitude to fire its engines for an impressive propulsive landing, within sight of a camera placed on a buoy in the Indian Ocean.

The heat effects ocaused color changes in the originally black heatshield that made it orange in some places and white in others, possibly thermal markers used by SpaceX engineers to mark the heating.

Buoy camera image of Starship landing. SpaceX image.

Learn more at:
https://www.spacex.com/launches/starship-flight-10



Possible planet shown near Alpha Centauri A after subracting light from both Alpha Centauri A and its nearby companion star Alpha Centauri B. NASA image.

Nearest Sunlike Star May Have a Planet in Its Habitable Zone

James Webb Space Telescope's MIRI instrument was used to image Alpha Centauri A to see if either planets or zodiacal dust could be detected in its habitable zone by using a new technique to remove light from Alpha Centauri A's companion star, Alpha Centauri B. The two stars are in a mutual orbit, and the confusing effects of both being close together has stymied attempts to identify planets around these stars.

Though the stars are in a mutual orbit, there is plenty of space between the stars for each to have its own full-sized solar system.

Now Aniket Sanghi and collaborators have used JWST to get data to apply a new processing technique to find planets orbiting Alpha Centauri A, a nearby twin to our own Sun, in its habitable zone.

The images seemed to reveal a super-Earth, that is, a world somewhat larger than

Earth, but smaller than Uranus and Neptune, orbiting in the zone where water will be able to be a liquid, solid, and vapor, just as it is in the water cycle on Earth, making it a nearby candidate in the search for life outside our solar system.

The team had trouble determining the orbit of the planet, if it exists, so further work will have to be performed to confirm its presence and to find out its orbit around Alpha Centauri A.

Original paper by Sanghi et al:
[2508.03812] Worlds Next Door: A Candidate Giant Planet Imaged in the Habitable Zone of $α$ Cen A. II. Binary Star Modeling, Planet and Exozodi Search, and Sensitivity Analysis

NASA Article:
NASA's Webb Finds New Evidence for Planet Around Closest Solar Twin

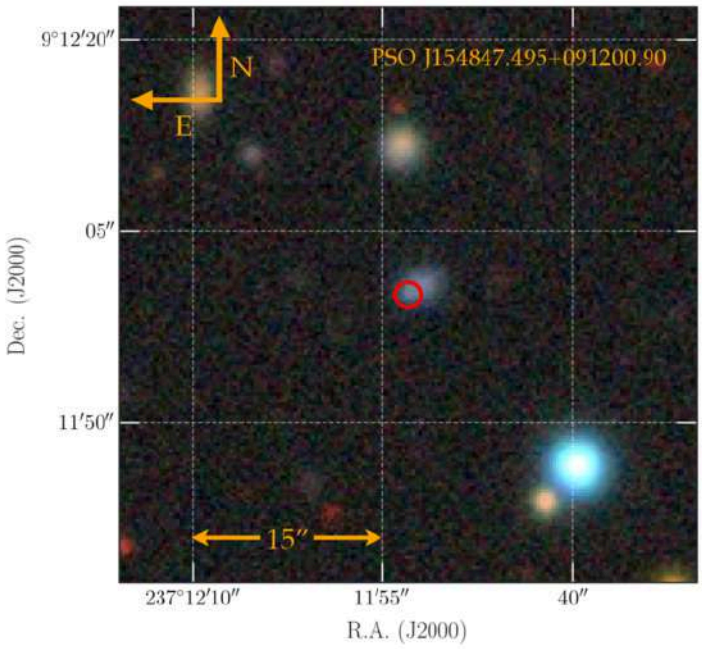


Image of supernova SN 2023zkd by the Dark Energy Camera (DECam) with the location of the supernova marked by the red circle in its host galaxy at a distance of 843 million light years.

New Type of Supernova Discovered

Researchers reviewing data from the Zwicky Transient Facility found a very unusual light curve from supernova SN 2023zkd that didn't match any known type of supernova. When they dug further, they discovered that the object had been slowly brightening for over four years before the outburst. They couldn't fit the data to any known model of star collapse, and had to develop new ideas.

Normally a supernova has a single sharp peak in brightness followed by a slow decline. The shape of the light curve over time, plus spectroscopic data allows us to identify the process that spawned the supernova. But in this case, looking at archival data, the team discovered that there had been two peaks. One came about 4 years before the most recently observed event, followed by a reduction in brightness that then slowly increased until the second major peak in brightness.

The team thought that something in the supernova's surrounding environment likely caused the unusual pattern, and they turned to computer models to see what might have caused the effects they saw.

After much work with alternatives, they found that the best fit was a nearby black hole drawing gas off the primary star and spiraling inward toward it as it built up an accretion disk then the final event was a merger between the black hole and the star that triggered the supernova.

This is the first known supernova triggered by the collision of a massive star with a black hole.

Supernova Types

Supernovas are divided into two broad types, known as Type I and Type II. Type I supernovas are characterized by a lack of hydrogen lines in their spectra, meaning that they are explosions of older stars. usually white dwarfs, that have consumed all their hydrogen. Type II supernovas have hydrogen lines in their spectra, and are a sign of young supermassive stars undergoing core collapse.

Within each type there are subtypes:
Type Ia--used as "standard candles" for

measuring intergalactic distances, these are explosions of white dwarves that have drawn gas off of a stellar companion until they exceed the Chandrachekar Limit of ~1.44 solar masses and explode.

Type Ib--Core collapse explosions of massive suns over 25 solar masses that have been stripped of their outer hydrogen atmosphere, either through a companion star or solar wind. They retain their helium envelope, and show strong helium lines in their spectra.

Type IC--Core collapse explosions of supermassive stars that have been stripped of their hydrogen and helium envelopes either by other stars or strong solar winds. They have no hydrogen or helium lines in their spectra, but they throw out many other heavier elements into space, including iron.

Type II supernova are classified as:

Type II-P--the most common type of Type II supernova, are caused by red supergiant stars of 8-25 solar masses size, with thick hydrogen outer atmospheres that extend out as far as the orbit of Jupiter in our solar system. The brightness curve after the initial explosion doesn't descend linearly, but reaches a plateau that lasts about 3 months because of a nuclear reaction triggered in the hydrogen that keeps the supernova bright longer than other types.

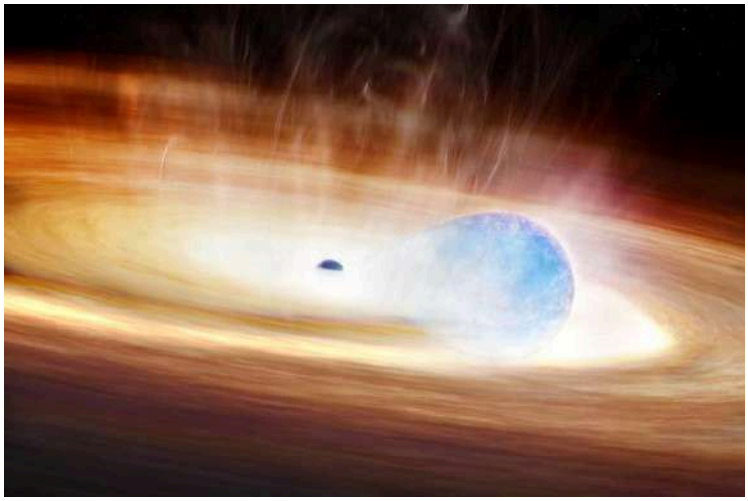
Type II-L--are the core collapse of a brighter, hotter supergiant (yellow or orange) with less hydrogen in the outer atmosphere. They have a linear decline in brightness over time, without the plateau seen in Type II-P.

Type IIb--are similar to Type Ib, but the star hasn't been completely stripped of hydrogen. They show hydrogen lines early, then transition to helium lines. They often have a double peak in brightness, or an exceptionally high single peak of brightness.

The new supernova is of another type, **Type IIn**, which are supernovas of stars in a complex local environment with a lot of nearby material. Each Type IIn is basically its own special event, depending on the surrounding gas, and other interacting bodies (like the black hole in SN 2023zkd's case).

Earthsky Article:
New type of supernova, as a black hole triggers a star explosion

Original Paper by A. Gagliano et al.
Evidence for an Instability-induced Binary Merger in the Double-peaked, Helium-rich Type IIn Supernova 2023zkd - IOPscience



Artist's concept of a black hole interacting with the atmosphere of a supermassive star before triggering supernova SN 2023zkd.
Image by Melissa Weiss/CfA.
Source: AI Helps Astronomers Discover a New Type of Supernova | Center for Astrophysics | Harvard & Smithsonian

IN THE SKY THIS MONTH

Also refer to the sky map on the last page.

THE MOON

Full Moon, Sept 7th
Last Quarter, Sept 14th
New Moon, Sept 21st
1st Quarter, Sept 29th
Full Moon, October 6th

Messier 33, the Triangulum Galaxy. Reprocessed image by Mark Graybill from Dwarf II, 300x15s images. Processed using Graxpert, GIMP, & Luminar.
Original sub-images from Oct 2024. Reprocessing improved detail in nucleus and arm structures.

August was a challenging month for astronomy this year. The Villages typically has 10 clear evenings suitable for astronomy each August, but this year we got only 6, mostly right at the start of the month (with a possible night on the 30th as I write this.)

September usually gives us a much better chance for clear evenings. Though the average is only 1 additional night (11 each September) the conditions tend to be dryer, with thunderstorms ending earlier in the day when they occur. Clear nights as a result of dry air currents can also add 1-4 additional nights of observing. In other words, even though September's average is only slightly higher, the variance in that average tends toward more good evenings.

Also, marginal evenings with partial cloud cover tend to be dryer and have better sky conditions than in August, allowing more astronomy during marginal nights.

October is the real turning point month in the averages, with an average of 18 clear evenings. So stick around for that!

Mercury is a morning planet this month, low in the eastern sky before sunrise. Shining at magnitude -1.3 early in September, it brightens to -1.8 by month's end. On September 2, Mercury passes 1.2° from Regulus in Leo, a good sight in binoculars about 30 minutes before sunrise (6:15 AM EDT). A telescope at medium power (~75-100x) shows its small, gibbous disk (5–6 arcseconds), but the low altitude makes it challenging. Use a clear horizon and binoculars to spot it. By late September, it sinks closer to the Sun's glare, becoming tougher to observe.

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

Venus is a morning star, glowing at magnitude -4.0, rising around 3:15 AM EDT. On September 1, Venus passes 1.3° from the Beehive Cluster (M44) in Cancer, a beautiful sight in binoculars showing the cluster's starry swarm next to Venus. Best viewed from 4:00-5:00 AM, when Venus is higher in the sky and the Sun has not yet begun to brighten the sky. Low powers in a telescope will also provide a great view.
On September 19, a lunar occultation occurs: the 6%-lit crescent moon covers Venus from 4:58–5:59 AM EDT, visible in The Villages. Watch Venus disappear behind the moon's bright limb and reappear from the dark side—a rare treat in binoculars or a telescope, which will show Venus's gibbous phase (~70% illuminated) at low powers. Venus remains high and brilliant all month, perfect for small scopes. A variable density filter can be used to bring out subtle cloud details at medium powers (75-150x) which improve contrast to help the filter. Humidity in our skies will present a challenge for this until the dryer winter months, however.

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

Mars goes through Virgo, dimming to magnitude 1.7 as it moves farther from Earth. It's

visible low in the western sky after sunset, setting around 7:45 PM early in September and near 6:15 PM by month's end. On September 23, Mars lies 2.5° from the waxing crescent moon, forming a striking pair in the evening sky near Spica. A telescope will reveal its tiny, reddish disk (~5 arcseconds), with no surface details due to its small size. Binoculars enhance the view of the Moon-Mars-Spica trio.

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

Jupiter shines brightly in the morning sky, rising around 3:00 AM EDT by mid-September in Gemini at magnitude -2.1. It's well-placed for observation before dawn, reaching 40° altitude at sunrise. On September 17, Jupiter is 4° from the waning gibbous moon, a fine binocular sight. A telescope will show its cloud bands and up to four Galilean moons.

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

Saturn is an evening highlight this month. It reaches opposition on September 21, shining at magnitude 0.6 in Aquarius. It rises at sunset (7:45 PM EDT) and remains visible all night, peaking at ~50° altitude around 1:00 AM. The rings, tilted at a low angle (2°), enhancing views of the planet's cloud bands in a telescope. A 4-inch or larger scope reveals Titan and other moons. On September 12, Saturn is 3° from the nearly full Moon, an easy binocular target, though the proximity to the Moon will tend to wash out detail on Saturn itself. Use Saturn to spot Neptune (~1° away) in your telescope this month to get a 2-for-1 observation at low powers! Binoculars will catch Neptune as a star as well, larger binoculars may see some color in Neptune and show it as clearly not an ordinary star.

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

Uranus is visible in the evening sky in Taurus, at magnitude 5.7, rising around 9:15 PM EDT by mid-September. In The Villages' suburban skies, binoculars or a telescope at low powers are needed to spot it as a pale greenish dot (3.7 arcseconds), near the Pleiades star cluster (4.5° away). On September 16, Uranus is 2.8° from the waning gibbous moon, aiding its location in binoculars. A star chart is valuable to identify it when it blends in with surrounding stars, such as in binoculars when its appearance is more starlike. Observe near 4:30 AM when it's highest (~45° altitude) to minimize atmospheric distortion. Uranus does not normally show any atmospheric details without photographic enhancement.

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

Neptune reaches opposition on September 23, shining at magnitude 7.8 in Pisces, visible all night. It rises at sunset (7:45 PM EDT) and peaks at ~50° altitude around 1:30 AM. A telescope or binoculars reveals it as a faint, bluish dot (2.4 arcseconds), near Saturn (~1° away). Use a star chart and Saturn as a guide to locate it.

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

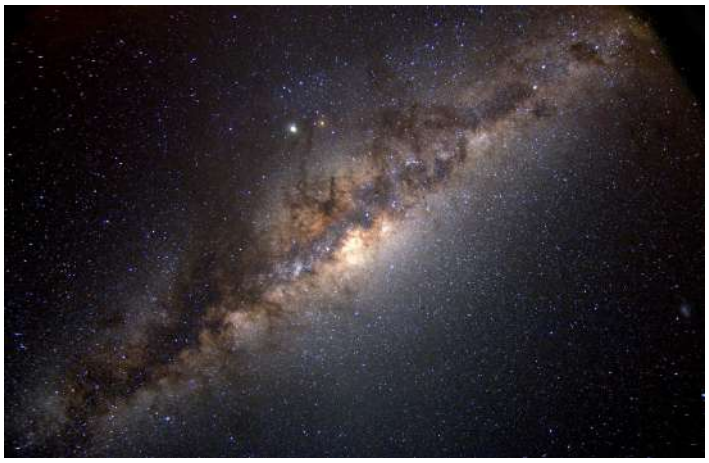
Bright Asteroids visible this month include **Ceres**, shining at magnitude 7.9 in Cetus. It's observable in the early evening, 30° above the southern horizon after 9:30 PM EDT, appearing as a star-like point. Use a star chart to locate it near Theta Ceti (2° away). **Vesta**, at magnitude 8.3, moves from Scorpius into Libra, best seen early in September before it sinks lower (~15° by 9:00 PM EDT). **Pallas**, at magnitude 8.9, is visible in Delphinus, high in the south around 10:00 PM EDT near Zeta Delphini. All three are within reach of a small scope or binoculars under The Villages' suburban skies; binoculars aid in locating them in

a telescope. Use a star chart for precise identification, the asteroid is the “star” not on your chart.

Ceres finder chart:
https://in-the-sky.org//data/object.php?id=A1

Vesta finder chart:
https://in-the-sky.org//data/object.php?id=A4

Pallas finder chart:
https://in-the-sky.org//data/object.php?id=A2



Astronomy Resources

from our members

The Club:

Our club provides a wealth of resources for our members, with more yet coming soon. Most important among these resources is our members themselves! Within our club, you can find friends, mentors, people who can introduce you to new areas of interest, find common interests outside astronomy, and others that you can pass your own knowledge on to.

Our members are our best resource!

Meetings

The Villages holds multiple meetings each month to support the many interests of our members.

General Meetings, held on the 3rd Tuesday of the month at Laurel Manor Rec Ctr, start with club business then move on to a presentation on a subject in astronomy or space exploration. We seek to cover a wide range of subjects in the 10 presentations given each year, including general astronomy, astronomy basics, cosmology, observing, biographies of astronomy pioneers, and space exploration. The other 2 months we hear from our members at round table meetings, one to learn more about their interests and how well the club is serving them, and the second is the source of this list of resources!

The presentations we’ve enjoyed over the past year were:

“From the Ground Up, How to Get Where You’re Going in Space”

“The Astronomical League”

“Future Space Missions”

“Basic Astronomy Terminology/What’s Wrong with Junk Scopes?”

“Electronically Assisted Astronomy Techniques”

“Living on Mars”

“The Three Sisters of Astronomy”

“Discovering the Solar System”

“Seeking the Theory of Everything”

“Telescopes and Astronomy”

Our upcoming year is slated to include presentations from NASA Ambassador Anne Holland, Jim Laurent, Robert Wickman, Linda Meng, Toni Graybill, Ken Katta and others!

Space Academy is a meeting that focuses on educational content and current topics in astronomical research. Held on the first Monday of the month at Truman Recreation Center, it is typically hosted by Toni Graybill, with others taking over for several meetings each year to cover special subjects. It has featured talks on The Sun, how engineers fixed a problem on

Voyager 1's computer (from over 20 light hours away, and without breaking it!), how black holes are found, and many other subjects.

Observer's Workshop is a meeting that happens at the same day and close to the same time as Space Academy so that we can share volunteers between the two meetings. This is where you can get help with your telescope, learn how to choose and use a telescope or binoculars, learn how to identify constellations by eye and find the visible planets. Our experienced astronomers will assist you.

We also hold special sessions each year, this October's workshop will be opened to all Villages residents to teach astronomy using binoculars (see above.) This November we will be teaching how to present the sky at a star party--what to come prepared to do, how to share things with the guests, what not to do (no new untested equipment, no matter how cool it is!) and so on.

EAA Meeting is where we share tips and techniques on electronically assisted astronomy. We take out our smart scopes (Seestar, Dwarf, Vaonis, Origin, Unistellar, etc.) or our traditional astrophotography setup with a smart controller (ASI Air, NiNA, Stellarmate, iMate, etc.) and get a chance to use them in the Homestead Astronomy Park, which we keep open late during these meetings for our members.

Visual astronomers and those curious about EAA devices are also welcome to these meetings. Visual astronomers can set up on site to observe while the site is open. The sky is roughly Bortle 5.5 at this site, but with high horizon lines due to the many trees that surround the park.

Fruitland Park Astronomy Group is a sister organization to our club. We are invited to their observing meeting in Fruitland Park each month. The meeting is held at the Cales Soccer Fields in Fruitland Park on the 3rd Saturday of the month (weather permitting). The site has generally good skies, and we are hoping to work with Fruitland Park to improve the lighting conditions that have deteriorated some over the past couple of years to decrease the effects of light pollution on the site.

It is a very good site for observing, you can set up on pavement right off your tailgate. If you wish, you can move deeper into the park to get darker conditions further from nearby lights. The north and northwest parts of the park are much darker.

You will have to provide your own power on the site.

Special Events

Our club hosts many special events each year, including our two **Starry Starry Night** events. At these events our astronomers invite all Villages residents to come view the sky through our equipment. We set up telescopes, smart scopes, binoculars, and astrophotography rigs to share the fall and winter sky with our neighbors.

Similarly, we hold 1 or 2 daytime events each year, either for a solar eclipse, or an **Astronomy Day** event if there are no well-timed eclipses that year.

These give our astronomers the chance to share the sky, and our volunteers a chance to assist our astronomers at these events by guiding attendees, speaking on related subjects, giving indoor presentations (e.g. video feeds of remote eclipse observations), and so on.

We also hold many **educational events for youth**. We provide Merit Badge classes for Scouts, astronomy events for girl scouts and summer school classes and for Camp Villages each year. This gives our members opportunities to share their knowledge and passion for the skies with youth and children.

Solar Viewing at Wildwood Summer School

Our Website

Our was redesigned over the past year to make it more accessable on all devices, including computers, phones, and tablets.

It also has our **online calendar** showing

the next few month's meetings and events, astronomical occurances of note (even when we aren't having a get-together to observe them) and local events we are participating in such as the CEMEX Earth Day events.

The website also has our **Newsletter Archive**. Every issue of The Villages Star ever published is there for you to read. Look up past issues for articles on what telescopes to buy, past events, articles on prehistoric astronomy, space missions, space telescopes, viewing specific objects, astrophotography and EAA reviews and how-tos, and club history.

September is our **Annual Resources Guide** in the newsletter, starting in 2023. Each year is different, so don't forget to check past issues for more information than we have here this year!

November newsletters feature a **Buyer's Guide** to telescopes, either for a novice astronomer or for holiday purchases.

The Villages Outdoor Expo

Each year The Villages invites us to the Expo to represent ourselves to our neighbors who are looking for new clubs and activities. Our volunteers go out on the two days of the expo to talk about our club to about 1000 people each year.

This gives our members a chance to share their own passion for astronomy with our community and find new friends to join us in the club!

Our club booth at The Villages Outdoor Expo

Cales Soccer Fields, Fruitland Park

Observing Sites

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.

Chiefland Astronomy

Homestead Astronomy Park despite its shortcomings, provides us with a place where we can do some observing within The Villages.

First Responder Recreation Center is one of the darkest places in The Villages. There are restrictions on where and when astronomy equipment can be set up at the center, but it provides good views. Located at 7746 Co Rd 42, Summerfield, FL.

Fruitland Park Cales Memorial Soccer Fields are also open to our members during the Fruitland Park Astronomy Club meetings each month.

Other Sites Around The Villages are available as well. Some members post on Facebook when they invite members over to their house to observe or do astrophotography. Members have also shared locations around The Villages that have good sightlines for astronomy and for watching launches (like the back of the pavilion at Truman Rec Center.)

Also see our website page:
The Villages Astronomy Club: Observing

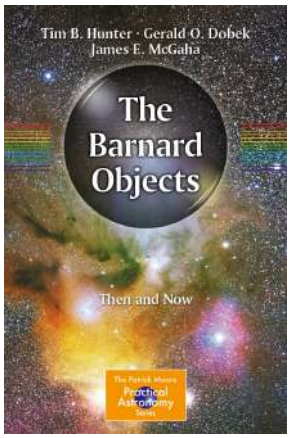
Kissimmee Prairie Preserve State Park has 5 astronomy pads that can be reserved in advance for astronomy. The park is a dark sky

site with good conditions for astronomy. Reservations on weekends tend to be made well in advance, so plan to book early. Pads are $16 a night. It is over 2.5 hours drive from The Villages, but is one of the best sites for astronomy in Florida.

Kissimmee Prairie Preserve State Park

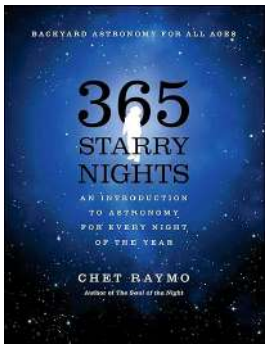
Books

The Barnard Objects:Then & Now by Tim B. Hunter , Gerald O. Dobek , James E. McGaha



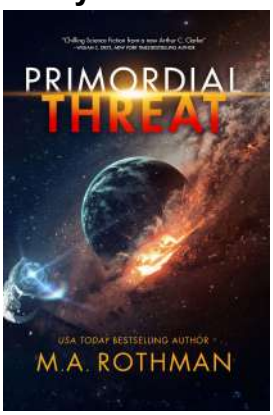
This book is equal parts history and science. Provide an introduction to nebula science and discoveries made over the decades; including an overview of popular astronomical catalogues and a look at how astronomical imaging has advanced since Barnard's time. It features a guide to viewing and imaging these objects yourself. A glossary of astronomical and photographic terms is provided, with detailed references. And a table displaying the locations of these Barnard Objects; including 25 missing objects from E.E. Barnard's original catalogue.
Amazon: https://amzn.to/3HJvgSV

365 Starry Nights by Chet Raymo



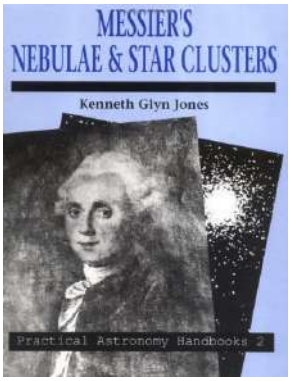
365 Starry Nights is a naked-eye astronomy book that gently takes the reader through the stars and constellations one night at a time. There is a page for each night of the year, so the reader can simply open the book to today's date and learn about what they can see up that night. Each month has a theme 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.
Amazon: https://amzn.to/4n4pb2j

Primordial Threat by M.A. Rothman



Science fiction based in fact about a threat to Earth discovered in 2066 that the world's defensive network against near Earth objects cannot protect us against. One overlooked genius foresaw the possibility, and now it is the job of the head of Earth's space defenses to find him and save the Earth in less than a year.
Amazon: https://amzn.to/3UUshKl

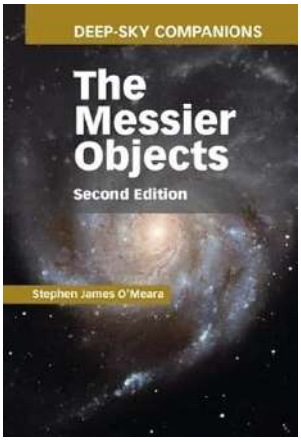
Messier's Nebulae & Star Clusters by Kenneth Glyn Jones



An overview of the history behind the famous catalog of deep sky objects including information about Charles Messier and Pierre Mechain, comet hunters who were the primary contributors to the catalog. Includes several pages on each object including how to find it,

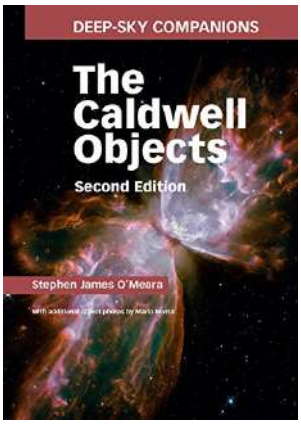
what to expect it to look like in different sized telescopes, and historical records of observation by early astronomers like Herschel, Rosse, etc. Still the best guide to the Messier objects for beginners. Amazon: https://amzn.to/3UOneer

The Messier Objects by Stephen James O'Meara



A more recent book on the Messier Objects, has excellent detail on viewing each object with excellent indexing for each object on the pages to make it easy to find them. Amazon: https://amzn.to/4mFzeeA

The Caldwell Objects by Stephan James O'Meara

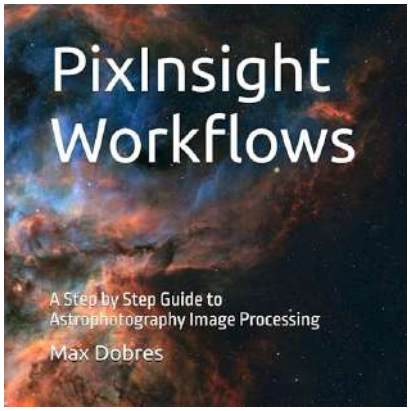


Astronomer and astronomy popularizer Patrick Moore decided to make a complementary catalog of objects to the Messier catalog--other objects that were bright, easy to observe in small telescopes, and representative of a wide variety of deep space objects--that had not been included in Messier's catalog. Some were so well known that Messier didn't feel like he needed them in his list (which was a list of things to not mistake for comets, since he and Pierre Mechain were comet hunters), others were too far south for him to observe from Paris.

Since Moore didn't want to confuse things by calling it the Moore catalog, creating a new set of M-numbers to confuse with Messier's, he used his family name of Caldwell to distinguish the C-objects from the M-objects. So we can say C-31 and know we're talking about the Flame Nebula, and not M-31 The Andromeda Galaxy.

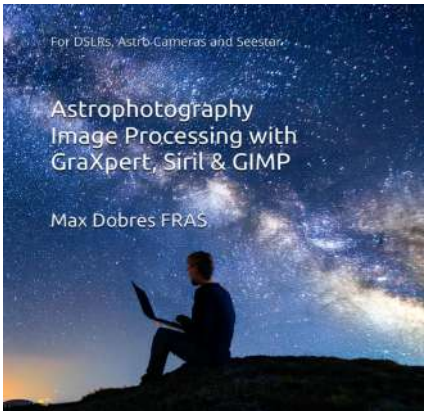
This book gives a comprehensive guide to each of the objects, how to observe it, and what it is. Amazon: https://amzn.to/4mI2K3g

Pixinsight Workflows by Max Dobres



Use PixInsight with Confidence. If you're already familiar with astrophotography and want to learn to use PixInsight, this book is designed as a practical, workflow-based guide—not an overwhelming manual—this resource will help you process images efficiently and effectively. Amazon: https://amzn.to/3HXntkj

Astrophotography Image Processing with GraXpert, Siril & GIMP by Max Dobres



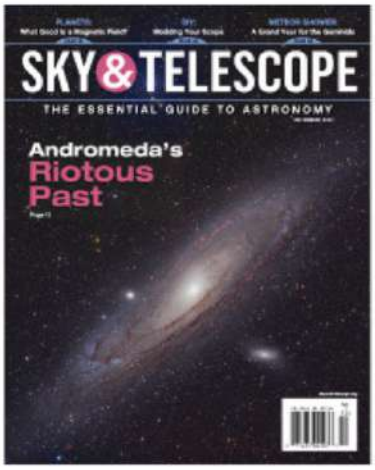
Covers using popular free software to process astro images effectively, with understanding of the various features each program offers. *Currently out of print, it is being updated to cover the current software versions.* Amazon: https://amzn.to/45TXuSP

Magazines

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.

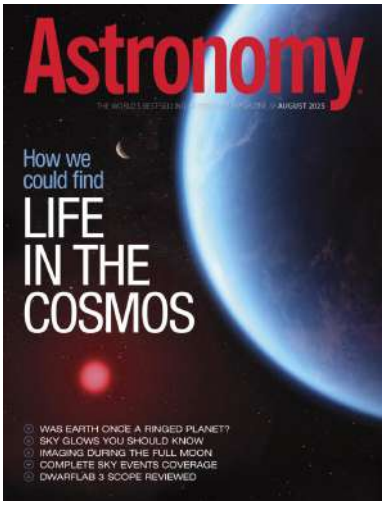
https://skyandtelescope.org/



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/



Reflector Magazine

Reflector magazine is the quarterly magazine of The Astronomical League (see below, under Organizations.) It is available in electronic form free online. Members of The Villages Astronomy Club are members of The Astronomical League, and will receive hardcopy of Reflector mailed to their address each quarter.

It includes historical articles, articles on observation, interesting things to look at, research on astronomy, and honorees in the Astronomical League's programs, including youth.

Education Resources

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

$400/year access to all courses. Homework and tests optional. Courses include Introduction to Cosmology, Introductory Applied Mathematics, Plato: The Dawn of Thought, Algebra, Trigonometry, and Astronomy 101.
https://petersonacademy.com/

Coursera: Science of the Solar System

Free online course by Caltech professor Mike Brown introduced the solar system and the science used to study it.
The Science of the Solar System | Coursera

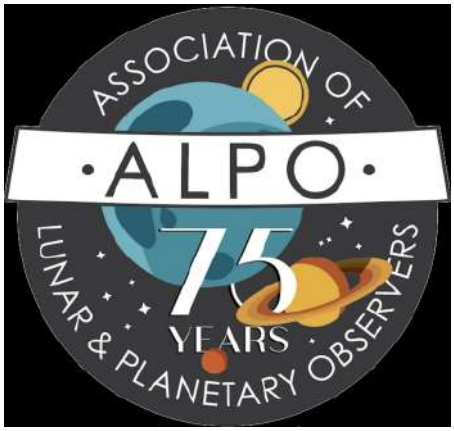
The Open University

The Open University

The Open University offers formal certification and degree programs online for both full time and part time students. As with traditional universities, students must qualify, and there is tuition for the courses. Financial aid is available.

Citizen Science

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. 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

American Meteor Society
founded in 1911

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

aavso

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/

Zooniverse

Zooniverse is a single point of contact for hundreds of crowdsourced science projects requiring help from volunteers to complete.

ZOONIVERSE
PEOPLE-POWERED RESEARCH

It started in 2007 as Galaxy Zoo, an early attempt at crowdsourced science. There were more galaxy images that required classification than researchers had resources or funding to go through. So they went to the Internet, where they set up a website with a brief traning course to teach people to perform the classifications then had them work through the data. They needed to collect multiple classifications of each object to ensure a high degree of accuracy, and set up a way for especially unusual images to get flagged. The project was a huge success, so much so that the biggest response was other researchers contacting them, wanting to do the same thing with their data!

Thus was born Zooniverse, which was opened up to new projects in a wide range of fields, and every expanding. Now with nearly 3,000,000 registered contributors, they have done research on many astronomical subjects, ancient textiles, medieval manuscripts, art, biology, medicine, and many other fields where great masses of data can be easily classified by amateurs.

Now available as an app for iOS and Andriod as well as on the web,

Zooniverse

A current Galaxy Zoo project is in progress, classifying galaxy images from JWST: COSMOS. COSMOS is a deep, wide area, multi-wavelength survey aimed at measuring the evolution of galaxies on scales from a few Kpc to 10's of Mpc.
Galaxy Zoo — Zooniverse

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

Videos Online and Offline

The Great Courses *Plus*

The Great Courses Plus

The Great Courses Plus is a company that produces video courses on many subjects, including astronomy and astrophysics. They provide the videos through streaming. Courses may be purchased individually from $15 to $100, with the more expensive courses usually being many more lectures (Understanding the Universe, at $100, is a 96 lecture course.)

Subscriptions of $16/month or $150/year

allow access to the full library of videos for the duration of the subscription.

Nebula Streaming Service

https://nebula.tv/

Paid streaming service with no preroll ads and downloading of videos. Multiple science channels on a variety of subjects. $5/month or $50/year.

Ed Ting - YouTube

Recommendations for new astronomers, telescope reviews and comparisons, practical observing tips, scope repair, accessories, reconstruction, retro-reviews (old telescopes reviewed.) Ed is in the New Hampshire Astronomical Society, and is a great resource of observing knowledge and advice.

Dr. Becky - YouTube

Astrophysicist speaking at a normal person's level explaining current subjects in astrophysics, basics of astronomy, and supposed conflicts being inflated by the media.

https://www.youtube.com/@NebulaPhotos

Nebula Photos. Host Nico Carver covers beginning astrophotography, astrophotography without a telescope or tracking mount, equipment reviews, portable equipment, astrophotography with DSLRs and other non-specialist equipment, basic photo processing software.

Cuiv, The Lazy Geek - YouTube

Equipment reviews, telescopes, mounts, photography equipment, astrophotography how-tos, image processing software, filters, techniques for astronomy.

NASA - YouTube

NASA's YouTube channel. Streams current launches and events, has historical video and education programs, current information on projects, probes, etc.

https://www.youtube.com/@MarcusHouse

Marcus House does weekly news videos on space launches, deep dive videos on launch vehicles and space probes. He has a fun, enthusiastic style that permeates his videos.

Retro Space HD - YouTube

Historical films from NASA and U.S. manufacturers remastered and repaired for modern viewing. Mercury, Gemini, Apollo, Skylab, Space Shuttle, early satellites, launch vehicles, educational videos for schools, etc.

RGV Aerial Photography - YouTube

Aerial photographers covering the details of work at Starbase, TX to build the launch complex, test area, and factory complex for Starship. Weekly updates and commentary video covering ongoing work in detail. SpaceX moves fast, so there's always a lot new to see!

NASASpaceflight - YouTube

News, commentary, live streams, scheduled programming, and deep dive videos into all things space exploration. Live cameras on Starbase, TX and on the Florida launch sites. Regular updates on work on all launch sites in the U.S. and Europe, as well as all launch vehicles and missions.

https://www.youtube.com/@SpaceflightNowVideo

SpaceFlightNow provides news and commentary program in a professional style covering space news in a way that regular media don't any more. Live streams of launches, coverage of press conferences, programs covering significant events in the Artemis program.

LabPadre Space - YouTube

Live video feeds of SpaceX sites, including the McGregor, TX engine test facility tests of Falcon 9, Falcon Heavy, and Starship engines (the video feeds have a feature to find recent engine firings in the feed.) The also cover Starbase, TX, and the launch complexes here in FL with 24 hour cameras.

Hazegrayart - YouTube

Realistic video animations of space vehicles that never flew. Versions of Shuttle that were never built, versions of Saturn that never flew. Also visualizations of actual events, like the EVA movements of the astronauts on the Moon during Apollo 11 and 12, Falcon 9 and Falcon Heavy launches from each complex each year.

Deep Space Astro - YouTube

Videos on astrophotography, equipment, and tutorials on processing software.

Rocket Lab - YouTube

Commercial launch company's YouTube channel. Watch official video of Electron vehicle launches and Neutron vehicle development, as well as informational videos on their satellite bus, launch sites, and other work in space exploration.

NASA Goddard - YouTube

NASA Goddard Space Center YouTube channel, filled with NASA science videos and information on projects and space telescopes managed out of NASA Goddard.

ISRO Official - YouTube

Official YouTube channel of the Indian Space Research Organization, covering India's launches, space program, and exploration at the Moon and Mars.

CuriousMarc - YouTube

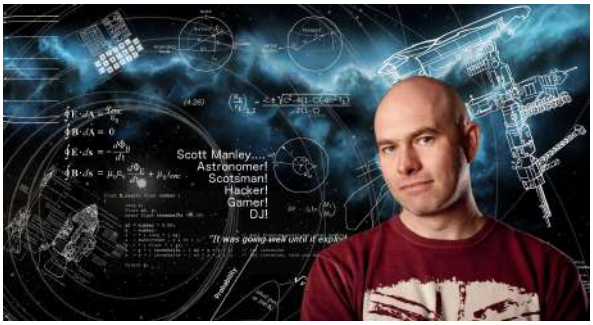
Retro hardware restoration channel with videos on restoring old space hardware such as the Apollo DSKY computer used on both the command and lunar modules and operating it. Includes visits with original designers, and video from original sources.

SmarterEveryDay - YouTube

Educational video channel by an engineer at Huntsville, Alabama who makes all original content including a video on the construction of JWST (his father is the heat shield engineer), how Apollo astronauts trained to land on the Moon, interviews with original designers of NASA Apollo hardware, and a wide range of other subjects including fireflies and why chickens move their heads like that.

Small Optics - YouTube

Channel on hand-on telescope use with low-no money solutions, use of minimalist equipment, restoring and recovering telescopes, as well as observing tips, tricks, and accessories for amateur observers.



Scott Manley - YouTube

Scott Manley is a physicist who does videos describing practical issues in spaceflight, nuclear power, and looks at specific space missions and launch vehicles. He does a regular update on launches and a monthly video answering viewers' questions about space and science. His light style and approachable funloving personality (and Scottish accent) have made him one of the most popular and well-known YouTube personalities.

Anton Petrov - YouTube

Anton Petrov covers a wide range of subjects on his channel, including math, astronomy, astrophysics, and current questions in the news.

Galactic Hunter - YouTube

Astrophotography centric channel does equipment reviews, how-to on imaging many types of objects, remote observatory discussion.

https://www.youtube.com/@astrofalls

Astrophotography, remote astrophotography, telescopes, equipment reviews and guides.

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

Websites, Software, & Apps

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

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/

Siril Astrophoto Processing (Free)

Siril
Siril is free general purpose astrophoto processing software that can use free plug-in

packages to extend its abilities (similar to PixInsight, below.) Widely used and well supported by many astrophotographers.

PixInsight Astrophoto Processing Software

PixInsight

PixInsight

Pixinsight is a commercial astrophoto processing software package that is very highly featured. The license for the base software is 300 Euros (about $300), many of the add-ons that make PixInsight particularly useful are commercial add-ons that require additional license fees. However, there are also some free add-ons that can be used, and PixInsight itself is particularly good at automating processes and allowing for A/B comparisons of changes in processing photos.

Widely used with a large user community, though noted for having a steep learning curve for newbies.

GraXpert Image Processing Software

GraXpert

Free astrophotography program specializing in gradient removal (such as differences in sky background due to lunar illumination) and noise reduction. Can be used as a stand-alone application or as a plug-in to other software including Siril and PixInsight (above.)

Sky & Telescope Website

SKY&TELESCOPE

Sky & Telescope

Sky & Telescope's website includes a star chart program, information on what is up in the sky this week and how to see it, tips on observing, news about new equipment and software for astronomy, beginner level articles on general astronomy as well as observing with telescopes, binoculars, or your eyes.

NextSpaceFlight Website & App

Next Spaceflight

NextSpaceFlight is a service by NASA Spaceflight (see below) to provide information on upcoming launches and flight events such as planetary fly-bys. It is a website and apps for iOS and Android. The apps can have alerts tailored to give alarms for launches in selected areas (such as Florida launches.)

Stellarium Website, Software, & App

Stellarium

Stellarium is a software planetarium with a multitude of features. It is free, and available for download as a standalone program for all major operating systems, or as an app for iOS or Android. It is also available for use on the website without a download.

It can be used to locate objects, preview any night's sky, locate transient events like comets and meteor showers. It can show you the field of view of your telescope, binoculars, or camera against the sky.

The app version on mobile devices can be used to find out what you're seeing in the sky by pointing your device at the sky.

Stellarium can also be used to control compatible go-to telescope mounts, including giving tours of the sky when you're observing.

Stellarium is the most widely used, and most recommended, planetarium program in our club.

Celestia Space Simulation Software

Celestia

Celestia is a free 3D space simulator that you can use to view the universe from different perspectives, create your own worlds, observe the orbits of the planets and their moons in real time or accelerated, and you can even use it as a planetarium!

Bright Supernova List of Purdue University

Bright Supernova

Find out where there are supernovas right now that you can see or image! The supernova list is maintained by the University of Purdue on this website.

NASA Exoplanet Watch

Exoplanets - NASA Science

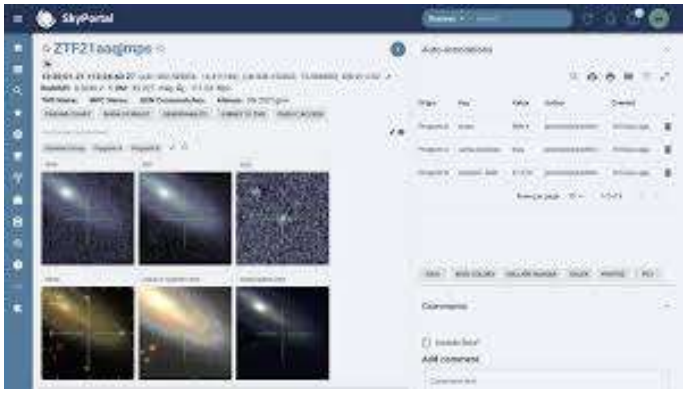
Want the latest news on exoplanets? Learn about new discoveries, work to detect atmospheres, compositions, and sizes of planets outside our solar system.

Astronomy Tools

astronomy.tools

Astronomy tools is an online toolbox for astronomers to find out the field of view of their instruments with any eyepiece, camera, or other setup, as well as sky conditions at their site, and custom star charts to help find the objects they're looking for.

SkyPortal Data Platform



SkyPortal

SkyPortal Astronomical Data Platform is a place to store, correlate, and discover astronomical data on specific objects of study. Include citations, sources, notes, and data collected on objects and areas of study. Originally developed to support observations of the Zwicky Transient Facility, it has had its abilities extended to support general scientific observation at levels from citizen scientist to advanced institutional research.

Telescopius

Telescopius

Telescopius is a website and apps for Android and iOS that are general purpose assistants for observers. Everything from tonight's sky conditions to field of view simulators to production of viewing lists and finder charts can be done using the online interface.

Chandra X-Ray Observatory Home Page

[Chandra X-ray Observatory]

See Chandra's latest work, research based on Chandra's observations, and status updates on Chandra itself. Chandra is the highest resolution X-Ray telescope, and can actually image the surfaces of neutron stars. It is a cornerpiece to high energy physics observations in space, where we can use the universe as our laboratory.

Astronomy Technology Today

https://astronomytechnologytoday.com/

Astronomy Technology Today is a web magazine on astronomy equipment. It covers the full range of commercially available equipment with commentary and reviews. Some free content, subscriptions are $12/year or $18/2 years. As of this writing, subscriptions are half off ($6/$9.)

SkyPortal for SkySafari by Celestron

SkyPortal Powered by SkySafari™ Mobile App

SkyPortal is an app that pairs with your Celestron Skyportal device to either control your telescope or allow for computer-aided manual guidance of your scope. Extensive object lists and information on objects.

NasaSpaceFlight Website and Forums

NASASpaceFlight.com -

NASASpaceFlight's website is a space news and commentary site with extensive public and private forums to discuss everything from past space programs to inside scoops on the latest developments. The articles are deeply researched and authoritative.

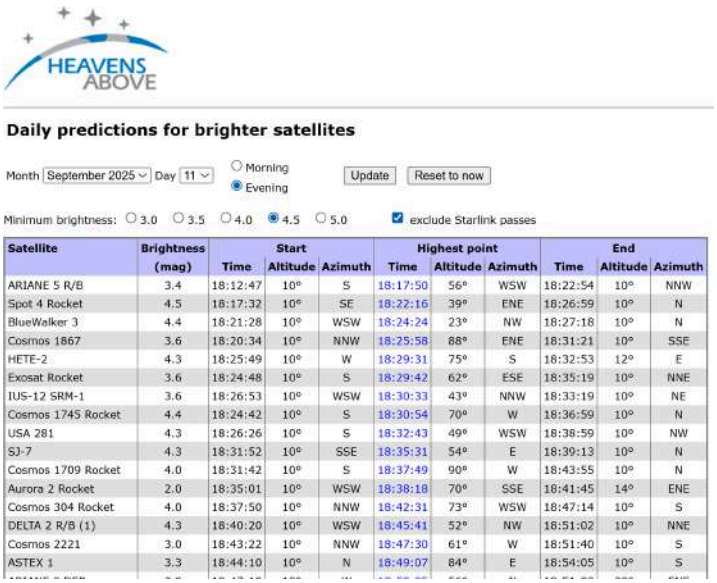
The forum areas hold a wealth of information as well as being a meeting-point for both enthusiasts and industry insiders. The L2 (Level 2) forums for paid members include an even greater wealth of data, including uploaded engineering and operations manuals for spacecraft and launch vehicles, archives of images, and access to forums where industry insiders meet to discuss topics such as new vehicle development, and certain highly-placed people in SpaceX have been known to drop in and let fall some bon mots every so often!

Heavens-Above website & app

https://heavens-above.com/

Heavens-Above is a satellite pass prediction site and app for Android that will give information about bright satellites that you can see in the sky. You can select a specific satellite (such as ISS or Hubble) and get overflight predictions for today or a chosen time period, or you can select all satellites brighter than a chosen magnitude.

Results will give you the direction where they will rise, be highest, and set as well as precise timings for those events (See example summary below).



Satellite	Brightness	Start			Highest point			End		
	(mag)	Time	Altitude	Azimuth	Time	Altitude	Azimuth	Time	Altitude	Azimuth
ARIANE 5 R/B	3.4	18:12:47	10°	S	18:17:50	56°	WSW	18:22:54	10°	NNW
Spot 4 Rocket	4.5	18:17:32	10°	SE	18:22:16	39°	ENE	18:26:59	10°	N
BlueWalker 3	4.4	18:21:28	10°	WSW	18:24:24	23°	NW	18:27:18	10°	N
Cosmos 1867	3.6	18:20:34	10°	NNW	18:25:58	88°	ENE	18:31:21	10°	SSE
HETE-2	4.3	18:25:49	10°	W	18:29:31	75°	S	18:32:53	12°	E
Exosat Rocket	3.6	18:24:48	10°	S	18:29:42	62°	ESE	18:35:19	10°	NNE
IUS-12 SRM-1	3.6	18:26:53	10°	WSW	18:30:33	43°	NNW	18:33:19	10°	NE
Cosmos 1745 Rocket	4.4	18:24:42	10°	S	18:30:54	70°	W	18:36:59	10°	N
USA 281	4.3	18:26:26	10°	S	18:32:43	49°	WSW	18:38:59	10°	NW
SJ-7	4.3	18:31:52	10°	SSE	18:35:31	54°	E	18:39:13	10°	N
Cosmos 1709 Rocket	4.0	18:31:42	10°	S	18:37:49	90°	W	18:43:55	10°	N
Aurora 2 Rocket	2.0	18:35:01	10°	WSW	18:38:18	70°	SSE	18:41:45	14°	ENE
Cosmos 304 Rocket	4.0	18:37:50	10°	NNW	18:42:31	73°	WSW	18:47:14	10°	S
DELTA 2 R/B (1)	4.3	18:40:20	10°	WSW	18:45:41	52°	NW	18:51:02	10°	NNE
Cosmos 2221	3.0	18:43:22	10°	NNW	18:47:30	61°	W	18:51:40	10°	S
ASTEX 1	3.3	18:44:10	10°	N	18:49:07	84°	E	18:54:05	10°	S

Astrospheric website & app

https://www.astrospheric.com/

Astrospheric is a weather prediction program for astronomers that tracks clouds, sky transparency, and light levels. It uses AI interpolation between the weather stations it receives data from to build forecasts as accurately as possible. It has a useful free level, upgrades to paid level give additional features.

Space.com website

Space

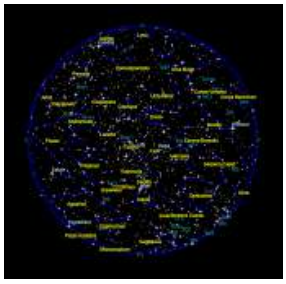
Space and astronomy news website targeted to the general population. Comprehensive and in depth coverage of current news stories on NASA, SpaceX, Blue Origin, space probes, research, etc. Written in an easily approachable style for non-specialists.

The Sky Live website

TheSkyLive

Current information on the sky, including locations of planets, their moons (see image above), the side facing Earth, what to look for, special events, etc.

Sky Map Online website



Sky Map

Displays a current star chart for your location with selectable parameters, including finder reticles, scaling, and printing ability.

Google Sky Map App for Android

Sky Map - Apps on Google Play

Planetarium app with features for finding objects, identifying objects in the sky, and seeking specific types of objects.

KStars

KStars - KDE Applications

KStars is an open source planetarium program available for Linux, Windows, Android, iOS and MacOS that can also be used as a sky map for guiding control software for telescopes.

Skychart/Cartes du Ciel

https://www.ap-i.net/skychart/en/start

Cartes du Ciel is software to create your own star charts. You can use your choice of object catalogs, set up the parameters you desire, then get star charts or interactive sky maps that suit your needs. Not only good for creating finder charts, it also underpins the atlas function in many telescope control packages. Free & Open Software, for all platforms.

CollectSpace

collectSPACE.com

CollectSpace is not only a site for collectors of space memorabilia, but also an excellent resource for information about historical items on display. For example, do you want to know more about the Saturn V displays around the country? The pages at CollectSpace will tell you which missions they were originally intended for, what pieces they were put together from, and where an when you can see them!

Phys.org Physics News Website

Phys.org

Science news site covers nanotechnology, earth sciences, astronomy & space, chemistry, physics, biology and other sciences.

In-The-Sky.org Website

https://in-the-sky.org/

In-The-Sky.org has current events in astronomy, such as eclipses, conjunctions, and occultations, listed on its home page, with links to detailed observing pages for each event on its site including timing information for specific viewing locations, guides to visibility, and finder charts. It also contains a planetarium tailored for your location, an orrery to track the locations of planets in the solar system relative to Earth and the Sun, as well as pages on each of the planets, constellations, and major astronomical objects with information updated constantly about viewing them from your site.

Astroberry Telescope Control Software

Astroberry Server

Astroberry is a remote telescope control solution for 32-bit Raspberry Pis and compatible hardware. Based on Linux, it is a turnkey package for controlling telescope mounts, focusers, cameras, guidescopes, etc. using free software. Unfortunately, it is limited to older hardware due to the limitation of running on a 32 bit system, but it is very easy to set up and get running compared to other free solutions like AstroArch (see below.)

Install this on an SD card for your Raspberry Pi 3 or earlier to get a smart remote controller for your telescope setup. Easy setup.

AstroArch Telescope Control

https://github.com/devDucks/astroarch

Free and Open Source telescope/mount/camera control software. AstroArch requires more technical engagement

from the user to get it set up and running than Astroberry, but it supports all current equipment with standard ASCOM drivers.

AstroArch can run on 64 bit architecture Raspberry Pis as well as mini PCs, laptops, or any other device that will support current Arch Linux distributions, including distros based on Arch such as Manjaro.

StellarMate

StellarMate

StellarMate is a low cost commercial solution for controlling telescopes and associated equipment. It can either be bought as an OS to install on a Raspberry Pi 4 or 5, or as software for a PC, or as a complete hardware and software package ready to go.

ASCOM Standards & Drivers

https://ascom-standards.org/

ASCOM is technology based on universal connectivity between astronomy apps/programs and the devices they use. ASCOM has opened up astronomy software innovation by eliminating the need to write special code for each device.

ASCOM hosts drivers for all equipment that support ASCOM standards (nearly everything made in the past 25 years except for one manufacturer, ZWO, who limit their ASCOM compatibility), allowing drivers to be downloaded directly from the ASCOM site rather than relying on manufacturer's continued support.

Open PHD2 Guiding

https://openphdguiding.org/

PHD2 is guiding software inspired by Stark Labs PHD Guiding. PHD2 is free of cost, open source, and community-developed and supported. Available for all major OSes, including some embedded/small devices.

INDI Control Library

https://indilib.org/

INDI, the Instrument Neutral Distributed Interface Library, is software to control telescopes and associated equipment transparently over networks, wires, or locally. It supports a wide range of devices and is scalable to control anything from a backyard telescope to a network of professional observatories across the world.

Forsyth Astronomical Society Website

Forsyth Astronomical Society

This entry is included in this section rather than Organizations because its primary interest for our members is the information the group presents on their website. They have copious information about astrophotography and image processing with specific programs. Since the group is outside our nearby area, we have elected to place it here rather than under Organizations.

There is lots of other great information on their site as well.

Nighttime Imaging 'N' Astronomy (NINA)

Nighttime Imaging 'N' Astronomy

NINA is the software of choice for many astrophotographers and remote imagers. It provides a comprehensive solution for control of imaging setups and scheduling of sessions.

Sequence Generator Pro

Sequence Generator Pro

Full featured astroimaging sequencing and control, there is a free Lite version with limited features. Full version costs $150 for saved equipment profiles, automatic object centering, autofocus, meridian flip, mosaic mode, etc.

SharpCap

SharpCap

Imaging control and live processing software. Pro version adds features like auto polar alignment, sky framing, and mosaic imaging control.

AutoStakkert

AutoStakkert!

AutoStakkert is software designed to perform “Lucky Imaging”, picking the clearest image frames out of video to produce a finished image that is “clearer than seeing.” Designed to be simple to use, it is most effective for planetary imaging, though the latest version 4 software can also be used for deep sky images as well. (Side note: this was the first astrophotography image stacking software I used a couple of decades ago with a web cam modified for astro imaging.--Mark.)

Artificial Intelligence/Chatbots

AIs are useful tools for learning, whether it’s finding answers to questions more effectively than through web searches, or for developing new skills. They can also provide useful suggestions for accessories, ways of constructing useful add-ons, or finding some hard-to-find information source.

Using them effectively means being willing to question or cross-check their answers. The technology is still in its infancy, but it already outstrips the major search engines in effectiveness for finding answers. Below are four AIs that have been highest rated for accuracy, providing links and citations, and having good knowledge about astronomy, astrophysics, space exploration, and science in general.

Perplexity.ai

Perplexity

Excels in research-oriented queries with real-time web searches, providing cited sources from reliable outlets (e.g., journalistic publications and academic sites). It's particularly strong for factual information on space exploration, such as uncovering details on Mars geology or ongoing missions, and integrates tools like Wolfram Alpha for astrophysics calculations. Low hallucination rate due to source-backed responses, making it ideal for verifiable scientific info.

Grok

https://x.com/i/grok

Focused on accelerating science, especially in cosmology, physics, and engineering relevant to space exploration. It outperforms on benchmarks for complex problem-solving and has continuous knowledge updates without cutoffs, plus integration with X for the latest news (e.g., SpaceX launches or NASA updates). Good for nuanced, fun explanations but can be less polished in sourcing compared to Perplexity. Grok 4 is much more accurate and less likely to hallucinate than Grok 3, but access is currently limited to Grok 4--access is typically opened up to each new version of Grok over the course of 3-4 months.

Claude

Claude

Provides detailed, nuanced explanations suitable for complex astrophysics concepts, with a large context window for analyzing long scientific discussions or papers. It's fast and organized but lacks automatic internet access, relying on built-in knowledge, which may limit up-to-date space exploration details.

DeepSeek

DeepSeek

Excels in STEM-focused tasks with strong capabilities in mathematical reasoning, code generation, and computational simulations critical for astrophysics (e.g., solving equations for celestial mechanics or analyzing space data for exoplanet detection). It's free to use without limits, making it suitable for technical deep dives astronomical image processing. However, it lacks real-time web access, and exhibits biases in non-technical areas.

ChatGPT

ChatGPT

Versatile and accurate for general scientific queries, offering deep reasoning and file processing for data analysis in astronomy. However, it can require manual prompting for sources, struggles with advanced physics, and has a high risk of oversimplifying or hallucinating on specialized topics like astrophysics.

Other AIs

There are other commonly available AIs out there, but they have been left off of this list because of severe problems with accuracy, hallucinations, inability to cite sources, and refusals to discuss subject matter based on manual blocks that extend beyond their intended range of questions.

It is recommended that users of AIs learn to use multiple AIs and learn what each is best at, starting with the ones above. The field is developing

Organizations

Central Florida Astronomical Society

Central Florida Astronomical Society
https://www.facebook.com/CFASoc/

Based in Oveido, FL, the CFAS has an extensive website and active membership. They have an impressive speaker series, drawing scientists, engineers, authors, and debunkers of pseudoscience.

Moonstruck Astronomy Club

Moonstruck Astronomy Club

Serving the On Top Of The World community as our club serves The Villages, the Moonstruck Club holds monthly meetings on the first Thursday of the month. If you would be interested in giving a presentation to their club, please contact our club president, Mark Graybill, to get contact information for Moonstruck (or contact them directly via the email form on their website.)

Fruitland Park Astronomy Group

The Fruitland Park Astronomy Group | Facebook

The Fruitland Park Astronomy Group is our sister club in Fruitland Park. Their events are open to the public, including both our members

and non-residents of The Villages. We encourage our members in the Villages of Pine Ridge and Pine Hills to become directly active in the club, assisting club president Dave Scruggs in managing the group and helping it grow. They meet on the 3rd Saturday of the month, and it is included on The Villages Astronomy Club's calendar. Dave is a font of information on astronomy and telescopes, who has a deep love for the Fruitland Park community he grew up in. Invite families, beginning astronomers, students, and astronomers from the surrounding area to their meetings, which are centered around observation.

St. Petersburg Astronomy Club

St. Petersburg Astronomy Club
St. Petersburg Astronomy Club | Facebook

The St. Petersburg Astronomy Club, Inc. (SPAC), has been Tampa Bay's 'Home for Family Astronomy' for more than 98 years. We provide free educational programs for our members and the public.

Meetings - General Meetings are normally held on the fourth Thursday of each month (except November and December when it is on the third Thursday) at St. Petersburg College/Gibbs Campus 6605 5th Ave North, Saint Petersburg, FL 33710, at 7:30 PM. Meetings are free and open to the public.

General meetings take place in the Natural Sciences Building, Room SC236. Parties and picnics are held in the Philip Benjamin Social Arts Building, Room SA114.

Please contact our Membership Chair, Peter McLean, for additional information.

NOTE: The MARS Astronomy Club of Tampa is no longer active as of late 2023. Their domain registration expired, so their website domain has been taken over by spammers. Their Facebook group is still online, but has no activity (other than people asking if the group is still active.)

Institutions & Museums

Embry-Riddle Aeronautical University

https://daytonabeach.erau.edu/

Our club has had a long association with ERAU. They have provided speakers to our group, and we have reciprocated by connecting our members with ways to support student programs there. They have monthly speakers and observing sessions held by their astronomy department while school is in session, see their astronomy department's open house page here: Open House - Observatory

Univ. of Central Florida Planetary Sciences

UCF Planetary Sciences

UCF has a strong planetary sciences program with active research. They also have an observatory with public events. Dates are listed at this web page, along with instructions for registration to attend:
https://planets.ucf.edu/observatory/

Museum of Science & Industry

MOSI

The Museum of Science & Industry in Tampa has many programs including a planetarium, public observing nights, and, of course, the museum itself. Open most days from 10am to 5pm (closed Sept-2-5th for facility work, but open on the 1st.)

See the website for further information. Public astronomy night information here:
SkyWatch - MOSI

Cape Canaveral Space Force Museum

Cape Canaveral Space Force Museum

There are two parts to the CC Space Force Museum, one is the former Air Force Missile Museum, which can be visited via an arranged tour through Canaveral Tours (along with a Canaveral Lighthouse Tour) or Space Shuttle Excursions for a space-oriented tour:
Canaveral Tours
Space Shuttle Excursions

The other part is the Sands Space History Center, which does not require a scheduled tour to visit. It may occasionally be reserved for groups, so check their availability on their "Locations & Hours" page when planning a trip:
Sands Space History Center
Location & Hours

American Space Museum Titusville

American Space Museum

American Space Museum

The American Space Museum in Titusville is walking distance from Space View Park, a popular site for watching launches in Titusville. The inside of the museum features actual control panels from launch complexes that can be interacted with, models of spacecraft and launch facilities, test equipment, and a space suit simulator. At the far end of the parking lot sit several rocket engines including thrust chambers, throats and skirts, and some turbopump bodies in various states around a Shuttle Orbiter model.

Kennedy Space Center Visitor Complex

Kennedy Space Center

The Kennedy Space Center Visitor Complex contains some of the best exhibits of space exploration hardware anywhere in the world. It is divided into two parts, the main complex which houses the rocket garden and Space Shuttle Atlantis display, and the Saturn Building which houses the Saturn V rocket display and Apollo control room simulator.

Buy your tickets ahead of time online from the center, or through a valid ticket discounter. Purchase tickets in advance, if possible. Plan to arrive early, and go directly to the bus tickets to get either the free tickets to the Saturn Building or one of the extra cost tours if you choose. If this is your first time, our members do not recommend paying extra for an upcharged bus tour, because there is more than you can do in a full day's touring without paying extra past the entry fee. Note that it is no longer possible to drive yourself to the Saturn Building as in years past, the bus is the only way to reach it, and a Visitor Center ticket is necessary for admission.

Also, our members do not recommend paying for the "Meet an Astronaut" experiences, as they have found these to be disappointing and not allow any real interaction with the astronaut.

It is also best to get to the Saturn Building as early as possible to avoid late in the day crowds and lines for return buses.

The indoor display of the Space Shuttle Orbiter Atlantis is rated as a must-do by our members. The display outside the building is a stack of the solid rocket boosters and External Tank components of the Space Shuttle to give you an idea of how large the whole thing was on the pad. It doesn't include an Orbiter, however, so the whole thing was actually much larger.

The rocket garden display can be seen at any time, avoid the heat of the day when viewing it.

A much overlooked display area is the museum area at the Gateway: The Deep Space Space Launch Complex, north of the rocket garden. It includes more recent space hardware such as a Falcon 9 booster, a Dragon capsule, a Dream Chaser lifting body, and an Orion capsule.

The United States Astronaut Hall of Fame used to be an independent museum outside the Visitor Complex, but has been moved inside the main Visitor Complex south of the rocket garden. Formerly it provided a chance to visit a museum without paying the expensive entry price of the

Visitor Center, but now it has been gobbled up by the Money Borg. While it is very nice to visit, if you have only one day at the Visitor Center, you will find it to be a time-costly distraction, unfortunately. The biographies and personal items of the astronauts and the history are top-notch, but being part of the inside-the-gates attractions destroys its tourism value in many ways.

It should be noted that NASA does not operate the Visitor Center themselves, they have contracted that task out to a for-profit organization who have increasingly sought to bring the peripheral attractions in the area into their own control.

When visiting KSC, consider bringing food or snacks to avoid the high prices, limited selection and quality of the onsite food, and to allow you to maintain your own schedule. Plan to stop for a good dinner outside the area and bring protein bars, home made sandwiches, and your own beverages to save time and money at the center. No glass containers are allowed, be sure to check the rules on the KSC VC website, above.

Before you go, study up on the artifacts on display, as not all exhibits are well described on site. For example, the Saturn IB rocket on display includes most of the parts of the rocket that was held in reserve for a potential Skylab rescue mission.

U.S. Space & Rocket Center, NASA Marshall Space Center

U.S. Space & Rocket Center

Similar to the Visitor Center at KSC, the Huntsville Visitor Center is operated by an outside contractor who have been making it impossible to access the formerly public exhibits like the Rocket Park without visitor center admission.

However, the center has many unique exhibits among the major NASA visitor centers, centering on launch vehicle development and the SLS launch system for the Artemis program.

Purchase tickets in advance for best prices and to be certain of entry in the event of high demand periods (which vary wildly as a result of school and organizational tours.)

Space Center Houston (NASA Johnson Space Center)

Space Center Houston

As with the other two major space center visitor complexes, Space Center Houston has eliminated public access to its Rocket Park. As with the other centers, it offers some unique exhibits, particularly with regard to astronaut training and equipment. Extra cost experiences are not likely to add siginificantly to your visit, there is a lot to see without upcharges, including a Saturn V, space suits, Apollo capsules, the Shuttle Orbiter simulator Independence (a high quality full scale model of the Orbiter) mounted on an actual Shuttle Carrier Aircraft, with interior tours of both vehicles.

Smaller NASA Centers

Centers and Facilities - NASA

Smaller, less well known NASA centers tend to give far more “bang for the buck” than the major centers whose visitor centers are operated by commercial theme park contractors. While usually less extensive, for a day’s visit they will provide a more personal experience and a more up-close look at NASA hardware, operations, and facilities. Centers differ on the requirements to visit, so visit that site’s visitor center page (for example, Armstrong Research Center is on an Air Force base and subject to the base’s entry controls).

Most centers have other nearby space related attractions that can be used to expand your touring day, for example, near Armstrong there is the Flight Test Museum and Blackbird Airpark that all together provide more than a full day’s touring.

Flight Test Museum, Edwards AFB

FLIGHT TEST HISTORICAL FOUNDATION

Flight Test Historical Foundation

The Flight Test Museum at Edwards AFB includes many exhibits on flight test as well as displays of notable flight test vehicles such as engines from the X-1, SR-71, and X-15, Bell X-1, X-25B Gyrocopter, YF-22 Black Widow II, and X-48C Blended Wing at the main museum, with many more aircraft at the on-base Museum Air Park including an F-111, F-16XL prototype, and Thor IRBM. It shows the development of flight suits, ejection seats, models, and historical items.

Blackbird Air Park

BLACKBIRD AIRPARK

AIR FORCE FLIGHT TEST MUSEUM

https://flighttestmuseum.org/blackbird-airpark/

In addition to the on-base air park museum, the Flight Test Museum operates the off-base Blackbird Air Park. The Blackbird Air Park has unique craft on display such as the SR-71A, the first operational A-12 Oxcart, a J-58 engine used in the SR-71 and A-12, a U-2, and a D-21 Drone used with the Blackbirds. Inside displays include wind tunnel test models and other Blackbird & U-2 related displays about how these craft were used and flown, and the demands on their crews.

Club Calendar

Special events by The Villages Astronomy Club
Events not hosted by The Villages Astronomy Club
Notable dates with no event planned.

September 2025

1 Space Academy, 6:30pm, Truman Rec Ctr, Observing Workshop 8pm
5 Exec Meeting, Fishhawk Rec Center, 11am
16 General Meeting, 6:30pm, Laurel Manor Rec Ctr
20 Fruitland Park Observing, 5pm, 300 Shiloh St. Fruitland Park
24 EAA Meeting, Homestead Rec Center, 7pm

October 2025

3 Exec Meeting, Fishhawk Rec Center, 11am
6 Space Academy, 6:30pm, Truman Rec Ctr, Observing Workshop/Binocular Workshop 7:30pm
18 Fruitland Park Observing, 5pm, 300 Shiloh St. Fruitland Park
21 General Meeting, 6:30pm, Laurel Manor Rec Ctr.
22 EAA Meeting, Homestead Rec Center, 6:15pm

November 2025

2 DST ENDS
3 Space Academy, 6:30pm, Truman Rec Ctr, Observing Workshop/Doing a Star Party 7pm
7 Exec Meeting, Fishhawk Rec Ctr, 11am
15 Fruitland Park Observing, 5pm, 300 Shiloh St. Fruitland Park
18 General Meeting, 6:30pm, Laurel Manor Rec Ctr, Frank Bridge, Binocular Observing
19 EAA Meeting, Homestead Astronomy Park, 5pm
22 Starry Starry Night, observing 6:30-8:30, 3 day Moon, Saturn, Uranus, Neptune, fall constellations.

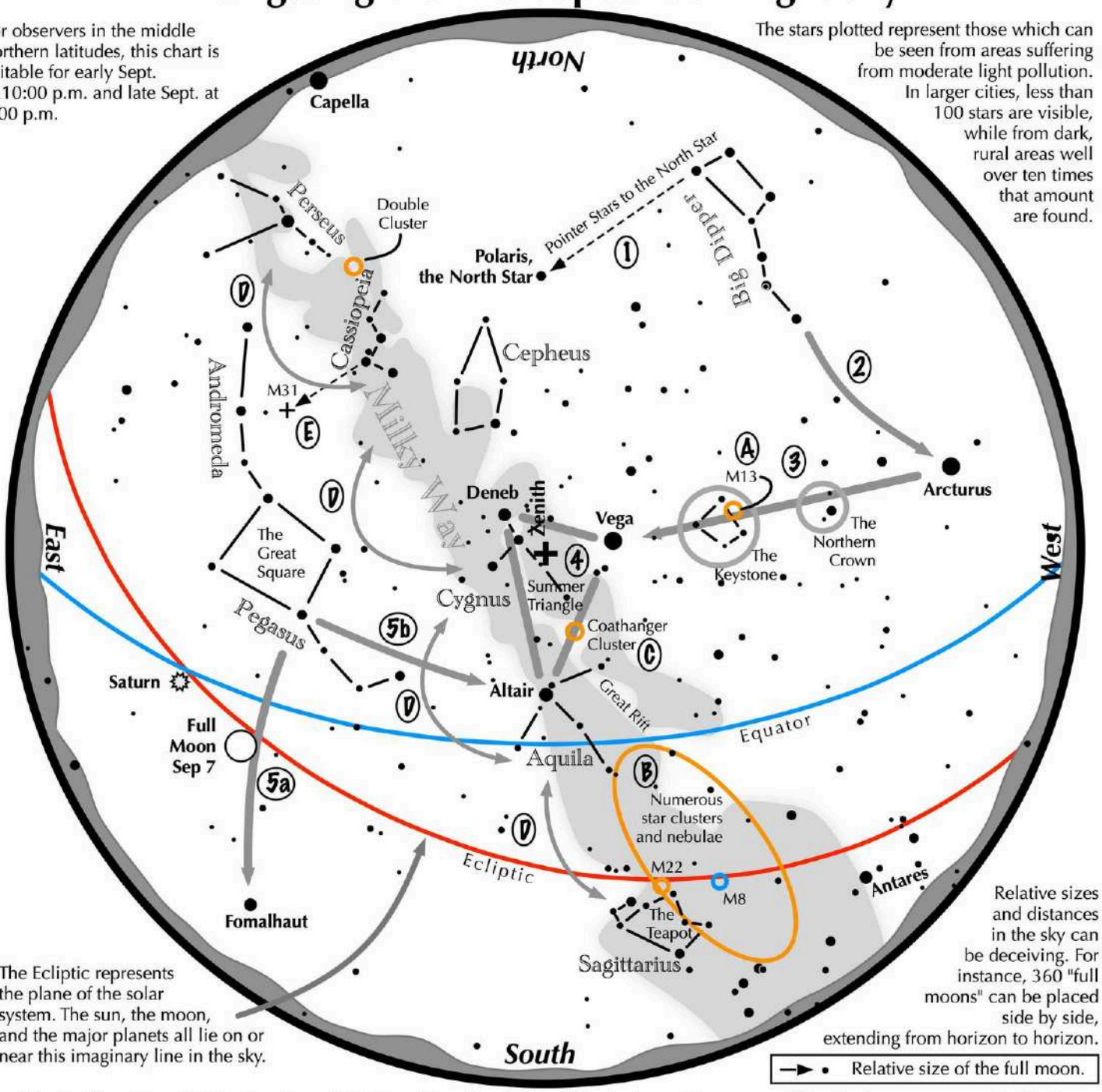
Club Calendar on the web:
https://vlgastroclub.org/calendar/

See star chart & special observing graphics on following pages:

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.

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