Volume 6, Number 4
April 2025

Club Website:
http://vlgastroclub.org/

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

UPCOMING EVENTS

Executive Directors' Meeting, April 4th, 11am
Fishhawk Rec Center, 2318 Buttonwood Run

All members welcome to our monthly planning meeting. This month we'll be making preparations for May's Astronomy Day and our summer program.

Space Academy, April 7th, 6:30pm
Truman Rec Ctr, 2705 Canal St.

Join us for Space Academy, where we have talks on the basics of astronomy and news about current research topics. This month we'll be reviewing projects in Zooniverse from Euclid and others to which you can contribute science!

Observers' Workshop, April 7th, 8pm
Truman Rec Ctr Pavilion, 2705 Canal St.

Learn to use your binoculars or telescope to see the sky! Get advice and guidance from experienced astronomers. Learn how to show the sky to the public, take advantage of accessories and techniques to make your observing more fun and more effective.

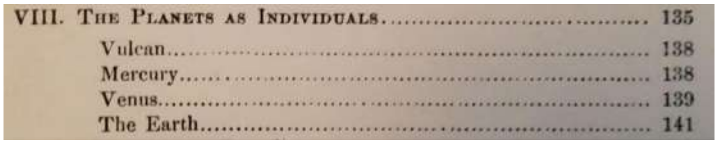
Formerly known as our **Telescope Workshop**, we've renamed this event to represent that we support all forms of observation.

The Rosette Nebula in Monoceros the Unicorn
By member John Harper

General Meeting, April 15th, 6:30pm:
Discovering the Solar System by Mark Graybill

Join us at Laurel Manor Rec Center, 1985 Laurel Manor Drive, at 6:30pm to learn about humanity's discovery of the solar system, what it really is, and what our place is in it.

From our own planet and its moon to all 13 of the planets plus the small bodies, comets, and the outer reaches of our solar system that stretch into interstellar space, see what we know about our Sun's neighborhood and how we learned it! See how we plan to learn even more as our technical capabilities grow!



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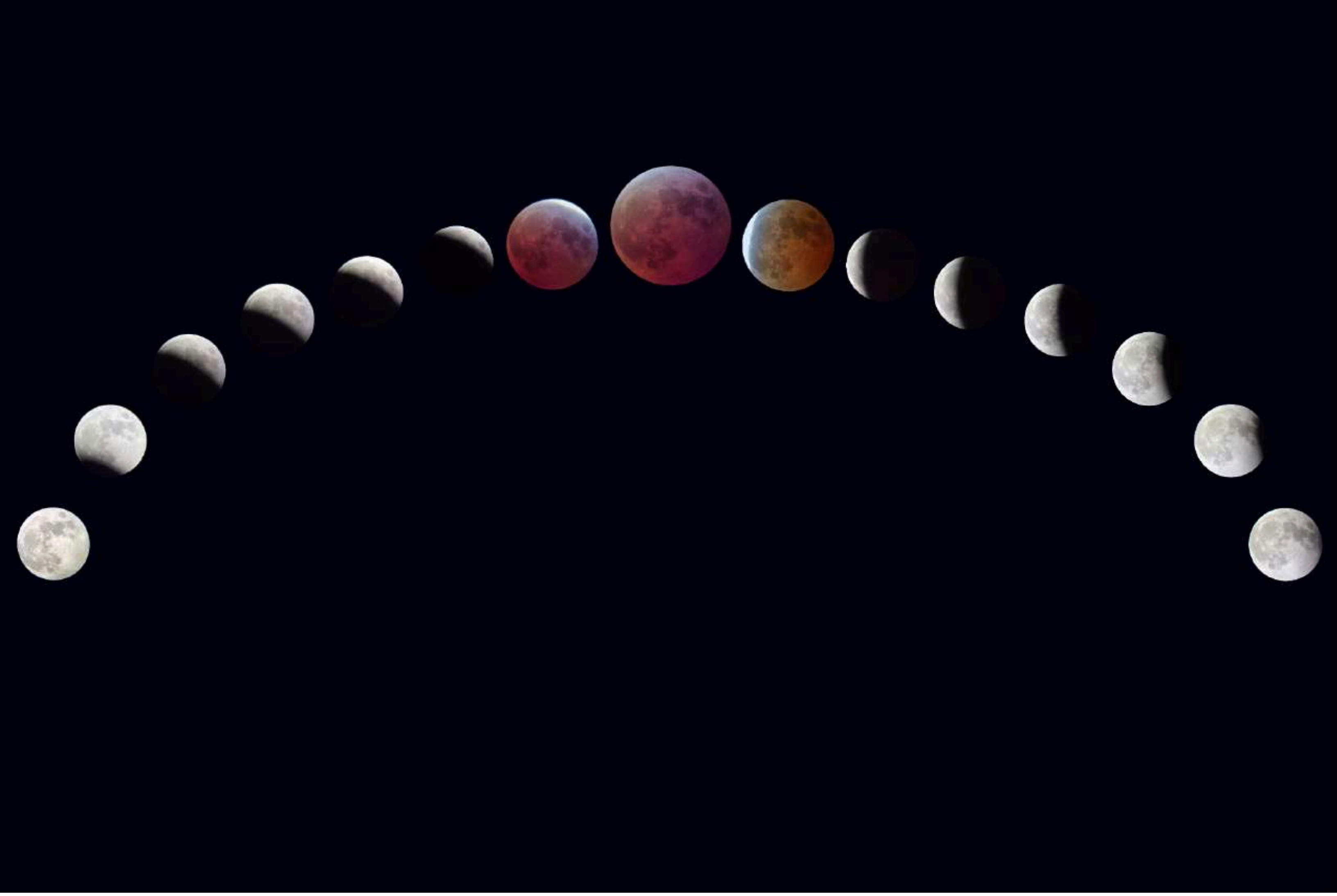

Total Lunar Eclipse
Image by member Emily M. Blessing

Fruitland Park Astronomy Group, April 19th, 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 group of friendly astronomers!

EAA Meeting, April 30th, Homestead Astronomy Park, 7:30 pm

Join us at Homestead Astronomy Park for an evening of observing with smart telescopes! Owners of smart scopes or scopes with smart controllers are welcome as are those who are interested in learning more about the options to get started in Electronically Assisted Astronomy (EAA). We will keep the park open late for observing and photography if weather permits.!

Astronomy Day, Saturday, May 3rd 12-3pm, Homestead Rec Center

Our annual daytime astronomy event where we present the Sun and a guided tour of our solar system will be held in the grass area east of the Rec Center building on May 3rd this year. If you've attended our prior eclipse events, this will be much the same, but the Moon will not be in front of the Sun this time!

We will have solar scopes giving a view of our Sun and its activity, and information at our booth on the Sun and how it works. We will have our Solar Walk set up with guides to give you a walking tour of our solar system with information about each of the planets and other features that make up our local region of space.

Join us as we celebrate our nearest star and its companions!

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

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.

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FEATURE ARTICLE

Binocular Astronomy by Mark Graybill

Astronomy isn't just for telescopes! You can see the sky with binoculars, too. Practically any binoculars can be used to view the sky. Even an inexpensive pair of 7x35 binoculars, or a pair of opera glasses, can be used to get beautiful views if you know where to look!

Binoculars are easy to aim because they have a field of view that's many times wider than the field of a normal telescope. They don't need a fixed base, or a finder scope.

What can you see in binoculars?

The Moon (and features on it),
Mercury,
Venus,
Mars,
Jupiter and four of its moons,
Saturn and 2 to 3 of its moons,
Uranus,
Neptune,
and about 26 asteroids.

About 620,000 stars!
About 50-60 star clusters.
Many double and triple stars,
Colorful stars,
about two dozen galaxies!

A Stable View

Seeing any detail requires a stable view. The way most people hold binoculars doesn't give a stable view, especially when looking up. When holding binoculars, hold your wrists together under the body of the binoculars, using your palms to form a platform to support them.

Hand Holding Binoculars
Image by Mark Graybill

Stability makes all the difference when viewing the sky. Holding binoculars by hand is the least stable technique, but it's often the most convenient, and you don't need to remember to pack any other equipment along!

You can get your hand-held binoculars even more stable if you stabilize yourself. Leaning against a nearby tree or your vehicle, seated with your back against something, or with your elbows resting on a fencepost.

The more stable you are, the more stable your image will be. And that will let your eyes relax and pick out more of the fine detail in the image in your binoculars.

But there are ways to be even more stable.

Monopods, Tripods, and Homebrew Mounts

A monopod is a single legged support that will hold your binoculars. Sports suppliers sell telescoping monopods that can be collapsed when they're not in use, then extended and attached to your binoculars' tripod adapter connection. Most binoculars will have a screw hole in the center of the hinge, under a cover.

Tripod Adapter Screw Hole & Cover
Image by Mark Graybill

This screw hole can be used to attach your binoculars to the monopod, which will have a swivel head to allow you to move your binoculars up and down to different angles. Some monopods also have feet so that they can hold themselves upright.

If your binoculars don't have a tripod adapter screw hole, don't despair! There are lots of ways to get the same support, even with a normal monopod. You simply rest the hinge of your binoculars on the monopod rather than attaching them with a screw. Or, skip the monopod and use whatever you have at hand to fill in.

These binoculars don't have tripod adapter screw holes. But they can still get the same stability by resting them on top of something!
Image by Mark Graybill

A walking pole or bottle becomes a handy monopod, no screw adapter required!
Images by Mark Graybill

You can rest your binos almost anywhere to get a more stable view without hauling along a monopod or tripod.
Image by Mark Graybill

If do have a tripod adapter on your binoculars, you can also use it to attach your binoculars to a tripod. Most will require a tripod adapter. It goes between the screw on the front of the binoculars and the flat base of the tripod head.

Binocular Tripod Adapter. The screw goes into the binocular hinge screw hole, the base goes on a tripod's head. Image by Mark Graybill

For larger and heavier binoculars there is a different form of tripod adapter known as a fork mount. The fork mount supports the binoculars in a cradle that can be moved up and down. Small fork mounts are also available for small binoculars with no tripod adapter screw hole. They will use velcro straps or some other mechanism to hold the binoculars.

Also, there are monopod and tripod adapters with a clamp to grip one barrel of the binoculars to attach it to its support. There are many ways to attach binoculars to a tripod or monopod!

Other Mounts

The problem with using a tripod and a normal tripod adapter is that when looking upward, it puts the observer straddling a leg of the tripod.

Boom mounts seek to solve this problem. The simplest use an arm that crosses the tripod head, and attaches to the binoculars with a swivel head to allow the angle of the binoculars to be changed. For small binoculars, 50mm and smaller, they may have only a small counterweight at the far end of the boom to balance the binoculars on the tripod, or no counterweight for binoculars less than 4lb or so.

A more complex, but far superior arrangement is to use a ***parallelogram mount***. These use the mechanical feature of a parallelogram that the sides are always parallel to keep the binoculars pointed the same direction no matter how high or low the eyepieces of the binoculars are moved to. That means multiple people of different heights can view the same object through the binoculars by simply pulling the binoculars to the right height.

Parallelogram Mount
Image by Farpoint Astro

Most commercial parallelogram mounts are quite expensive, about the same price as an entry-level telescope. Yet they open up a whole new world of binocular observation as well as being able to share binocular views easily at star parties.

I built my own parallelogram mount out of about $25 of parts from the hardware store in an afternoon. It served me well for over a decade of observing and star parties, and I deeply regret leaving it behind when I moved to The Villages. So I plan to build another. My old mount carried my 80x20 binoculars easily. It was easier to set up and use than any of my telescopes (even my Dobson), so it was my “lazy option” when I went observing.

The parallelogram also meant that I didn’t have to bring along a stepladder, anyone who looked through my binoculars did so standing on their own two feet.

Observers’ Workshops

Do you have a telescope or binoculars that you’d like to know how to use better? Do you dream of giving people their first view of Saturn or The Seven Sisters in the sky?

Then our Telescope Workshop is for you!

Telescope Workshop is our club’s monthly event that gets experienced astro observers together with beginner and intermediate observers to expand their skills, help them learn to use their equipment, and share tips & techniques on not only viewing the night sky but sharing it as well!

Do you have a pair of binoculars? Bring them out to Telescope Workshop and let us show you how to see the sky with them. Learn about how to hold them stable, and what sort of objects you can expect to see well with binoculars rather than a telescope, and how to share views of the sky through binoculars!

What to View in Binoculars?

Messier 35, The Shoebuckle Cluster in Gemini
Image by Mark Graybill

Binoculars give a different view of the sky than a telescope. That means they excel at some objects that are difficult to view well in a telescope, while being not so good as a telescope for other objects.

Star clusters are the first thing I recommend looking for in binoculars. Your binoculars will give you views of large bright clusters like you will never see in a telescope (unless you have a specially-built “Richest Field Telescope, which is unlikely unless you built it yourself!)

The Pleiades, Hyades, Beehive Cluster, Shoebuckle Cluster, Alpha Persei Moving Group and other large extended clusters will take your breath away. The first four of these are near the ecliptic, which means you’ll also get chances to view them along with planets at times for an extra special view!

Planets will be bright and will obviously not be stars (except for the really small planets like Pluto and Ceres) but they won’t show any significant detail at normal binocular magnifications (6-30 powers.) Fortunately, that’s not all there is to see in a planet. Uranus and Neptune have color that can appear to change under different conditions, Uranus can appear green or blue, Neptune ranges from a pale blue to a strong turquoise. Mars varies from pale orange to deep red. Mercury from amber to red. Saturn from pale yellow to amber. Jupiter pink to orange.

But that's not all there is to see from the planets. Jupiter, Saturn, Uranus, and Neptune all have moons that you can see in binoculars. Larger apertures will see more, but in binoculars you also have the advantage of seeing with two eyes, which gives you double the light of a telescope of the same aperture. Plus, for many people the more relaxed two-eye view makes faint objects easier to see.

Jupiter's four big bright moons are visible in any binoculars, as is Titan at Saturn, and usually Rhea and Dione. Depending on conditions and your binoculars, you may be able to see up to seven of Saturn's moons!

Uranus has two moons, Ariel and Umbriel, that are a challenge for binoculars, but possible under excellent viewing conditions.

Similarly, Neptune's Triton is a challenging catch.

Globular Clusters

In addition to open clusters of stars, such as listed earlier, globular clusters make a great sight in binoculars. Each has its own feel--some are tightly condensed into small balls, others fade gradually from their inner core to the outer reaches, others yet have a tight bright core and a diffuse outer halo, like a mini galaxy.

Here are some of my favorites:
M22 in Sagittarius, which has a large, bright center and misty glowing edges,
M13 in Hercules which is just plain bright. It's center is bright and it fades out gradually.
M4 is large and misty, covering a large area of sky near Sirius, the Dog star.
M80 in the Scorpion is small and tightly bound.
M55 in Sagittarius is small and bright, with a faint haze around the edge.
M2 is big and bright in the center, fading out rapidly to its edges.
M5 is large and has a large central bright area.

More Deep Sky Objects

In addition to the star clusters mentioned above, you can see nebulas and galaxies in binoculars. Two lists of deep sky objects, the Messier Catalog and the Caldwell Catalog, give lists of objects viewable in binoculars. All together, they represent 219 objects that you can catch, including:

75 galaxies,
16 diffuse nebulas,
17 planetary nebulas,
3 Supernova remnants.

Some of these are brighter and easier to see than others, but all but a few on each list can be seen even in 7x35 binoculars. Start with the biggest and brightest as you learn what you can do with your binoculars.

Unstructured Viewing

Star Clusters M46 and M47
Image by Mark Graybill

With a telescope, I don't recommend going out under the sky without some idea of what you intend to look at. A telescope's low power field of view lets you see about 1/36,000th of the sky at any one time. Your chances of stumbling on something interesting to look at are very low, even if you aim at the brightest stars in the sky. If you observe with a telescope, you have to know where you're going!

Binoculars will give you a field of view 11x larger than the telescope, or more. They give enough magnification to improve the contrast of the sky over your eyes, and collect enough light to bring things into view that your eyes can't see. Even a pair of 7x35 binoculars collects 25 times as much light as your eyes! 50mm binoculars double that!

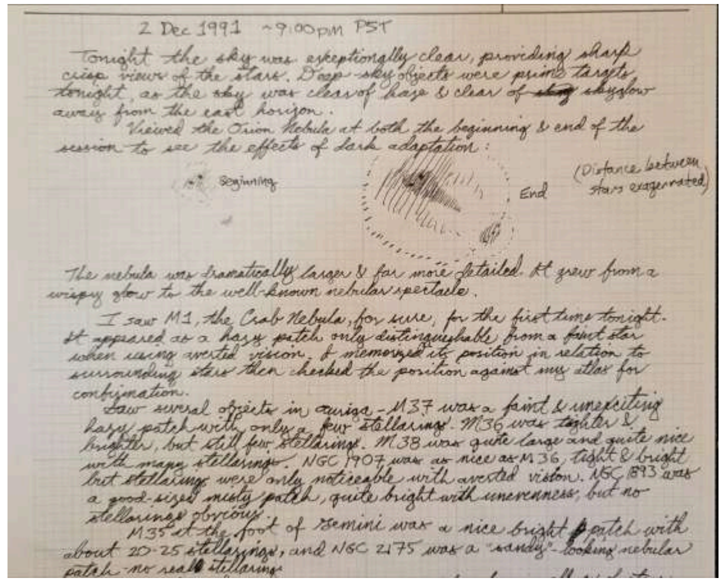
That means you can walk out the door with a pair of binoculars with no plan, and find things that look good. Star fields and the Milky Way. Scanning the Milky Way can be an entire evening's observing session. If you know a few constellations, you can find your way directly, even if you can't see where the Milky Way is by eye.

At this time of year, it stretches from NNW up through the high western sky then back down to the SSE. From Casseiopeia to Perseus to Auriga to Gemini to Monoceros to Canis Major to Pyxis to Vela. There are many bright stars along the way to help mark the path, from Casseiopeia's W to Alpha Persei to Capella to Sirius and onward.

Six months from now, it will run from NW to SE, crossing the highest point of the sky. Perseus to Casseiopeia to Cygnus to Sagittarius to Scorpius to Telescopium. Again, we have many bright stars along the way. Between Sagittarius and Scorpius lies Scutum, with the richest star fields you will see in binoculars, including Messier 20, the Scutum Star Cloud. The center of our galaxy lies in this direction, giving many wonderful nebulas and star clusters to view in the three constellations here--Sagittarius, Scutum, and Scorpius.

Overhead in fall is Cygnus, where we are looking at the break between one arm of our Milky Way and another. The Veil Nebula, a Supernova Remnany, lays in this direction along with the Pelican and North America nebulas, a collection of star clusters, and rich star fields spreading into Lacerta and Vulpecula, including M27, the Dumbbell Nebula.

But even if you don't know where the Milky Way is, a bit of sweeping around with binoculars will get you there! The same can't be said for the narrow field of view of a telescope!


2 Dec 1991 ~9:00pm PST

Tonight the sky was exceptionally clear, providing sharp crisp views of the stars. Deep-sky objects were prime targets tonight, as the sky was clear of haze & clear of ~~sky~~ skyglow away from the east horizon.

Viewed the Orion Nebula at both the beginning & end of the session to see the effects of dark adaptation:

Beginning

End

(Distance between stars exaggerated)

The nebula was dramatically larger & far more detailed. It grew from a wispy glow to the well-known nebular spectacle.

I saw M1, the Crab Nebula, for sure, for the first time tonight. It appeared as a hazy patch only distinguishable from a faint star when using averted vision. I memorized its position in relation to surrounding stars then checked the position against my atlas for confirmation.

Saw several objects in Auriga - M37 was a faint & unexciting hazy patch with only a few stellarings. M36 was tighter & brighter, but still few stellarings. M38 was quite large and quite nice with many stellarings. NGC 1907 was as nice as M36, tight & bright but stellarings were only noticeable with averted vision. NGC 1893 was a good-sized misty patch, quite bright with unevenness, but no stellarings obvious.

M35 at the foot of Gemini was a nice bright patch with about 20-25 stellarings, and NGC 2175 was a "sandy"-looking nebular patch - no real stellarings.

A Page from My Binocular Observing Log where I note the effect of my eyes being fully dark adapted on how much of the Orion Nebula I could see in 7x35 binoculars.

Image by Mark Grabill

Get Started with Binoculars

You will hear many astronomers like myself advise beginning observers to start with binoculars. They're easy to use, inexpensive, can be used for other things even if astronomy doesn't grab you. And, even if you get a telescope later, you'll still use your binoculars!

When I was learning my way to many objects in the sky with my telescope, my binoculars were my best friend, helping me find the way to get my telescope on target.

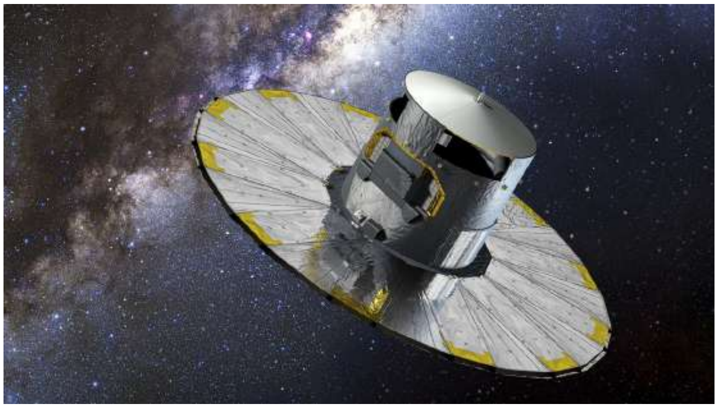
Even after I had been observing with telescopes for 27 years, I decided to take an entire year observing with nothing but an inexpensive pair of Bushnell Falcon 7x35 binoculars as a challenge to myself. From July 1991 to July 1992, I used nothing else to observe with from my own instruments!

My first view of Uranus was in binoculars. I learned my way through the Messier list with binoculars. And I still go out with binoculars.

I can't recommend a better way to see the sky!

NEWS

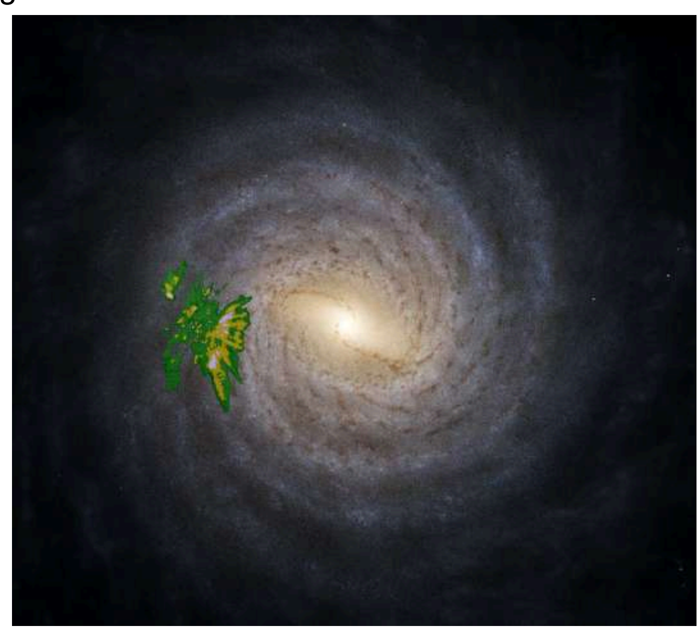
Gaia Mission Ends--More Data Coming



Gaia Satellite Concept Image, ESA-D

On March 27th the Gaia satellite was moved to its final orbit around the Sun after the last of the nitrogen gas that it used for position-keeping was exhausted. After ten and a half years in orbit, taking over 3 billion measurements of 2 million stars it has reached the end of its life.

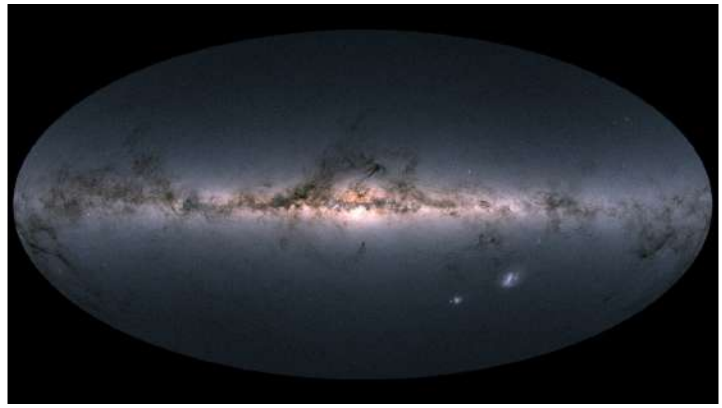
The mission has given data that is so precise it has allowed us to gain a far deeper understanding of our galaxy and the Sun's neighborhood. Measurement of the precise positions of young stars over time has shown how these stars move from their stellar nurseries out into the galaxy's populations of stars in the galactic arms.



Young Stars Measured by Gaia, ESA image

This is not the end of the mission's data on the distance, position and motion of the stars it examined, however. Only about one third of all the data has already been released, with future releases planned through 2026.

The mission's data has already been used in many scientific papers, and is being compiled into new star catalogs that will be used in the study of the stars, and the structure of the Milky Way, for many decades yet to come.



The Milky Way as Seen by Gaia, ESA image

Firefly Blue Ghost Moon Mission Ends

Sunset on the Moon. Earth Shines Above the Setting Sun. Firefly Aerospace image.

On January 15th Firefly Aerospace's Blue Ghost lunar lander, set off on its journey to the Moon on board a SpaceX Falcon 9 rocket. On March 2nd it landed, shortly after sunrise at its landing site, and began two weeks of operations.

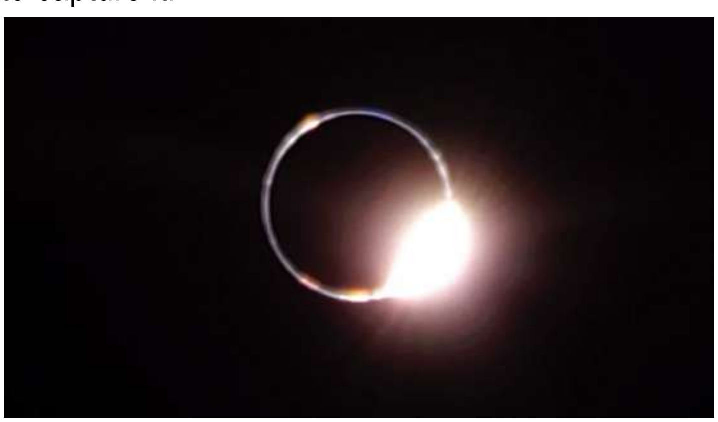
The lander carried a number of instruments for studying the lunar surface and its properties, as well as cameras to catch the interaction of the lunar dust with its landing rockets. And, of course, cameras to capture dramatic images from its site on the Moon.

Blue Ghost Sees Its Own Shadow After Landing
Firefly Aerospace image

After landing on the edge of a crater, the lander began deploying instruments for a busy "morning" on the Moon before the heat of lunar noontime. The first data had already been recorded during its landing, with four high speed cameras recording the lunar dust disturbed by the 8 small rockets that brought Blue Ghost to its landing. It then deployed Lunar PlanetVac to sample lunar regolith, deployed the Electrodynamic Dust Shield to demonstrating dust mitigation for solar panels, space suits, and mechanical parts. Its first two days of operation saw 57GB of data returned from the Moon.

An Eclipse on the Moon

A lunar eclipse on the Earth means a solar eclipse on the Moon. And Blue Ghost was there to capture it!

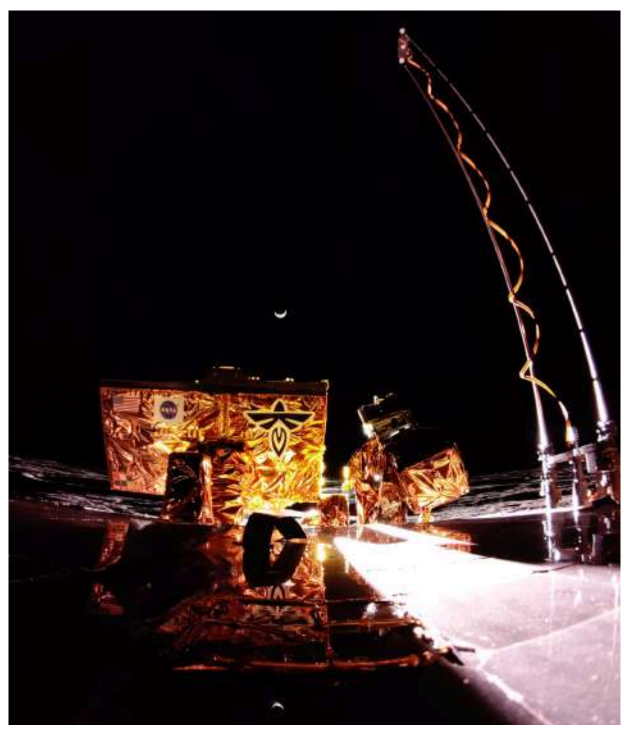


Earth Eclipses Sun as Seen by Blue Ghost, NASA

NASA posted images online showing the eclipse from both sides--the Moon and the Earth.

Shadows on the Moon. Blue Ghost is in the round sea near the right edge of the Moon. NASA image

As temperatures rose to over 250 degrees during the lunar noon, Blue Ghost shut down most of its instruments waiting for cooler conditions. Once they came, Blue Ghost sent a pair of probes flying off across the lunar landscape to allow it to measure electrothermal effects in the Moon's crust 700 miles deep.



Blue Ghost's LMS Mast Stands 6' Above Its Deck after launching a probe 60' away. Firefly image.

Firefly also tested the ability of lunar probes to use Earth's global navigation satellite networks. It successfully received GNSS signals on the Moon to obtain position information. This will help future missions while the lunar navigation satellite systems are being deployed over the next decade.

Learn more:
[Firefly Aerospace Successfully Completes 14 Days of Surface Operations on the Moon]

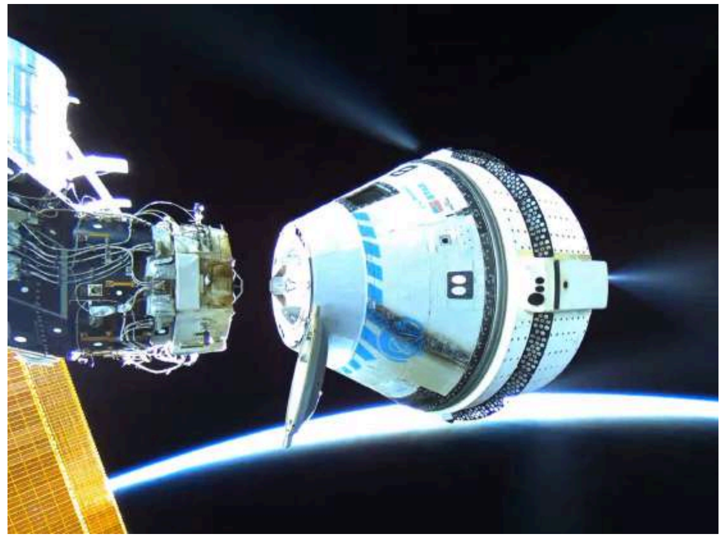
Boeing Starliner Crew Returns to Earth

A Pod of Dolphins Greets the Crew 9 Capsule Alongside Recovery Crews
SpaceX image

After 286 days in space, the Boeing Starliner test crew of Butch Wilmore and Sunita Williams has returned to Earth. Launched to the ISS aboard the Boeing Starliner capsule on June 5th, 2024, their original intended stay aboard the ISS was intended to run from docking on June 6th to departure on June 14th.

That schedule didn't last long, however, as issues with thrusters overheating and helium leaks kept Starliner at the station longer. Its departure date was delayed successively to June 18th, then 22nd, then June 26th. Finally, on August 24th NASA decided to return Starliner without crew on board, and keep Wilmore and Williams on ISS through Expeditions 71/72 to return in February 2025. This schedule was further delayed by issues with the Dragon capsule being prepared for Crew 10, which delayed Crew 9's departure until mid-March. Finally, on March 18th, the Crew 9 capsule returned to Earth.

An Open Ended Schedule



Starliner Undocks from the ISS. Sen image

Starliner had issues with thrusters and helium seals during its cruise after launch, before arrival at the ISS. It experienced multiple thruster shutdowns due to overheating, and while the helium leaks were small, they were noted as potentially having an impact on the time Starliner would be able to stay in space if they could not be stopped.

During the cruise, additional tests were performed on the thrusters to characterize the cutouts, and determine whether the offline thrusters could be returned to service or would be offline for the remainder of the flight. During the cruise, all but two of the thrusters were able to be restored with no apparent ill effects, and the remaining two seemed possible to restore as well. Once it was determined that the available thrusters would be sufficient to safely approach and dock with the ISS, the decision was made to do so. The decision to go to the ISS rather than to return the crew immediately placed the test program into unplanned territory.

After arrival at the ISS, work started immediately on the helium leaks. It was soon determined that closing the supply valves on the lines stopped the leaks. This meant that Starliner would not be limited in its time in space by the helium supply used for pressurizing critical systems. Boeing would be expected to fix the cause of the leaks before future flights, but the need to return Starliner in short order had been lifted.

The next issue to address was the thrusters. After some work, all but one of the thrusters was returned to service. The remaining thruster seemed to have a deeper problem caused by an overheating incident during its flight to the ISS. Ground based testing of the engine failed to recreate the problem, causing growing doubts among the NASA officials overseeing the test, who feared that additional engine failures of the same sort may create a cascade effect of causing additional engine failures, as engines are overheated while compensating for the loss of others.

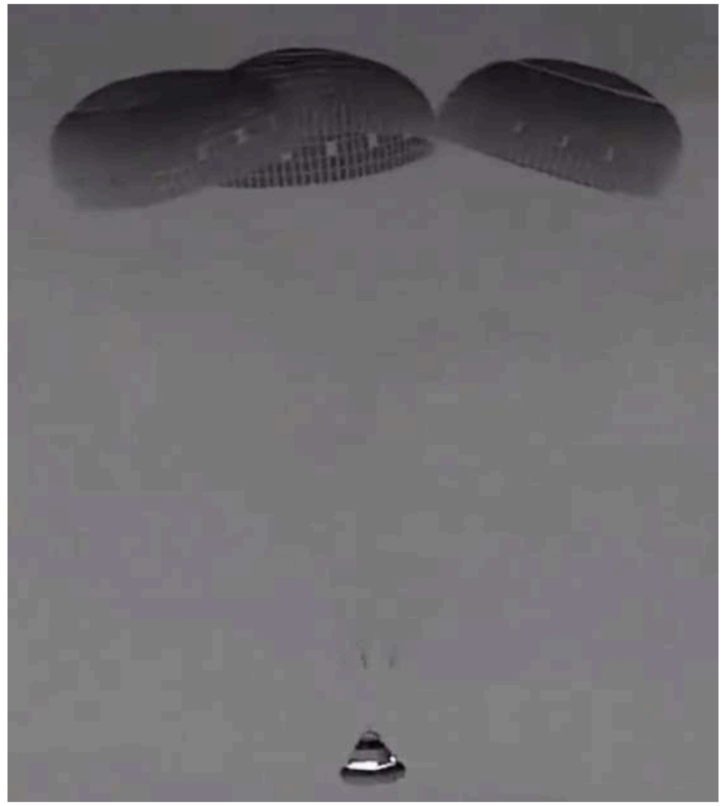
While reviewing data from Boeing and Aerojet tests of the engines, the date for Starliner’s undocking was moved back multiple times. Finally, on June 26th, NASA shifted the test to an indefinite schedule while they worked the problem.

Starliner remained docked to the ISS Harmony module’s forward port while Boeing performed remote diagnostics of Starliner. Butch and Suni were incorporated into ISS crew activities during the time they were waiting between their activities to support the Starliner test.

The debate on the failure of the thrusters went back and forth on whether the failures were related to hardware or software. Testing showed that the engines’ seals and performance had been degraded by the problems noted on the flight up, raising concerns about the craft’s ability to use those thrusters for deorbit burns. Hot fire testing of seven thrusters on July 27th while docked to the ISS showed improved performance, but not that the issues were fully resolved.

On August 7th, NASA held a formal review, noting that Starliner had a docking limit of 90 days in the ISS schedule, requiring its departure on or before September 4th.

Lifeboats and Return Vehicles



Boeing Starliner Returns to Earth Sept 6th 2024
NASA image in Infrared

On August 24th, 2024 NASA announced that Starliner would be returned to Earth without crew. Wilmore and Williams would be incorporated in the ISS Expedition 71/72 crews in place of two astronauts previously scheduled for flight aboard SpaceX Crew 9.

The open issue, though, was what would they do if there were a need to evacuate the ISS between the departure of Starliner and the arrival of Crew 9? Their space suits were built for Starliner, and not directly compatible with Dragon. Both astronauts had Dragon spacesuits, but on Earth (as they had both been part of the Dragon development program prior to being reassigned to Starliner.) Once Starliner undocked from ISS, there would only be one US crew vehicle docked, SpaceX Crew 8, and the docked Soyuz module already had a full complement of 3 cosmonauts on board who depended on it.

NASA’s decision to avoid the risks

associated with Starliner had created new risks of its own. Crew 8's cargo area was reconfigured to allow Wilmore and Williams to lay on top of cargo packages, where they would be held in place by cargo straps in a modified configuration. As the Starliner space suits were incompatible with the Dragon, Wilmore and Williams would not have had any protection against a loss of cabin pressure during an emergency return.

Per NASA commercial crew manager Steve Stich on September 6th: "So in a temporary situation, we would not have suits for Butch and Suni on Dragon."

From the departure of Starliner on Spetember 6thm until the arrival of Crew 9, Butch and Suni were dependent on a very risky emergency lifeboat plan. For 23 days, their only ride home was in shirtsleeves lying on cargo containers with cargo straps to hold them down.

The Mission Grows Longer

Crew 9 Original Planned Crew. Mission Specialist Stephanie Wilson, at left, and Commander Zena Cardman, at right, were taken off the flight to make room for the return of Butch and Suni. NASA

When the Crew 9 capsule arrived on October 29th, 2024, it carried Dragon compatible space suits for both Butch & Suni. These were test fitted and checked out 3 days later on the 1st.

Return of Crew 9 was originally planned for February, but by December it became clear that the capsule for the relief crew, SpaceX's Crew 10, would be delayed. This capsule was a brand new Dragon capsule, tail number C213, being manufactured and tested for the Crew 10 flight.

Initially the flight was delayed from February to March. But as problems persisted, in February 2025 NASA and SpaceX chose to substitute the flight proven capsule C207 *Endurance* for the delayed C213 to avoid further launch delays that would extend Butch and Suni's time in orbit even more.

Once Crew-10 was stacked for a launch planned on March 12th, hydraulic issues delayed the launch two more days, until March 14th.

Handoff

SpaceX Crew 10 Capsule C207 *Endurance* Docked to the ISS, March 16th, 2025

Typically, ISS crews are given about one week of overlap on board the ISS to hand off the work on board. Ongoing experiments, station issues being worked or monitored, and other information are exchanged with the new crew during this time, making this overlap time a valuable part of bringing a new crew up to speed.

However, yet another issue had impacted ISS operations--the Cygnus supply capsule planned for launch in June 2025 had been dropped in transit between its construction and launch facilities, with damage to the container in which it was shipped. To date, the craft itself is being assessed for damage. But with the possibility of a delayed launch of supplies, NASA decided to shorten the handover between the Crew 9 and Crew 10 astronauts to reduce the amount of supplies used on the ISS in case of delays to supply delivery. Originally the handover period had been planned for 3 days, but delays to Crew 10's launch reduced this to only a day with the expectation that ground controllers would work with the new crew to assist them in coming up to speed.

A Cygnus Cargo Capsule Being Prepared for Launch at Wallops Island's MARS Complex. Northrop Grumman image

Finally, on March 17th SpaceX Crew-9 detached from the ISS, and it returned to splashdown off the coast of Talahassee,Florida on March 18th. A pod of dolphins was on hand exploring the capsule as recovery crews from the recovery craft *Megan* secured the capsule and hoisted it onboard. Shortly thereafter the crew was extracted from the capsule, given initial medical checks, then flown to Houston for further medical assessment and to be reunited with their families.

Butch Wilmore and Sunita Williams spent 286 days in space during this flight. Nick Hague and Aleksandr Gorbunov were in space for 171 days. As is normal for long duration stays in freefall, physical therapy and a period of reacclimatization will be necessary for Butch & Suni. This process can take weeks.

Long Duration Flights

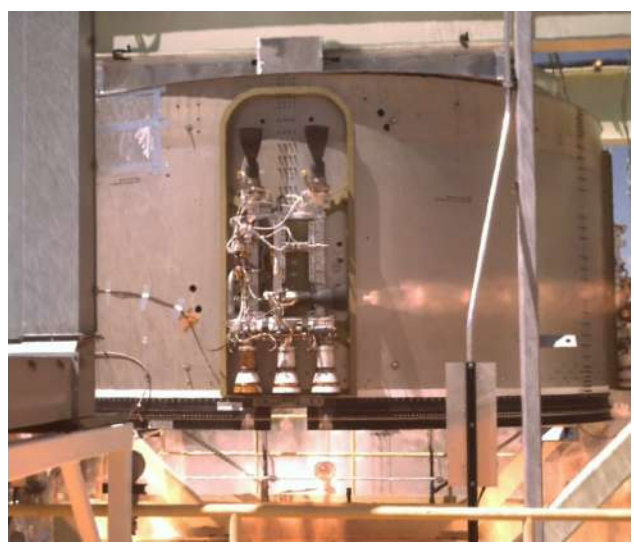
U.S. Long Duration Flight Record-Holder Frank Rubio, 371 Days. NASA image

Butch and Suni's long stay aboard the ISS has been exceeded by 7 other astronauts:

Peggy Whitson, 289 days.
Christina Koch, 328 days.
Mikhail Kornienko, 340 days.
Scott Kelly, 340 days.
Piotr Dubrov, 355 days.
Mark Vande Hei, 355 days.
Frank Rubio, 371 days.

The longest human spaceflight ever is Valeri Polyakov's 437 days, on Mir simulating a Mars mission.

Starliner's Future



Starliner Engine Cluster Test. Boeing image.

NASA remains committed to having dissimilar redundancy in its human spaceflight program, and is working with Boeing to fix all the issues observed on the Starliner capsule during its Crewed Flight Test. To date, NASA says that about 70% of all issues have been resolved, and that Boeing will be conducting thruster tests in the summer heat of White Sands, New Mexico, to recreate the conditions of the thermal shutdowns seen in flight (and during a single ground test last year.) They will be testing changes to the the4mal protection for the engines.

NASA is expecting to conduct another test of the Boeing Starliner in space, possibly before the end of 2025. They will wait until the engine test results before they decide whether the next flight will carry a test crew on board or not.

More information on current Starliner status is available on NASA's Commercial Crew blog: [NASA, Boeing Prepare for Starliner Testing]

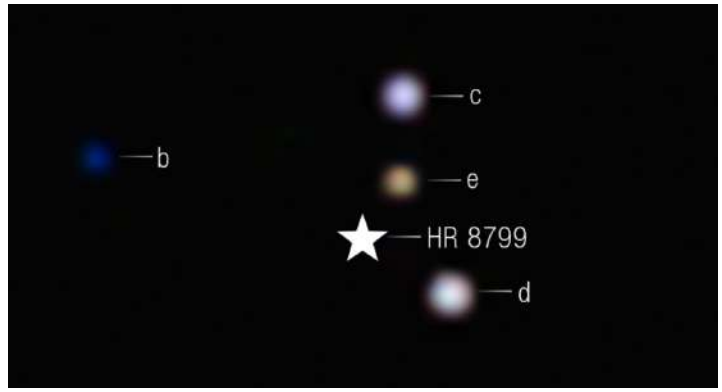
[Boeing Starliner astronauts on the ISS set the story straight: 'We don't feel stranded' | Space]

Boeing's Starliner Approaches ISS during OFT-2 NASA image

JWST Images Exoplanets, Detects CO2

The James Webb Space Telescope has directly imaged 4 gas giant planets in a solar system 130 light years away. The JWST is equipped with an instrument capable of blocking out the light of a star to allow imaging of the relatively dim planets in other star systems.

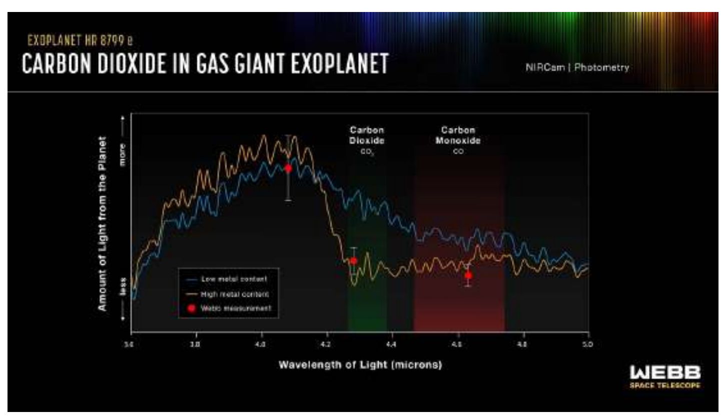
The atmospheres of the young planets orbiting star HR 8799 show the presence of carbon dioxide, which indicates the presence of heavier elements such as carbon, oxygen, and iron in their atmospheres, which is evidence that the planets formed through a process known as core accretion.



4 Planets, 130 LY Away. Direct image by JWST's NIRCAM instrument. Their host star is blocked out, its location marked by the star. ESA/NASA.

Core accretion is the method by which Jupiter is believed to have formed in our own solar system. In core accretion, a solid core of heavy elements forms first, then as it grows it attracts and retains gasses as an atmosphere. Seeing predicted characteristics of this process in a newly-formed solar system outside our own is an important point of confirmation for the theory.

[Webb images young, giant exoplanets, detects carbon dioxide]



Spectrum of HR 8799 e showing absorption of heavy molecules relative to a best fit model of a low metallicity planet (blue). ESA image.

IN THE SKY THIS MONTH

Also refer to the sky map on the last page.

The Moon:

1st Quarter, April 4th
Full Moon, April 12th
Last Quarter, April 20th
New Moon, April 27th
1st Quarter, May 4th

The Lyrid Meteor Shower spans April 14th to 30th this month, peaking on April 22nd. Any time during this period is a good time to view the Lyrids, especially with no Moon. The radiant point for the Lyrids rises about 10pm, making it especially good for evening viewing--most showers are best viewed after midnight. The maximum rate at peak is estimated to be 18 per hour, about 1 per 3 minutes.

Lyrid meteors shoot rapidly across the sky, appearing to come from between Lyra and Hercules. Look for bright star Vega, part of the Summer Triangle. They will appear around this area, appearing to shoot away from it.

Lyrid meteors will commonly reach 2nd magnitude in brightness. Occasionally one will become a bright fireball, flashing with sudden brightness, casting shadows, and leaving a smoky-looking trail.

The Lyrid shower has had sudden increases in its rate. One outburst, in 687 B.C. made the Lyrids the oldest documented meteor shower that is currently seen. Chinese astronomers recorded meteors fell like rain, and were so bright that fixed stars were invisible.

Mercury is in our morning sky this month, at greatest elongation on the 21st, 27 degrees ahead of the sun, rising shortly before 6am. It will be in a good position to view all month, and most of May, even as the Sun begins to rise earlier and earlier. Venus and Saturn precede it into the sky, making for a nice planetary triplet for early risers! Look for its **conjuction with Saturn** on the 10th and 11th!

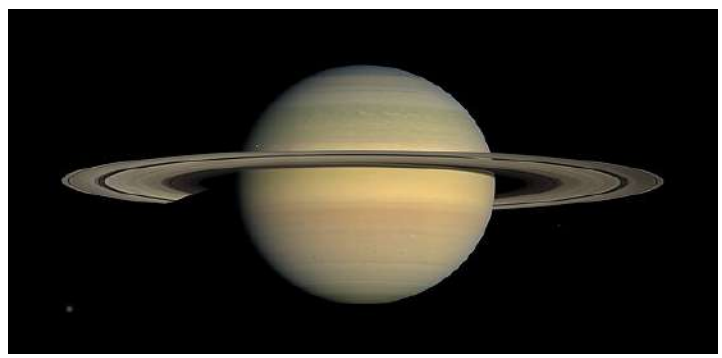
Mercury online viewing chart:
https://in-the-sky.org//data/object.php?id=P1

Venus has moved from an evening star to a morning star, along with Mercury. Rising a little after 6am on the 1st, it rises earlier each day through the month, placing it higher in the sky at any given time before sunrise. It and **Saturn approach a conjunction** at the end of the month!

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

Saturn is the third member of the morning planet trio. Its rings are still nearly edge-on to us, and will begin to open up as the month progresses. There's a second sight to see with Saturn's rings: **Saturn Equinox**. On May 6th, Saturn's rings will be edge-on to the Sun, which means that there will be no ring shadow on Saturn's surface! Stay prepared for this once every ~15 years event!

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



Saturn During Equinox, Cassini Spacecraft Image, 2009. NASA.

The Morning Triplet, April 11th, 6:15am.

Mars is high in our evening sky all month this month, at magnitude 1. It forms a line with Castor and Pollux early this month from the 6th to the 12th or so.

Mars is 8 arcsec across at the start of the month, and shrinks to 6.6 arcsec at the end of the month.

To see what features are visible at any time, you can use the virtual Mars globe at: [MarsMap]

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

Jupiter begins its descent toward the western horizon after a beautiful show this year. At magnitude -2 it will be the brightest starlike object in the evening sky. It starts the month at 36 arcsec across, decreasing only slightly to 34 arcsec at month's end. So the show isn't over yet.

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

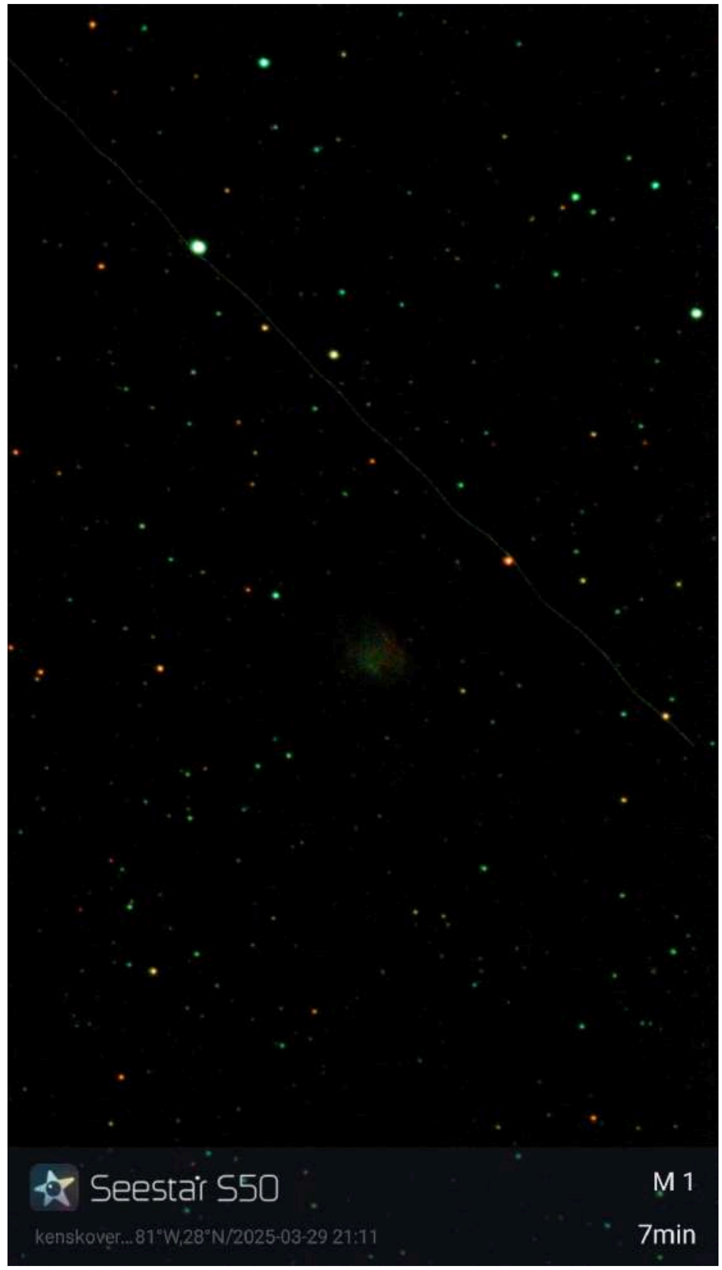
Astronomical League Jupiter Observing Program: [Jupiter Observing Program - Astronomical League]

Astronomical League Solar System Observing Program: [Solar System Observing Program - Astronomical League]

Deep Sky This Month

We are in the changeover from the winter skies to summer skies, with the spring skies in between. Enjoy your last chance to see Orion, Taurus, Gemini, Auriga, and Canis Major before their return to the evening sky late this fall.

The Crab Nebula is the cloudy-looking object that inspired comet hunter Charles Messier to create a list of things that he kept mistaking for comets. After "discovering" if for the third time, and realizing he'd already made the mistake of thinking it was a comet for the third time, he and fellow comet hunter Pierre Mechain started making a list of cloudy-looking objects to not mistake for a comet. Now known as Messier 1 or M1, the Crab Nebula is a good object near one of Taurus' horn tips for telescope or smart scope. It's a challenging object in binoculars, but possible with careful observation.



A short exposure image of The Crab Nebula by member Ken Katta, which happened to catch a tumbling satellite in the field of view.

The rise of Leo, Coma Berenices, and Virgo earlier in the evening heralds the beginning of Galaxy Season for deep sky observers. The Coma Cluster and Virgo cluster give many galaxies in view simultaneously. And for once, our so-so observing conditions actually have an advantage over dark skies! It's easier to learn which galaxy is which under suburban skies, because in dark sites you see too many background galaxies!

And let's not forget the Leo Triplet:

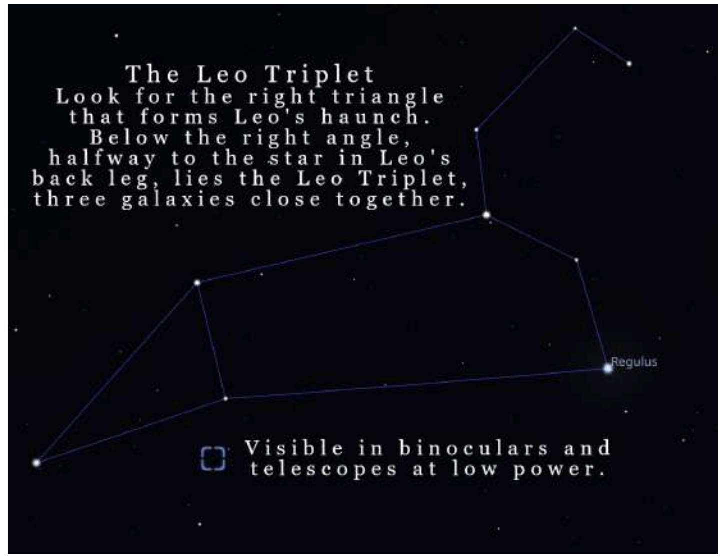
Leo Triplet, galaxies M65, M66, and NGC 3628 by member John Harper.

Recommended AL Observing Programs:

[Binocular Messier Observing Program - Astronomical League]

[Messier Observing Program - Astronomical League]

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



Finding the Leo Triplet

Club Calendar

Special events by The Villages Astronomy Club

Events not hosted by The Villages Astronomy Club

Notable dates with no event planned.

April 2025

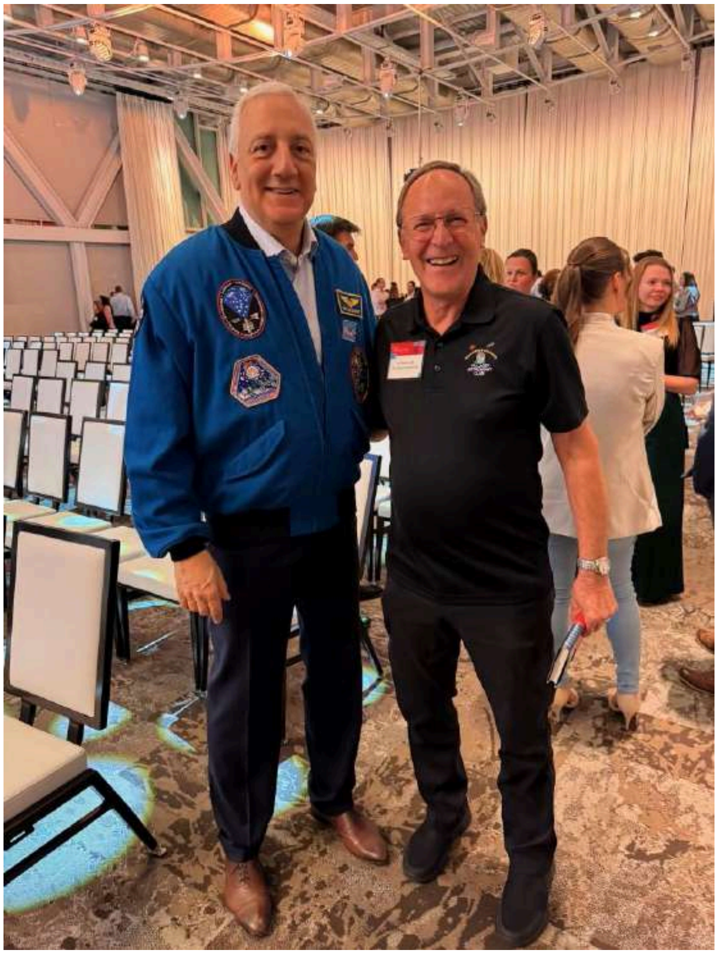
4 Exec Meeting 11am Fishhawk Rec Center
7 Space Academy 6:30, Telescope Workshop 8pm
15 General Meeting, High Energy Physics in Space by Toni Graybill,
19 Fruitland Park Observing, 5pm, 300 Shiloh St. Fruitland Park
22 Lyrid Shower Peak @9pm, runs from 16-25th.
30 EAA Meeting, Homestead Astronomy Park, 7:30pm

May 2025

2 Exec Meeting 11am Fishhawk Rec Center
3 Official Astro League Astronomy Day, 3 day Moon 43% waxing crescent, rises 12:03pm, setup 11, event 12-3, close by 4.
5 Space Academy 6:30pm, Telescope Workshop 8pm
6 Saturn Equinox
17 Fruitland Park Observing, 5pm, 300 Shiloh St. Fruitland Park
20 General Meeting 6:30pm, Pauline Schwartz, Subject TBA
28 EAA Meeting, Homestead Astronomy Park, 7:45pm

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

Meeting an Astronaut

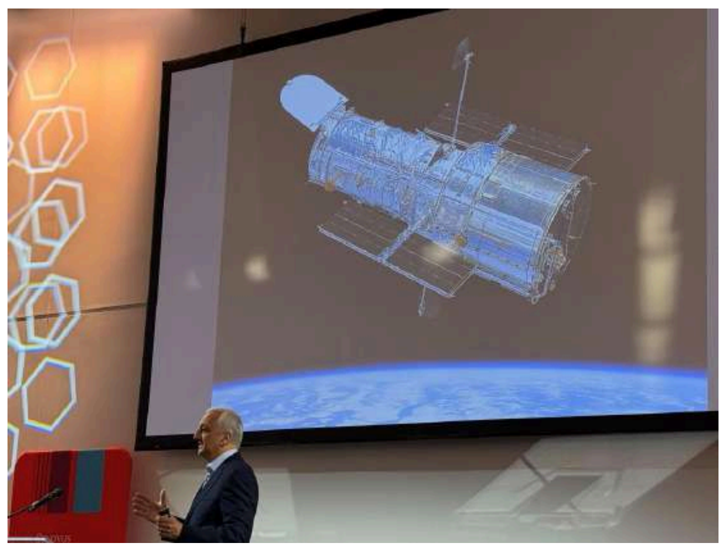


Member Jeff Kahler, Sr. recently attended an event that featured astronaut Mike Massimino as keynote speaker. Jeff got to meet “Mass” personally, and get signed copies of his book!

A veteran of two space flights, (STS-109 in March 2002 and STS-125 in May 2009) Massimino has logged a total of 571 hours and 47 minutes in space, and a cumulative total of 30 hours and 4 minutes of spacewalking in four spacewalks.

STS-109 was the fourth Hubble Space Telescope servicing mission. The crew of STS-109 successfully upgraded the Hubble Space Telescope leaving it with a new power unit, a new camera (the Advanced Camera for Surveys), and new solar arrays. STS-109 set a record for spacewalk time with 35 hours and 55 minutes during 5 spacewalks. Massimino performed 2 spacewalks totaling 14 hours and 46 minutes. STS-109 orbited the Earth 165 times, and covered 4.5 million statute miles in over 262 hours and 10 minutes.

STS-125 was the fifth and final Hubble servicing mission. The 19 year old telescope spent six days in the Shuttle’s cargo bay undergoing an overhaul conducted by four spacewalkers over five daily spacewalks, with the assistance of crewmates inside the Atlantis. The space walkers overcame frozen bolts, stripped screws, and stuck handrails. STS-125 set a new record for spacewalking with 36 hours and 56 minutes during five spacewalks. Massimino performed 2 spacewalks totaling 15 hours and 58 minutes. The refurbished Hubble Telescope now has four new or rejuvenated scientific instruments, new batteries, new gyroscopes, and a new computer. The STS-125 mission traveled 5,276,000 miles in 197 Earth orbits and was accomplished in 309 hours, 37 minutes and 9 seconds.



Among the anecdotes from Mass’s speech was recalling the tension when a stripped screw prevented a handle from being removed from the Hubble during its servicing. The entire service mission depended on getting the handle out of the way so that the telescope’s equipment bay could be opened.

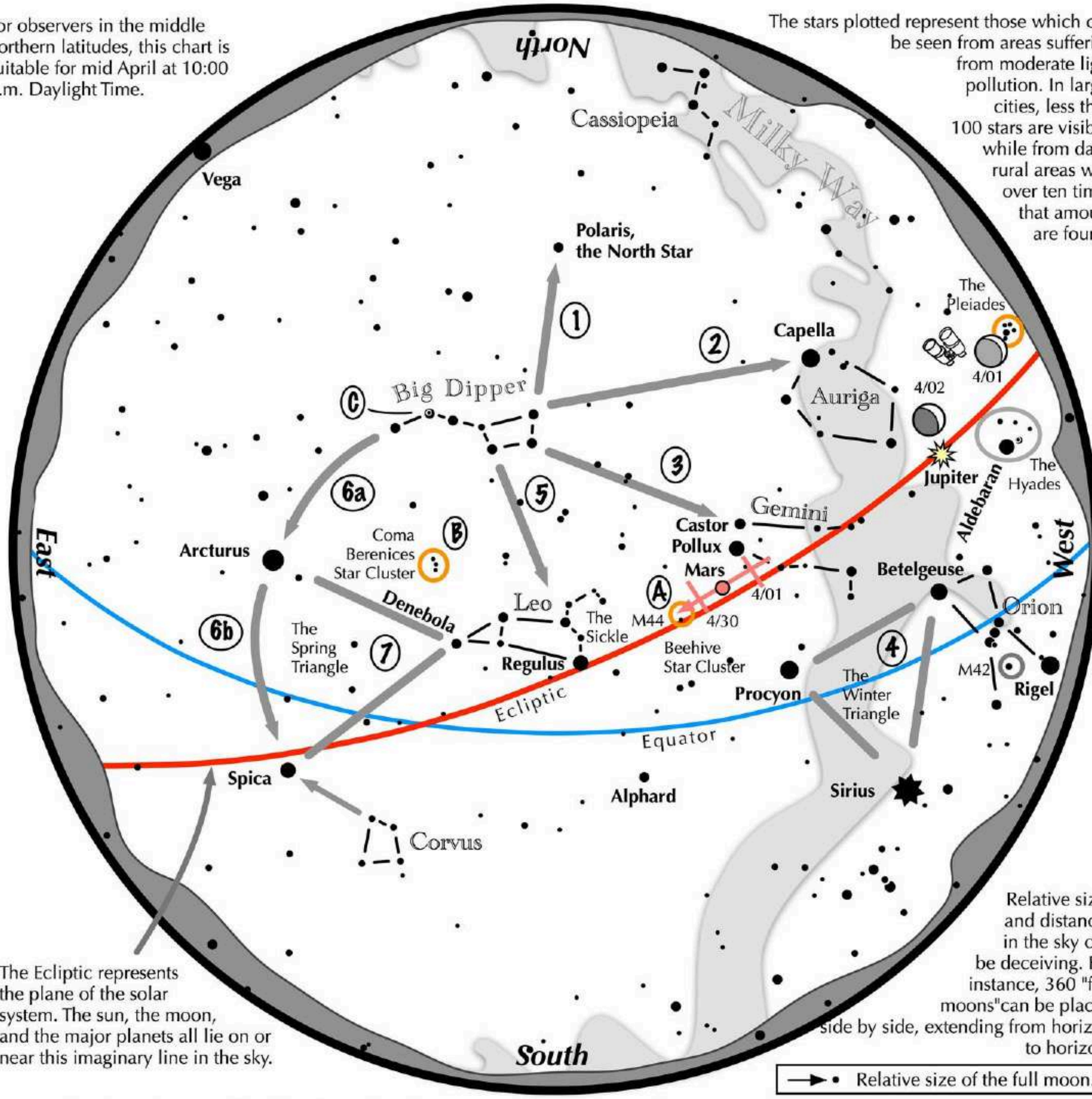
After some consultation on the ground with engineers, Mass was directed to snap off the handle, which he managed “handily.”

See Monthly Sky Chart Next Page

Navigating the April Night Sky, Northern Hemisphere

For observers in the middle northern latitudes, this chart is suitable for mid April at 10:00 p.m. Daylight Time.

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 April night sky: Simply start with what you know or with what you can easily find.

1. Extend an imaginary line north from the two stars at the tip of the Big Dipper's bowl. It passes Polaris, the North Star.
2. Draw another imaginary line west across the top two stars of the Dipper's bowl. It strikes Capella low in the northwest.
3. Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
4. Look in the west-southwest for the bright Winter Triangle stars of Sirius, Procyon, and Betelgeuse.
5. Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
6. Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.
7. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.

Binocular Highlights

A: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.
B: Look nearly overhead for the loose star cluster of Coma Berenices.
C: In the Big Dipper's handle shines Mizar next to a dimmer star, Alcor.

Astronomical League
www.astroleague.org