Volume 51 Number 8 August 2025

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Coming Events

Monthly Meeting
August 24, 2025, 7:00PM
Baker Wetlands Discovery Center

Public Observing
August 24, 2025, 8:00PM
Baker Wetlands Discovery Center

Club Officers

President
Rick Heschmeyer email

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Inside This Issue

Report From the Officers

By Rick Heschmeyer

It seems like we have alternated between heavy rain and unbearable heat this past month. As a result, observing has been difficult. We had one more event scheduled this summer, at the Field Station on Friday, July 11, starting at 9PM, with a rain date of the following night. Both nights were cancelled due to clouds and/or rain. As had been mentioned in emails we were expecting a big crowd but the number of RSVP's that were received by the Field Station was incredible. Over 100 people were planning on attending!

As a result of this interest, we have scheduled two more events at the KU Field Station this fall. The first is scheduled for Friday, September 5th at 8:30PM and Friday, October 3 at 8:00 PM. A rain date is scheduled for the following Saturday evenings in the event of inclement weather. We fully expect that attendance will be around 100 for each event, so we will desperately need as much help as possible. Even if you don't have a telescope, we need your help. Drop me a note if you what to assist.

Our next Monthly Club Meeting will take place on Sunday, August 24, 2025, at 7:00 PM at the Baker Wetlands Discovery Center. The presentation will be a talk about the Astronomical League's AstroCon 2025, which I attended in Bryce Canyon, Utah in June. It will be followed by public telescope observing at 8PM, weather permitting.

NOTE: In several places the date for the August Club Meeting was announced as August 31, but since that is during the Labor Day weekend, the date was updated to the current August 24. If you have marked your calendar for the 31st please change it now.

The nights for KU's Public Telescope Nights have been announced. They are September 11, October 9, November 6th and December 11th (all Thursdays). More information can be found at this link.

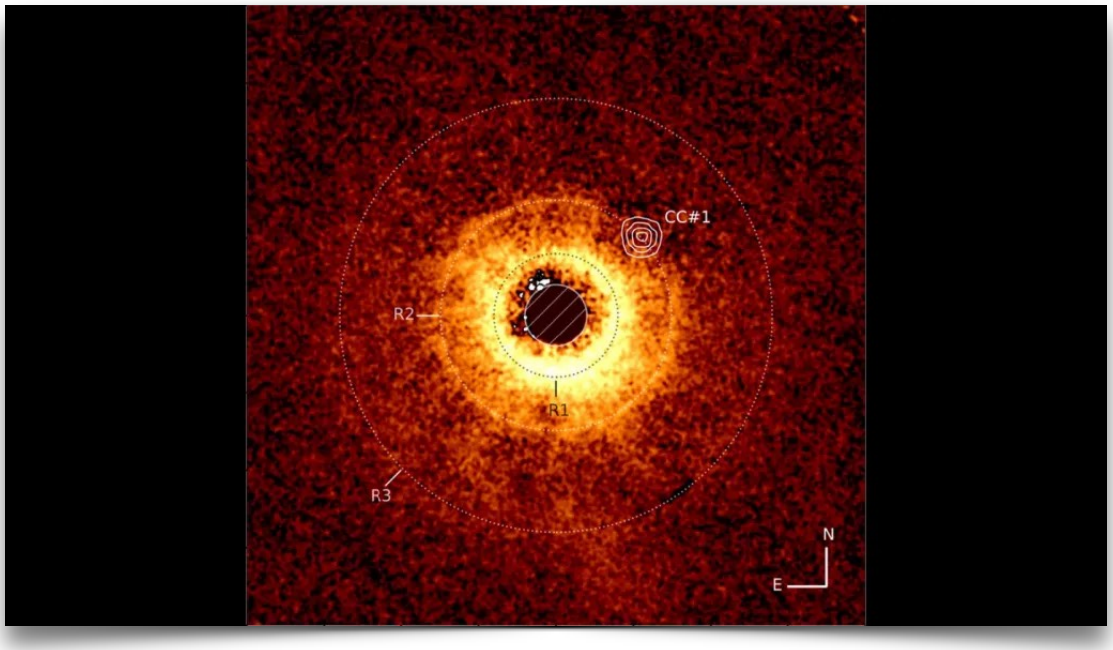
Looking forward to seeing everyone at our upcoming events.

Clear Skies!

In a first, the Webb telescope found a planet by actually ‘seeing’ it

JWST discovered the Saturn-sized world orbiting a young star 111 light-years away

By Adam Mann
Sciencenews, JUNE 25, 2025



Astronomers used the James Webb Space Telescope to directly image a new exoplanet — represented by CC#1 in the image — within the three-ring debris disk surrounding the star TWA 7.

For the first time ever, the James Webb Space Telescope has discovered an exoplanet by directly imaging it. The newfound world has a mass roughly similar to Saturn and orbits inside the debris disk surrounding a young star named TWA 7, researchers report June 25 in Nature.

JWST has previously discovered more than 100 planets, mostly through the transit method, in which the telescope watches an exoplanet pass in front of its parent star, causing a brief dimming in the star’s light. Direct imaging — capturing a photo of a star-orbiting exoplanet — is a far more challenging task.

“The basic problem is that the star is bright and the planet is very faint,” says Anne-Marie Lagrange, an astrophysicist at the French National Center for Scientific Research in Paris.

This means that starlight usually outshines any tiny exoplanet companions, making them nearly impossible to spot. But like some other space-based telescopes, JWST is equipped with a coronagraph that can block out a star’s light to help reveal objects surrounding it.

Lagrange and her colleagues decided to focus on young stars that could be seen pole-on, essentially giving a bird’s-eye view into the systems. They chose newly formed stars still surrounded by a dusty disk of debris because gaps in such disks represented places where exoplanets could potentially hide, though those gaps can also be created by magnetic fields or pressure changes within the disk.

Located around 111 light-years away, the 6.4-million-year-old TWA 7 star was already known to have three distinct rings within its debris disk. When JWST stared at the system in June 2024, it spotted a faint object that could be an exoplanet in a gap between the first and second ring. The object might also have been a background galaxy, but the team calculated that the odds of that were around 0.34 percent.

The potential planet orbits roughly 52 times farther from its star than Earth is from the sun, and has a mass about one-third that of Jupiter’s. Simulations of such an exoplanet in a dusty disk around a star produced images closely matching those from JWST. “This was really why we were confident that there was a planet,” Lagrange says.

She believes that the finding could help astronomers discover other similar worlds using JWST. ☀

A Closer Look At Uranus's Moons Reveals a Surprising Dark Side

Using Hubble telescope, scientists found the planet's four largest moons contradict existing data.

By Passant Rabie

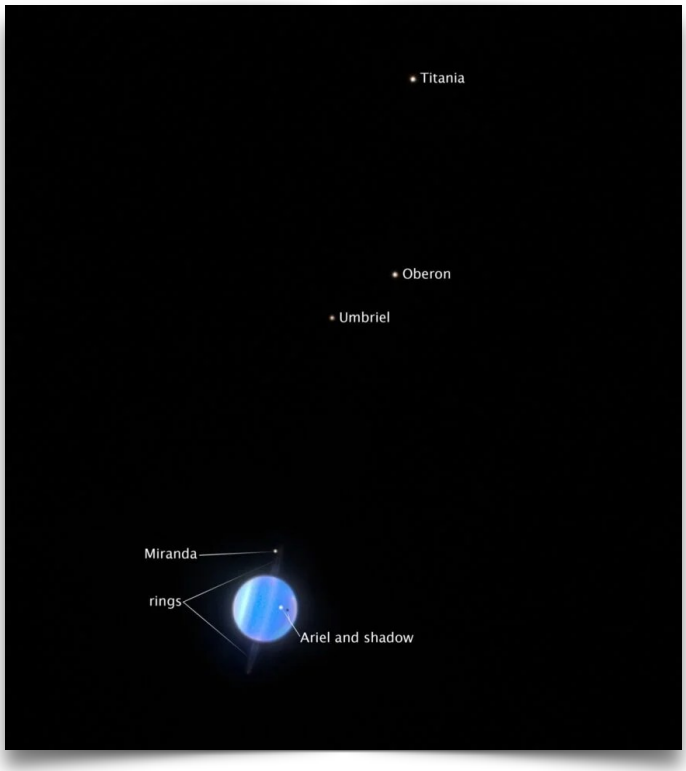
Gizmodo, June 16, 2025

The five largest moons of Uranus appear in a jagged, roughly diagonal line from top right to bottom left.

The moons that orbit Uranus are already known to have unusual characteristics: some are heavily cratered, others have tectonic features or a patchwork of ridges and cliffs. Using the Hubble space telescope, scientists took a closer look at the surface of Uranus's four largest moons and discovered something rather unexpected.

For the study, a team of astronomers went searching for signs of interactions between Uranus's magnetic field and its four largest moons: Ariel, Umbriel, Titania, and Oberon. The moons, all named after characters from the works of William Shakespeare, are all tidally locked. That means one side of the moon, the leading side, is always facing the planet, while the other one, the trailing side, always facing away from Uranus. Scientists had long assumed that the leading side would be brighter, while the trailing side would appear darker. Instead, they found it to be quite the opposite, discovering clear evidence for the darkening of the leading sides of the outer moons.

The findings, presented this week at the 246th American Astronomical Society meeting, held in Anchorage, Alaska, indicate that Uranus' magnetosphere might not interact much with its large moons, despite previous data suggesting otherwise.



"Uranus is weird, so it's always been uncertain how much the magnetic field actually interacts with its satellites," Richard Cartwright, a researcher at the Johns Hopkins University's Applied Physics Laboratory, and principal investigator behind the new study, said in a statement.

The ice giant is indeed a certified weirdo. Uranus is tilted 98 degrees, making it the only planet in the solar system with an equator nearly at a right angle to its orbit. A single day on Uranus is around 17 hours, the amount of time it takes for the planet to rotate on its axis. The planet completes one orbit around the Sun every 84 Earth years. "At the time of the Voyager 2 flyby [in 1986], the magnetosphere of Uranus was tilted by about 59 degrees from the orbital plane of the satellites," Cartwright explained. "So, there's an additional tilt to the magnetic field."

Uranus and its magnetic field lines rotate faster than its moons orbit the planet, causing the magnetic field lines to constantly sweep past the moons. As a result, scientists believed that charged particles from the planet's magnetic field, or magnetosphere, should hit the surface of the trailing sides of the moons. Those charged particles would accumulate on the moons'

trailing sides, scattering radiation and thereby making them appear darker on the side that's facing away from Uranus.

Using Hubble's ultraviolet capabilities, the scientists behind the study found that the leading and trailing hemispheres of Ariel and Umbriel are actually very similar in brightness. For Titania and Oberon, it was the opposite of what they expected. The leading hemispheres of the two outer moons were darker and redder compared to their trailing hemispheres.

The team of scientists came up with an explanation for the strange phenomenon. Uranus's irregular moons, small distant bodies with eccentric orbits, are constantly being hit by micrometeorites and ejecting some of that material into orbit around the planet. Over millions of years, that material moves inward toward the orbits of Titania and Oberon.

As the moons orbit Uranus, they pick up the dust "much like bugs hitting the windshield of your car as you drive down a highway," according to a statement by the Space Telescope Science Institute. All that build-up might be what's causing Titania and Oberon to appear darker and redder. "So that supports a different explanation," Cartwright said. "That's dust collection. I didn't even expect to get into that hypothesis, but you know, data always surprise you."

As for the two other moons, Ariel and Umbriel, it may be that Uranus's magnetosphere does interact with them but not in a way that's resulting in a bright and dark side. The recent discovery adds more mystery to Uranus and its system. ☀

Record-Setting Dark Matter Detector Comes Up Empty—and That's Good News

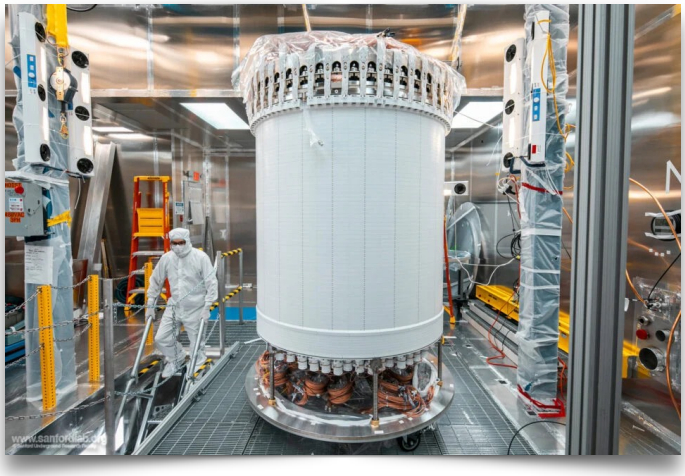
LUX-ZEPLIN's latest result sets the most stringent limit on WIMPs' interaction strength to date.

By Gayoung Lee

Gizmodo, July 8, 2025

WIMPs (weakly interacting massive particles) are one of the most serious contenders for dark matter—the "missing" mass supposedly constituting 85% of our universe. Given its elusiveness, dark matter tests the patience and creativity of physicists. But the latest results from LUX-ZEPLIN (LZ), the South Dakota-based detector, may have brought scientists a small step closer to catching WIMPs in action.

In a recent Physical Review Letters paper, scientists analyzed 280 days' worth of data from LUX-ZEPLIN, reporting the tightest ever upper limit on the interaction strength of WIMPs. The result—a near fivefold improvement—demonstrates how physicists are increasingly getting better at circumventing the problem that dark matter is, well, *dark*; the elusive stuff evades any detection method that depends on materials interacting with visible light or other types of radiation.



There's ample evidence to suggest that dark matter does in fact exist, including numerous astrophysical observations hinting at some invisible matter exerting gravitational force on objects we *can* see. Physicists, as a result, tend to use materials that we can see, such as liquid forms of heavyweight elements like xenon, and simply wait for some unknown particle to interact with it. That strategy—waiting for particles to interact with heavy elements—is a well-tested approach for detecting WIMPs, hypothetical particles that interact with gravity but on a scale so tiny that only the most sensitive detectors might catch a glimpse.

The LUX-ZEPLIN experiment, located one mile underground in a decommissioned South Dakota gold mine, employs nearly 15,000 pounds (7 tons) of liquid xenon. The chemical element's high atomic mass and density make it potentially easier for scientists to detect any unknown particles that may pass through the detector. Also, liquid xenon is transparent, preventing any unwanted noise—usually arising from

radioactive matter around the detector—from spoiling an experiment.

“If you think of the search for dark matter like looking for buried treasure, we’ve dug almost five times deeper than anyone else has in the past,” said Scott Kravitz, a physicist at the University of Texas at Austin and deputy coordinator for LZ, in a press release. “That’s something you don’t do with a million shovels—you do it by inventing a new tool.”

“These results firmly establish that LZ is the world’s most sensitive search for dark matter heavier than 10 GeV, that’s about 10 times heavier than a proton,” explained Scott Haselschwart, a physicist at the University of Michigan and LZ physics coordinator, in an email to Gizmodo. “To put our result in perspective: we have ruled out dark matter that would interact only once in a single kilogram of xenon every four millennia!”

The latest experiment also represents the first time the LZ team applied a technique called “salting,” in which false WIMP signals were added in advance. This helped the researchers—who, of course, would love to find dark matter—avoid bias and stay skeptical of potentially promising signals.

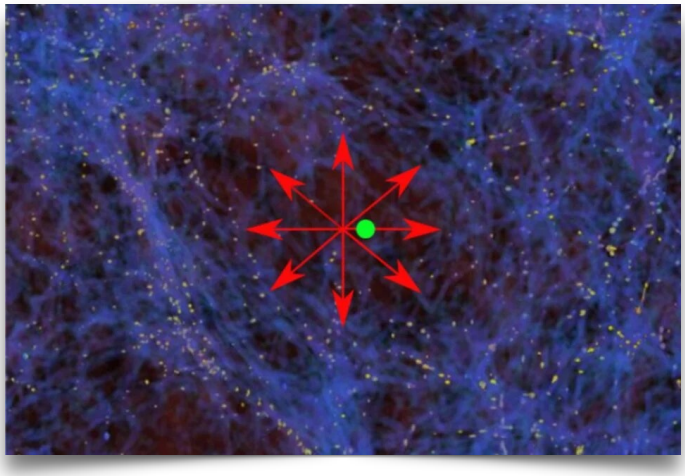
“There’s a human tendency to want to see patterns in data, so it’s really important when you enter this new regime that no bias wanders in,” said Haselschwart in the same release. “If you make a discovery, you want to get it right.”

The next steps for the LZ experiment are to continue pressing against the upper limit for WIMPs and utilize the detector’s cutting-edge technology to probe other interesting and rare physics processes, explained Amy Cottle, a physicist at University College London also involved with LZ, in the statement.

“LZ is the most sensitive search for WIMP dark matter to date, but we still have another two years of data to collect,” Haselschwart wrote to Gizmodo. “This means that a discovery of dark matter in LZ could come anytime now. We are truly looking for dark matter where no one has ever looked before and that is extremely exciting!” ☀

New Research Bolsters Freaky Theory That Earth Sits in a Giant Cosmic Void

This theory could finally solve one of the biggest mysteries in cosmology.



By Ellyn Lapointe

Gizmodo, July 8, 2025

Images of the cosmos, such as the James Webb Space Telescope’s deep space snapshot, make space look chock-full of stuff. In the grand scheme of things, it is, but all those stars, galaxies, planets, and other celestial objects may not be as uniformly distributed as photos make them look.

The fact is, space is likely peppered with bubbles of relative emptiness, and some astronomers believe we’re sitting inside of one. A growing body of evidence suggests that our entire Milky Way galaxy is located within an enormous cosmic void. Most recently, researchers found that sound waves from the early universe—essentially the sound of the Big Bang—support this idea. This work, led by Indranil Banik, a cosmologist at the University of Portsmouth, proposes a solution for the Hubble tension: one of the biggest mysteries in the universe.

Banik and his colleagues published their findings in the journal Monthly Notices of the Royal Astronomical Society in May. He has been working on the Hubble tension for the past five years. This puzzling cosmological problem stems from two differing values calculated for the Hubble constant, which represents the expansion rate of today’s universe.

"The Hubble tension is a mismatch between the rate at which we expect the universe to be expanding—based on extrapolating observations of the infant universe forward to today, using the standard cosmological model—and the rate at which we actually observe it to be expanding when we look at the nearby universe," Banik told Gizmodo. "It's really a mismatch between theory and observations."

Basically, galaxies and stars in the local, more recent universe appear to be moving away faster than the Hubble constant predicts. This defies the standard cosmological model, which describes how the universe grows and evolves. It also throws the age of the universe into question, as astronomers need the Hubble constant to extrapolate how much time has passed since the Big Bang.

Banik believes the local void theory can offer a solution. If our galaxy is located inside a bubble of relatively empty space, gravity would pull nearby matter toward the higher density exterior of the void, he explained in a Royal Astronomical Society statement. As the void empties out, the velocity of objects moving away from us would be larger than if the void were not there, thus giving the appearance of a faster local expansion rate, Banik said.

For this to make sense, our solar system would need to be near the center of a void about two billion light-years wide with a density about 20% lower than the average density of the universe (to be clear, a void isn't just empty space—it's a region of the universe with fewer galaxies and less matter than average). This theoretical low-density region has become known as the KBC void.

Multiple studies have supported its existence, including several authored by Banik. Still, the local void theory remains controversial because the void doesn't fit with the standard model of cosmology, which states that the matter that makes up today's universe should be more uniformly spread out on such large scales. The KBC void "is too large and too deep for the standard model of cosmology, where the chance of us randomly finding ourselves in such a void is about one in a billion," Banik told Gizmodo. "So we would need to adjust the model such that structure on scales [larger than] about one hundred million light-years grows faster than the model predicts."

His most recent study looked at baryon acoustic oscillations (BAOs). These are a pattern of wrinkles in the density distribution of galaxy clusters spread across the universe. Banik likened them to sound waves from the Big Bang. BAOs provide an independent way to measure the expansion rate of the universe and how fast that rate has changed throughout cosmic history. These "sound waves" act as a sort of standard ruler, and astronomers can use the ruler's angular size to chart the history of cosmic expansion, according to Banik.

He and his colleagues considered all available BAO measurements over the last 20 years. Their work showed that a local void model is about one hundred million times more likely than a standard cosmological model without a local void.

This is strong evidence to suggest that we are, indeed, living inside a cosmic void, but it isn't definitive proof. Banik is also working with supernovae data to investigate one of the main pitfalls of the local void theory. "Any kind of local or late-time solution to the Hubble tension implies that in the more distant universe, there wasn't a Hubble tension," he explained. "Supernovae data seem to suggest that the Hubble tension actually does persist out to higher redshift."

If he can find evidence to show that the Hubble tension disappears beyond the local universe, that would be a breakthrough for the local void theory. For now, though, this cosmic conundrum will remain unresolved. ☀

Scientists Discover Uranus Has a Dancing Partner

By Mark Thompson

UNIVERSETODAY, JULY 11,2025

In the vast expanse between Uranus and Neptune, a team of researchers have uncovered something really quite extraordinary, a minor planet that has been locked in precise gravitational manouevres with Uranus for at least a million years. This discovery sheds new light on the complex dynamics that govern our Solar System's outer reaches.

The object in question, designated 2015 OU_{194}, belongs to a class of small bodies called Centaurs, rocky and icy objects that orbit between Jupiter and

Neptune. What makes this particular Centaur special is its remarkably stable relationship with Uranus, locked in what is known as a 3:4 mean motion resonance. This means that for every three orbits 2015 OU_{194} completes around the Sun, Uranus completes exactly four. This precise mathematical relationship creates a gravitational partnership that keeps the two objects in a stable dance, preventing them from colliding or drifting apart.

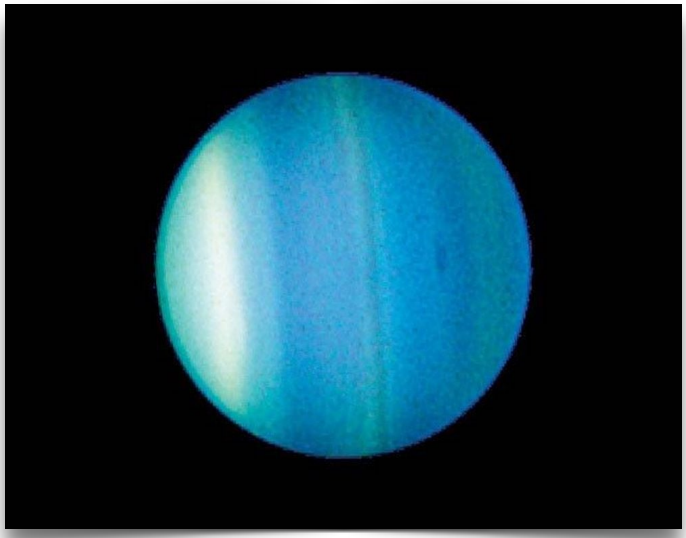
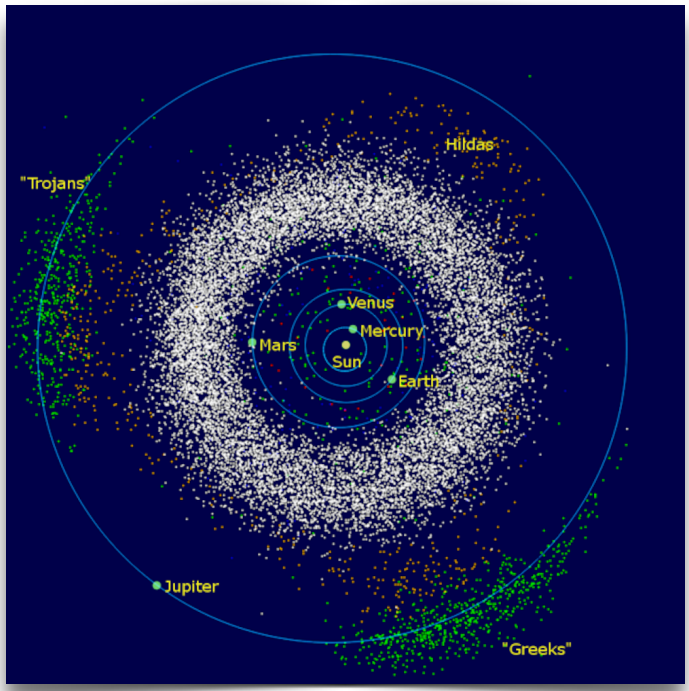


Image of Uranus from the Hubble Space Telescope shows bands and a new dark spot in Uranus' atmosphere.

The discovery came about through detective work with archival observations. Researchers led by Daniel Bamberger from the Northolt Branch Observatories in Germany, located additional observations of 2015 OU_{194} from 2017 and 2018, extending the object's data points from just one year to 3.5 years. This longer observation period was crucial for understanding the object's true orbital behavior.

Computer simulations revealed the remarkable stability of this relationship. The resonance has remained stable for at least 1,000 years in the past, probably even 1 million years and is predicted to continue for another 500,000 years into the future. This longevity suggests that the gravitational partnership formed early in our Solar System's history and has persisted through countless changes.

What makes this discovery particularly significant is that no objects has previously been found in resonance between the orbits of Uranus and Neptune. It's a region of space, while containing many small



The asteroids of the inner Solar System, where they are far more numerous than the outer Solar System, are plotted on this diagram.

bodies, that appears to lack the kind of stable orbital relationships commonly found elsewhere in the Solar System.

The researchers didn't stop with just one object though. Their investigation uncovered additional candidates, including 2013 RG_{98}, which also appears to maintain this same 3:4 resonance with Uranus for several hundred thousand years. A third candidate, 2014 NX_{65}, shows strong gravitational influence from Neptune, suggesting the complex interplay of forces in this region.

The existence of these Uranus resonant objects suggests that similar relationships may be more common than previously thought. As our survey capabilities improve and we discover more objects in the outer Solar System, we may find that these gravitational partnerships are common and fundamental to understanding how small bodies are distributed throughout the region. ☀

August's Night Sky Notes: The Great Rift

NIGHTSKYNETWORK, JULY 19, 2025

The Milky Way, Painting by Miguel Araoz Cartagena, b. 1977, Oil on canvas, 2014. This painting by Cusco artist Miguel Araoz Cartegna depicts the Milky Way over Cusco during July and August - the time when the sky is clear and most of the Inka constellations can be easily observed.

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!

To observe the Milky Way, you need clear, dark skies and enough time to adapt your eyes to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that's the beauty and quietly deceptive nature of long exposure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn't easily visible until it rises a bit above the horizon, and the thick, turbulent air obscures the view. The Milky Way is huge, but it is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Avoid bright lights as they will ruin your night vision. It's best to attempt to view the Milky Way when the Moon is at a new or crescent phase; a full Moon will wash out any potential views.

Keeping your eyes dark-adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way.

Other "dark nebulae" of cosmic clouds pepper the Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their traditional stories along with the constellations and the Milky Way. One such story tells of a Yacana the Llama, and her baby, wandering along a river that crossed the sky – the Milky Way. The bright stars Alpha and Beta Centauri serve as the llama's eyes, with the dark sections representing the bodies of mother and baby, with the baby below the mother, nursing.

In the activity, "Our Place In Our Galaxy", if the Milky Way were shrunk down to the size of North America, our solar system would be about the size of a quarter. At that scale, Polaris - which is about 433 light years distant from us - would be 11 miles away.

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The "Our Place in Our Galaxy" activity can help you do just that, with only birdseed, a coin, and your imagination. You can also discover the amazing science NASA is doing to understand our galaxy – and our place in it - in the Galaxies section of NASA's Universe page. ☀

The Backyard Observer, August 2025

By Rick Heschmeyer

SAGITTARIUS, PART 1

When we look to the south in the summer night sky, we look directly towards the center of the Milky Way galaxy. While the galactic center is about 26,000 light-years distant, the constellation whose stars lie closer, but in the same direction, are in this month's constellation Sagittarius, the Archer. While many of the stars near the center are obscured by intervening clouds of gas and dust, there is still a multitude of showcase objects to view. In fact, there are fourteen Messier objects within the boundaries of Sagittarius. Nearly 13% of the Messier catalog! As a result, we are going to break the constellation into two parts. This month we will focus on the westernmost objects within the constellation. Next month we will visit on the remaining objects.

We will start this month's tour with a large asterism that most stargazers will recognize, the "Teapot". The stars Delta Sagittarii (Kaus Media), Epsilon (Kaus Australis), Zeta (Ascella), and Phi form the actual pot itself. The star Gamma2 Sagittarii (Alnasl) forms the end of the spout of the teapot. The star Lambda Sagittarii (Kaus Borealis) form the top of the triangular lid. And finally, the stars Sigma Sagittarii (Nunki) and Tau Sagittarii form the handle of the pot. Traditionally the Milky Way represents the steam rising from the spout of the pot.

One of the many showcase objects in the constellation is Messier 8, the Lagoon Nebula. The nebula is associated with the nearby open cluster NGC 6530. The name derives from the large dust lane bisecting this bright emission nebula from southwest to northeast. It was discovered in 1654 by Italian astronomer Giovanni Batista Hodierna. IT lies about 5000 light years away.

Messier 17 is another excellent nebula. It has been known by many monikers. Those used most are the Omega Nebula or the Swan Nebula, but it has also been known as the Checkmark Nebula, the Horseshoe Nebula, Number 2 Nebula, and the Lobster Nebula. By any name, this emission nebula is a gem of the night sky. It is associated with the open cluster NGC 6618, many of whose stars are obscured by the glow of the nebula.

Messier 18 also known as the Black Swan Cluster, is an open star cluster located just to the south of Messier 17. Messier discovered it in 1764. Some scientists speculate that it may be a binary cluster with NGC 6618, mentioned above. In small telescopes the cluster will reveal about a dozen stars.

Messier 20 another bright emission nebula called the Trifid Nebula due to the three lobes bisected by dark nebulosity. The northeastern edge of the nebula is a refection nebula. The Spitzer Space Telescope discovered about 120 newborn stars, and several dozen embryonic stars, not visible to us due to the large amounts of gas and dust. This nebula is truly a stellar nursery.

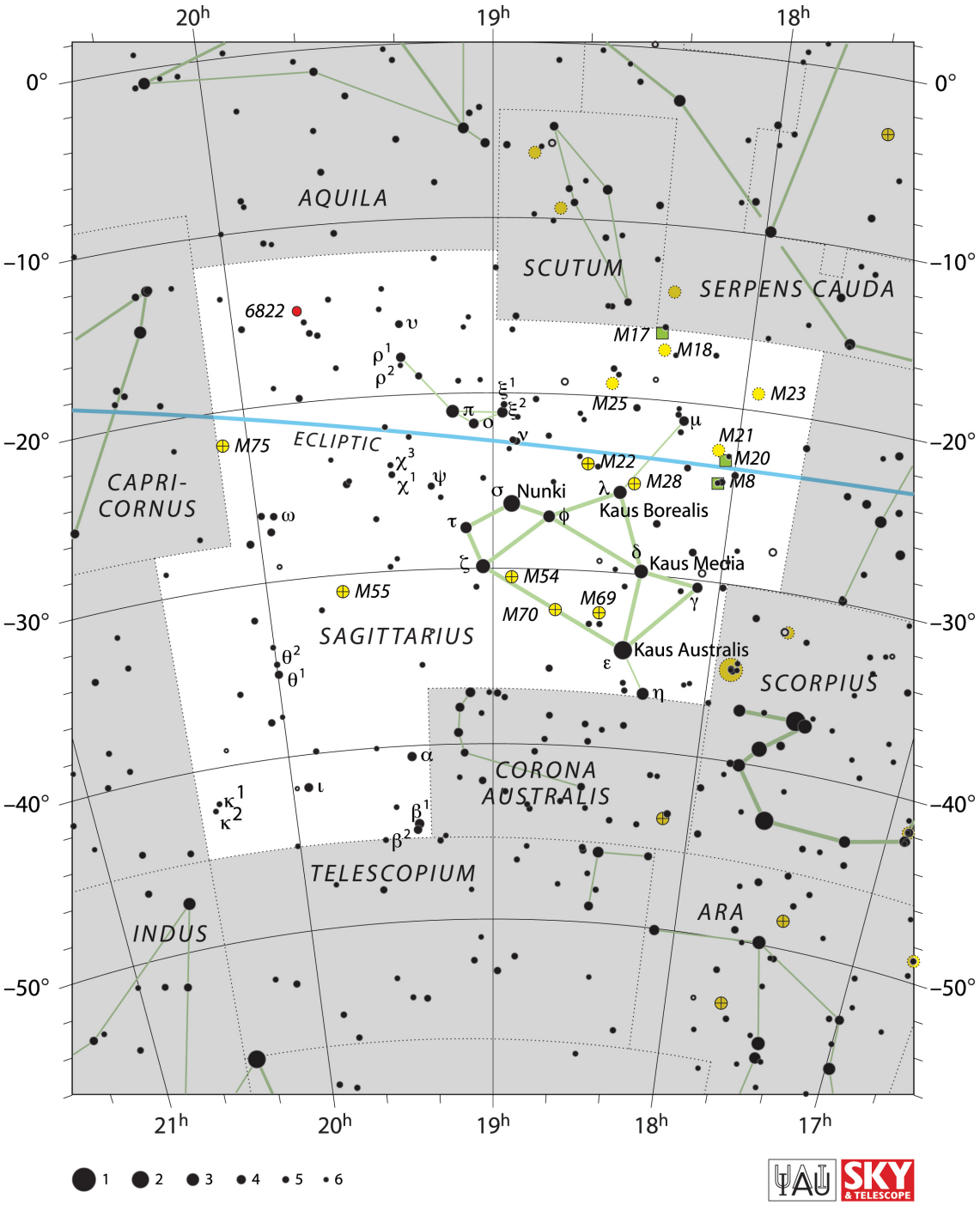
Messier 21 is a small, compact open star cluster that appears to be attached (but not actually linked) to Messier 20 by two chains of stars. It contains about 70 stars and lies roughly 4000 light years away.

Messier 23 is another open star cluster containing about 150 stars. It's shape has been described as resembling a bat in flight.

Messier 69 is a small, loose and faint globular cluster with a bright core. It is faintly visible in binoculars and small telescopes. It was discovered by Messier in 1780.

On the same night he discovered Messier 69, Charles Messier also discovered Messier 70. This globular cluster is located near the spot where, in 1995, Comet-Hale Bopp was discovered. The cluster is roughly the same size and brightness as its neighbor Messier 69. M70 is particularly fascinating because it has undergone what is known as a core collapse. This means that even more stars squeeze into the object's core than in an average globular cluster.

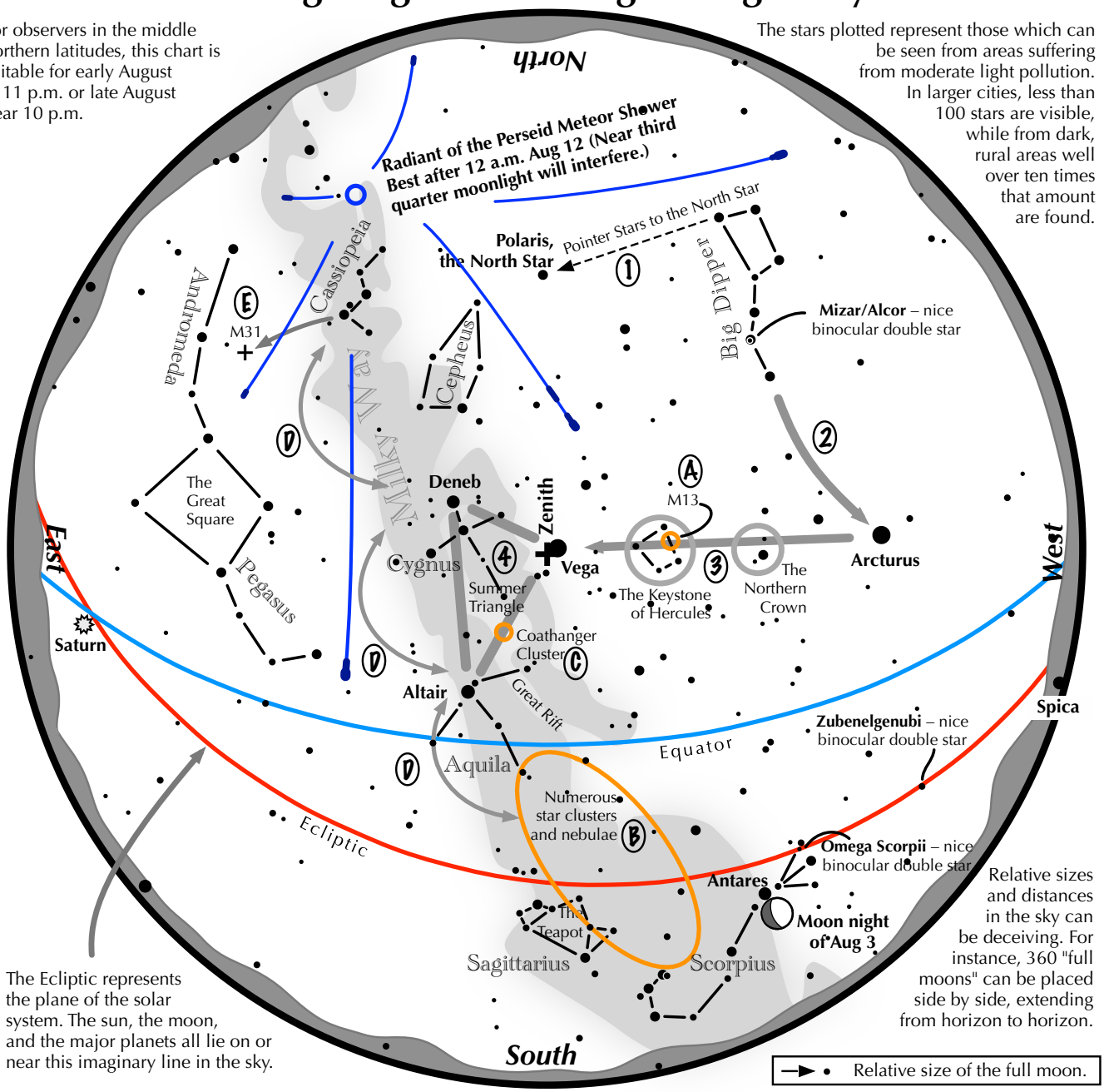
I hope you enjoy this month's objects and get ready for a second helping of Sagittarius deep sky wonders next month.



Navigating the mid August Night Sky

For observers in the middle northern latitudes, this chart is suitable for early August at 11 p.m. or late August near 10 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 August 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 June evening sky.
3. To the northeast of Arcturus shines another star of the same brightness, 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. High in the East lies the summer triangle stars of Vega, Altair, and Deneb.

Binocular Highlights

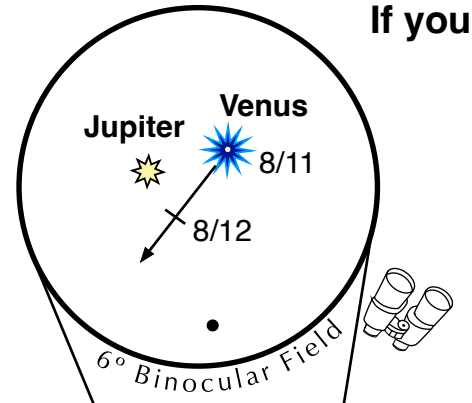
A: On the western side of the Keystone glows the Great Hercules Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
D: Sweep along 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.

If you can view only one celestial event this month, view this not this one, but these two!

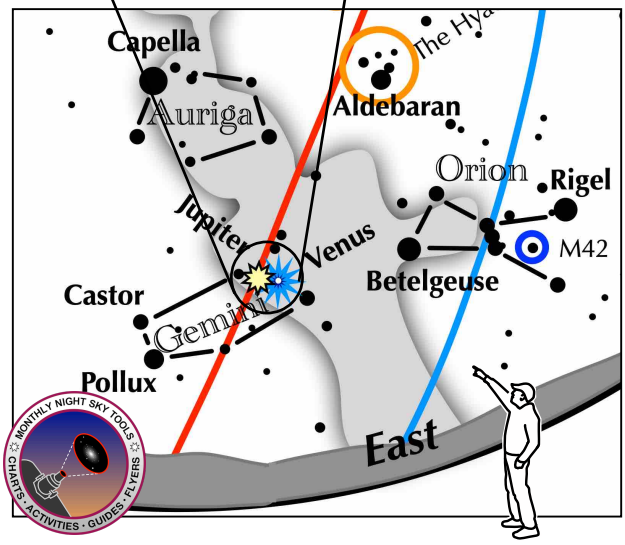
1. Look to the east 90 minutes before sunrise on August 11 and 12.
2. Find Venus and Jupiter shining left of Orion. They will be next to each other.
3. Use binoculars to separate them.

4. On August 20 and 21 about 90 minutes before sunrise look to the east-northeast.
5. On the 20th, the crescent moon, full with earthshine, floats near Venus.
6. On the 21st, a thinner crescent rises shortly before sunrise.
7. You will also see Sirius and Procyon rising.

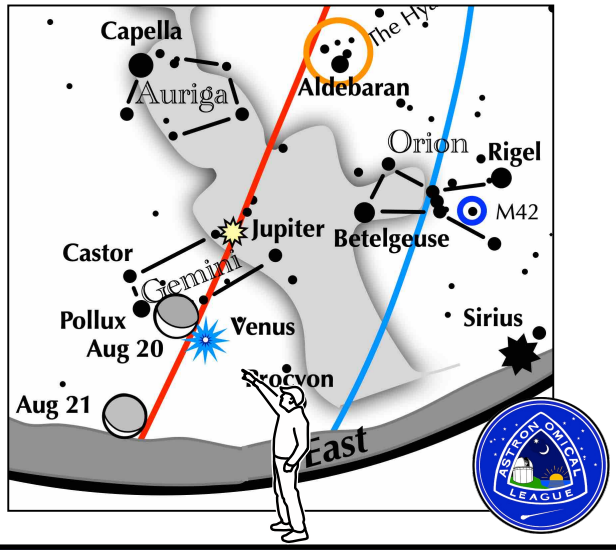
What great way to start your day!



August 11 & 12



August 20 & 21



About Astronomy Associates

The club is open to all people interested in sharing their love for astronomy. Monthly meetings are typically on the last Sunday of each month and often feature guest speakers, presentations by club members, and a chance to exchange amateur astronomy tips. These meetings and the public observing sessions that follow are scheduled at the Baker Wetlands Discovery Center, south of Lawrence. All events and meetings are free and open to the public. Periodic star parties are scheduled as well.

Because of the flexibility of the schedule due to holidays and alternate events, it is always best to check the Web site for the exact Sundays when events are scheduled.

Copies of the Celestial Mechanic can also be found on the web at newsletter.
Annual Dues for the club are: $12 for regular members; $6 for students Membership forms can be accessed at the club website form.