Volume 52 Number 3 March 2026

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Coming Events

Monthly Meeting
March 29, 2026, 7:00PM
Baker Wetlands Discovery Center

Public Observing
March 29, 2026, 8:00PM
Baker Wetlands Discovery Center

Club Officers

President
Rick Heschmeyer email

NSN Coordinator
Howard Edin email

Faculty Advisor
Dr. Jennifer Delgado email.

Newsletter Editor
Chuck Wehner email

Inside This Issue

Report From the Officers

By Rick Heschmeyer

On Sunday, February 22 Dr. Brian Thomas of Washburn University presented "Terrestrial Effects of Nearby Supernovae and Gamma-Ray Bursts" and shared some of his research into how these celestial events may have helped shape Earth's history, and possibly its future. Very cold temperatures with some wind cut our observing session short as it negatively affected both humans and equipment.

The night before our February meeting we held an event at the KU Field Station to observe the planetary alignment taking place in February. In spite of chilly temperatures, we had another great Field Station turnout. Between RSVP's received by the Field Station and the 11 AAL members that were present to help, we had almost 100 people attend!

The KU Astronomy Public night for March is Thursday, March 12, outside of Slawson Hall. Planetarium shows start at 7:30, 8:00, and 8:30 pm. Stargazing and telescopes after the shows as conditions allow.

Our January meeting presentation, which was cancelled due to a winter storm, has been rescheduled of Sunday, March 29. Rick Heschmeyer's talk is "The Useful Stars: The Night Sky as Calendar, Navigational Aid, and Cultural Repository". The meeting will stars at 7pm at Baker Wetlands Discovery center and will be followed by public telescope observing, weather permitting.

As a reminder, if you have not already done so, please pay your club dues for 2026. Thanks.

Keep looking up! Stay warm! Spring is just around the corner!

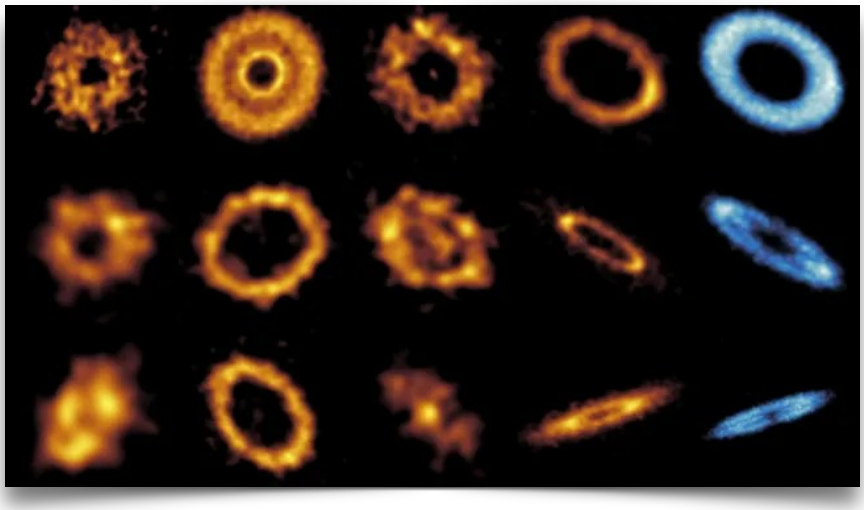
Clear Skies!

Astronomers discover the 'growing pains' of teenage exoplanets

By Robert Lea

SPACE.COM, JANUARY 27, 2026

"We've often seen the 'baby pictures' of planets forming, but until now, the 'teenage years' have been a missing link."



When the Undertones sang about "Teenage Kicks," they could well have been inadvertently referring to the chaotic and violent "teenage" periods of planetary systems that are shaped by collisions between bodies of various sizes, such as the impact upon Earth by a massive body that created the moon.

Now, using the world's largest radio telescope project, the Atacama Large Millimeter/submillimeter Array (ALMA), astronomers have captured snapshots representing the chaotic "teenage years" of planets forming around infant stars.

The breakthrough, made as part of the Resolve exoKuiper belt Substructures (ARKS) survey being conducted by ALMA, could not only help scientists better understand the processes that drive the evolution of planetary systems, but it could also help us better understand a turbulent period of our own solar system's history that has, until now, been shrouded in mystery.

"We've often seen the 'baby pictures' of planets forming, but until now, the ‘teenage years’ have been a missing link," team co-leader Meredith Hughes of Wesleyan University, Connecticut, said in a statement. "This project gives us a new lens for interpreting the craters on the moon, the dynamics of the Kuiper Belt, and the growth of planets big and small. It’s like adding the missing pages to the Solar System's family album."

Teenage kicks

Hughes and colleagues used the 66 radio telescopes located in the Atacama desert region of northern Chile that make up ALMA to observe 24 disks of dusty debris around infant stars, the detritus that remains after planets have formed.

"Debris discs represent the collision-dominated phase of the planet formation process," ARKS team member Thomas Henning of the Max Planck Institute for Astronomy (MPIA) said. "With ALMA, we are able to characterise the disc structures pointing to the presence of planets. In parallel, with direct imaging and radial velocity studies, we are searching for young planets in these systems."

Evidence of this period of the solar system's history can be seen in the icy ring of comets beyond the orbit of Neptune known as the Kuiper Belt. These objects were created through massive collisions and planetary migrations that occurred around the sun billions of years ago, around the same time as Earth's moon was forming.

Planet baby pictures are fairly easy to obtain because the gas-rich disks in which they form, protoplanetary disks, are bright. Debris disks like the 24 seen by ALMA are thousands of times fainter, which is why they have proved so elusive for many years.

ALMA collected the radio wavelength emissions from dust particles and other molecules in these disks to build a picture of their complex structures, revealing multiple rings, wide and smooth outer halos, and unexpected arcs and clumps.

"We're seeing real diversity – not just simple rings, but multi-ringed belts, halos, and strong asymmetries, revealing a dynamic and violent chapter in planetary histories," ARKS team member and University of Exeter researcher Sebastián Marino said.

The key to this level of detail is the fact that with its 66 antennas, ALMA and its radio interferometry technique provide a wider view than any single telescope. This has confirmed that the teenage phase of planetary systems is a time of great upheaval.

"These discs record a period when planetary orbits were being scrambled and huge impacts, like the one that forged Earth's moon, were shaping young solar systems," team member Luca Matrà, of Trinity College Dublin, Ireland, added. ☀

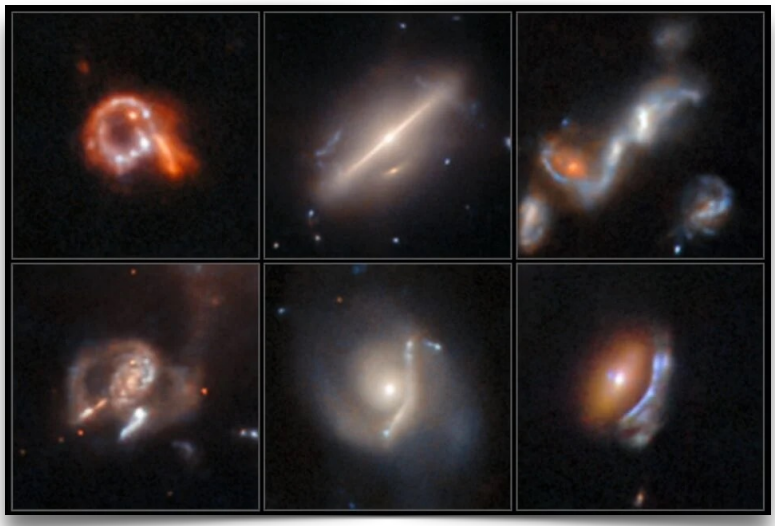
AI Sifts Through a Mountain of Hubble Data, Uncovers Hundreds of Cosmic Weirdos

Using a brand new data analysis tool, astronomers identified more than 800 strange and previously undocumented space objects.

By Ellyn Lapointe
GIZMODO, JANUARY 27, 2026

The universe is filled with innumerable astrophysical objects, each one different from the last. But even amid this vast diversity, some stand out as truly bizarre.

A pair of astronomers recently discovered hundreds of these cosmic weirdos buried in archival Hubble Space Telescope data. These objects have waited years for researchers to catalog and investigate their unusual characteristics, and thanks to AI, they finally have.



This new image from NASA and ESA's Hubble Space Telescope displays six previously undiscovered, weird, and fascinating astrophysical objects, including three gravitational lenses, one galactic merger, one ring galaxy, and one galaxy that currently defies classification

"Archival observations from the Hubble Space Telescope now span 35 years, offering a rich dataset in which astrophysical anomalies may be hidden," David O'Ryan, a research fellow at the European Space Agency (ESA) and lead author of the study published in Astronomy & Astrophysics, said in an agency statement.

O'Ryan and his colleague, ESA data scientist Pablo Gómez, created an AI-assisted data analysis tool called AnomalyMatch and used it to search for rare astronomical objects in the Hubble Legacy Archive. It took just two and a half days to sift through nearly 100 million image cutouts and identify nearly 1,400 anomalous objects, 800 of which were previously unknown to science.

"This is a powerful demonstration of how AI can enhance the scientific return of archival datasets," Gómez said in a NASA statement. "The discovery of so many previously undocumented anomalies in Hubble data underscores the tool's potential for future surveys."

Mining Hubble's vast archive

Hubble has spent more than three decades continuously surveying the cosmos. To date, the telescope has made more than 1.7 million observations, building a data goldmine that has significantly expanded our understanding of the universe.

However, sifting through this mountain of data to find rare and anomalous objects, such as colliding galaxies, gravitational lenses, and ring galaxies, is an onerous task for astronomers. Gómez and O'Ryan developed AnomalyMatch to do the heavy lifting for them.

Their AI tool is a neural network—a machine learning model designed to mimic the way the human brain processes data and recognizes patterns. AnomalyMatch is trained to sniff out cosmic objects that look unusual, compiling a list of targets that astronomers like O'Ryan and Gómez can then examine more closely to confirm and classify.

A wealth of weirdos

Of the 800-odd oddballs AnomalyMatch and its creators identified, most were galaxies actively

merging or interacting with other galaxies, morphing them into unusual shapes or giving them trailing tails of stars and gas.

They also found many gravitational lenses—massive celestial bodies that bend spacetime and warp the light around them, acting as a natural lens—and other rare objects such as galaxies with huge star clumps, jellyfish galaxies with gaseous "tentacles," and planet-forming disks that resemble hamburgers or butterflies when viewed edge-on.

Most intriguing were several dozen objects that defied classification entirely, presenting new opportunities to probe never-before-seen cosmic structures.

The findings show that neural networks like AnomalyMatch can maximize the value of data archives like Hubble's. Gómez and O'Ryan hope their tool will unlock new discoveries from forthcoming datasets as well, including that of ESA's Euclid space telescope and the National Science Foundation and U.S. Department of Energy's Vera C. Rubin Observatory.

These next-generation surveys will produce a deluge of data, and analyzing that data will require next-generation techniques. Combing through the cosmos with AI could open the door to a whole new world of scientific discovery. ☀

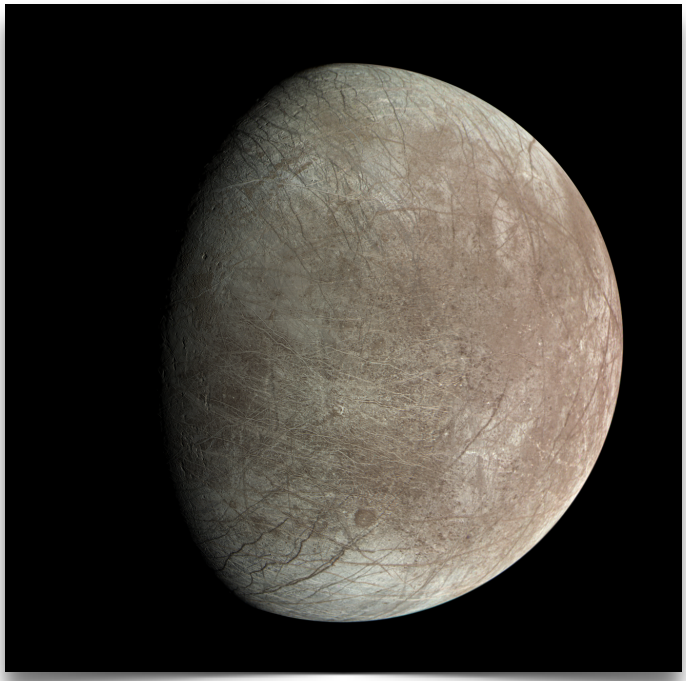
NASA's Juno Measures Thickness of Europa's Ice Shell

JPL, JANUARY 27, 2026

Results from the solar-powered spacecraft provide a new measurement of the thickness of the ice shell encasing the Jovian moon's ocean.

Data from NASA's Juno mission has provided new insights into the thickness and subsurface structure of the icy shell encasing Jupiter's moon Europa. Using the spacecraft's Microwave Radiometer (MWR), mission scientists determined that the shell averages about 18 miles (29 kilometers) thick in the region observed during Juno's 2022 flyby of Europa. The Juno measurement is the first to discriminate between thin and thick shell models that have suggested the ice shell is anywhere from less than half a mile to tens of miles thick.

Slightly smaller than Earth's moon, Europa is one of the solar system's highest-priority science targets for investigating habitability. Evidence suggests that the ingredients for life may exist in the saltwater ocean that lies beneath its ice shell. Uncovering a variety of characteristics of the ice shell, including its thickness, provides crucial pieces of the puzzle for understanding the moon's internal workings and the potential for the existence of a habitable environment.



Jupiter's moon Europa was captured by the JunoCam instrument aboard NASA's Juno spacecraft during the mission's close flyby on Sept. 29, 2022. The images show the fractures, ridges, and bands that crisscross the moon's surface.

The new estimate on the ice thickness in the near-surface icy crust was published on Dec. 17 in the journal Nature Astronomy.

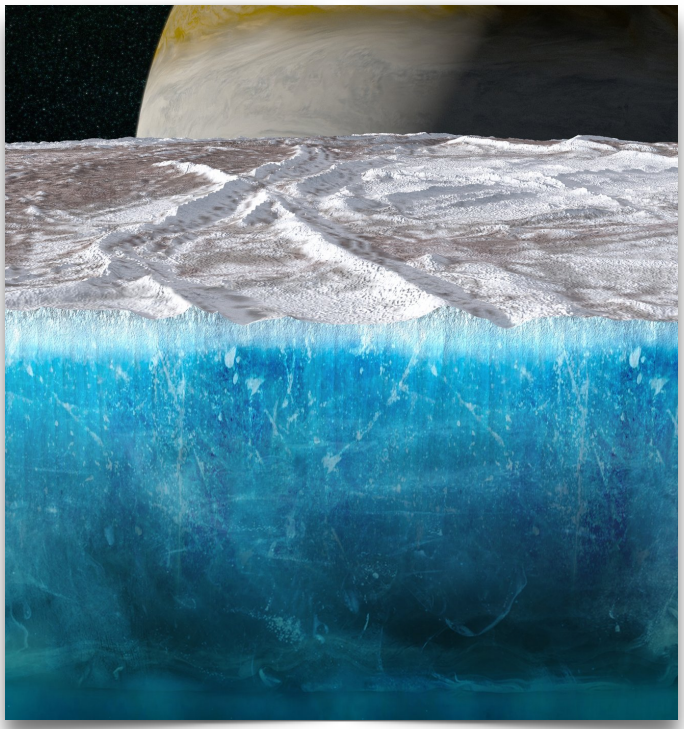
Catching waves

Although the MWR instrument was designed to investigate Jupiter's atmosphere below the cloud tops, the novel instrument has proven valuable for studying the gas giant's icy and volcanic moons as well.

On Sept. 29, 2022, Juno came within about 220 miles (360 kilometers) of Europa's frozen surface. During the flyby, MWR collected data on about half the moon's surface, peering beneath the ice to measure its temperatures at various depths.

"The 18-mile estimate relates to the cold, rigid, conductive outer-layer of a pure water ice shell," said

Steve Levin, Juno project scientist and co-investigator from NASA's Jet Propulsion Laboratory in Southern California, which manages the mission. "If an inner, slightly warmer convective layer also exists, which is possible, the total ice shell thickness would be even greater. If the ice shell contains a modest amount of dissolved salt, as suggested by some models, then our estimate of the shell thickness would be reduced by about 3 miles."



This artist's concept depicts a cutaway view showing Europa's ice shell. Data used to generate a new result on the ice thickness and structure was collected by the microwave radiometer instrument on NASA's Juno during a close flyby of the Jovian moon on Sept. 29, 2022.

The thick shell, as suggested by the MWR data, implies a longer route that oxygen and nutrients would have to travel to connect Europa's surface with its subsurface ocean. Understanding this process may be relevant to future studies of Europa's habitability.

Cracks, pores

The MWR data also provides new insights into the makeup of the ice just below Europa's surface. The instrument revealed the presence of "scatterers" — irregularities in the near-surface ice such as cracks, pores, and voids that scatter the instrument's microwaves reflecting off the ice (similar to how visible light is scattered in ice cubes). These scatterers are estimated to be no bigger than a few inches in diameter and appear to extend to depths of hundreds of feet below Europa's surface.

The small size and shallow depth of these features, as modeled in this study, suggest they are unlikely to be a significant pathway for oxygen and nutrients to travel from Europa's surface to its salty ocean.

"How thick the ice shell is and the existence of cracks or pores within the ice shell are part of the complex puzzle for understanding Europa's potential habitability," said Scott Bolton, principal investigator of Juno from the Southwest Research Institute in San Antonio. "They provide critical context for NASA's Europa Clipper and the ESA (European Space Agency) Juice (JUpiter ICy moons Explorer) spacecraft — both of which are on their way to the Jovian system." Europa Clipper will arrive there in 2030, while Juice will arrive the year after.

Juno will carry out its 81st flyby of Jupiter on Feb. 25

☀

This inside-out planetary system has astronomers scratching their heads

The odd configuration of worlds orbiting the star LHS 1903 hints at a history of violence

The planetary system (illustrated) orbiting LHS 1903 has a weird arrangement of worlds, with a rocky planet closest to the red dwarf star, then two gaseous ones, and then another rocky one.

By Adam Mann

Sciencenews, FEBRUARY 12, 2026

Like a double-stuffed Oreo of planetary proportions, the star LHS 1903 boasts two rocky exoplanets sandwiching two gaseous ones.

From the star outward, the lineup — rocky-gaseous-gaseous-rocky — defies models that predict rocky planets appearing close in and gaseous ones further out. The configuration hints at a history of violence in the system, potentially refining our understanding of planetary formation, researchers report February 12 in Science.

"Bad stuff does happen in young planetary systems," says Andrew Cameron, an astronomer at the University of St. Andrews in Scotland. "This one has the look of something that's been turned inside out."

LHS 1903 is a red dwarf star located roughly 116 light-years away and is about half as massive as the sun. Its four companions all orbit in less than 30 days, making for a compact system whose worlds range from around 1.4 to 2.5 times our planet's radius, straddling the boundary between super-Earths and mini-Neptunes.

NASA's Transiting Exoplanet Survey Satellite discovered the system in 2019, and subsequent observations were made by a host of ground- and space-based instruments. This lets scientists precisely pin down the planets' masses and densities, giving some clues to their compositions.

Planets are thought to form from the dusty disks surrounding young stars. Rocky planets typically grow closer in, where intense starlight can strip away their atmospheres. Gas is more prevalent in the outer disk, spawning giants like Jupiter that often retain thick envelopes.

"[LHS 1903] follows that pattern beautifully for the first three planets," Cameron says. "Then, something weird happened to the fourth planet."

Based on its density, LHS 1903's fourth planet appears to be rocky, whereas the two planets starward from it seem to be wrapped in gaseous envelopes. It would be like finding a world resembling Venus out past the orbit of Neptune.

The headscratcher supports the idea that, sometime early in their history, LHS 1903's outer planets migrated inward. Such a process is believed to have occurred in our own solar system's first few hundred million years, when a gravitational spasm caused Jupiter and Saturn to lurch toward the sun, knocking asteroids helter-skelter and perhaps even switching Uranus and Neptune's orbits.

Something similar may have happened to LHS 1903's planets, either sending a large body crashing into the fourth planet that blasted away its atmosphere or scattering world-building material from the outer system. The fourth planet may have grown up late, "just as the system ran out of gas," Cameron says. ☀

A massive clump of dark matter may lurk in the Milky Way

The invisible blob of matter is thought to be about 10 million times the sun's mass

Dark matter halos that surround galaxies are predicted to have multitudes of clumps called subhalos (bright spots in this simulation).

By Emily Conover
SCIENCENEWS, JANUARY 29, 2026

A huge clump of dark matter could be sitting on our galactic doorstep.

Scientists found evidence of an invisible, massive nugget in the galactic neighborhood of the sun. The suspected clod of dark matter has a mass about 10 million times that of the sun, researchers report January 29 in Physical Review Letters.

Dark matter is an unidentified substance, evident based only on its impact on the cosmos. The Milky Way is enveloped in an enormous dark matter "halo," and scientists suspect that untold numbers of smaller clumps, called "subhalos'" reside within it. Now they have a candidate, located about a kiloparsec from the sun, or around 3,260 light-years.

Scientists spotted the unobtrusive object by monitoring remnants of dead stars called pulsars, which send out bursts of radio waves at a regular clip. Tracking how the rate of pulses changes over time allows scientists to make a variety of measurements of the cosmos.

Out of 53 pulsars the researchers studied, one pair of neighboring pulsars showed signs of a shift in their

pulse rate that pointed to a gravitational pull from something massive. To estimate the mass of the object, the researchers included additional pulsars in the vicinity of the original pair, for a total of 19 pulsars. Notably, there were no stars or gas clouds nearby that could explain the observations, leaving dark matter as the likely culprit.

Different dark matter theories predict different distributions of dark matter subhalos. So, if scientists could map out all of the Milky Way's subhalos, that could pin down the nature of dark matter, says astrophysicist Sukanya Chakrabarti of the University of Alabama in Huntsville. "That's the final goal. That's what we're after." ☀

The Backyard Observer, March 2026

By Rick Heschmeyer

Aries

This month's constellation, Aries, the Ram, is one of the 12 Zodiacal constellations. In spite of its small size, it is one of the original 48 constellations described by Ptolemy in the second century. Aries is also a fairly dim constellation. In Babylonian tins the constellation was described as a hired farm hand, but somewhere along the line it changed from the shepherd to the animal he kept.

The brightest star in Aries is Alpha Arietis, or Hamal. It is an orange giant star and shines at magnitude 2. It lies at a distance of 66 light years from earth but is slowly drifting through space in our direction. It is the 50th brightest star in the night sky. It is believed to host a planet larger than Jupiter. A US Navy ship is named after Hamal's other name, the USS Hamul.

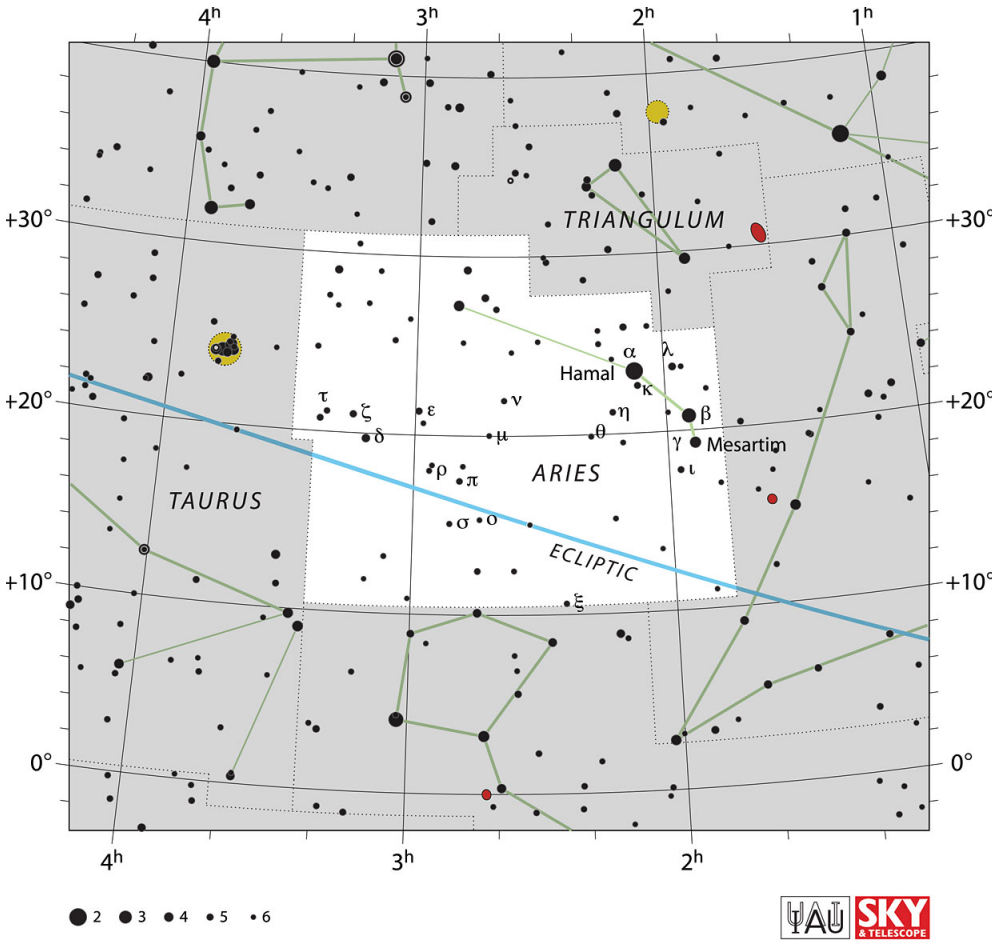
Beta Arietis, or Sheratan, is the second brightest star in the Ram, coming in at 3rd magnitude. It is also a spectroscopic binary star system with each star orbiting the other with a period of 107 days. The stars are so close that they cannot be resolved in any conventional telescope. It lies at a distance of 58 light years.

Mesarthim is the Gamma star in Aries at 4th magnitude. It is at least a binary star, possibly a triple star system. It lies about 165 light years from the Sun. The double nature of the star was discovered in 1664 by the English astronomer Robert Hooke.

41 Arietis is the only other bright star in Aries. It is a triple star system. It was once considered a member of the no-longer-existent constellation Musca Borealis, the Northern Fly, located between the constellations of Aries and Perseus. This constellation/asterism was also once known as Apis, the Bee. Today, it is now part of Aries, and the other constellation names have been discarded.

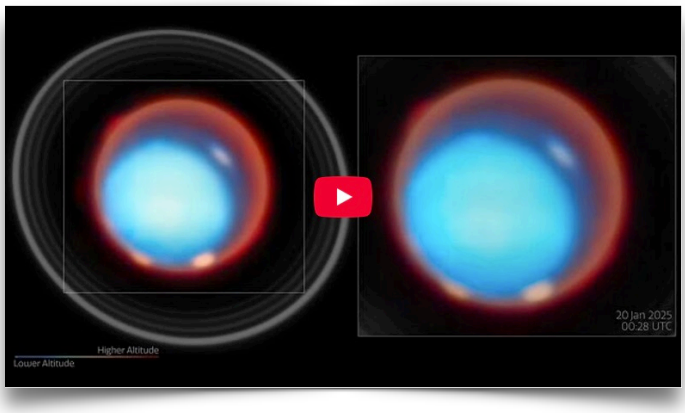
There are no Messier objects in Aries, and only a handful of fairly faint galaxies, but there is a nice meteor shower that radiates from Aries, the Daytime Arietids. It is one of the strongest meteor showers that peaks during the day on June 7 each year.

While it only represents 1% of the celestial acreage in the night sky, don't forget to stop and take a look at Aries.



Webb Just Spent 17 Hours Staring at Uranus—and Found Its Auroras Are Even Weirder Than We Thought

The telescope observed the ice giant for a full rotation, revealing how temperature and charged particles vary with altitude.



By Passant Rabie
GIZMODO, FEBRUARY 22, 2026

On January 19, the Webb space telescope stared deep into the chaotic world of Uranus for 17 hours, observing as the faint glow from molecules above the planet's clouds meets its unusual magnetic field. The resulting data helped scientists map Uranus's upper atmosphere in unprecedented detail, revealing new insight into how its tantalizing auroras are formed.

An international team of researchers used Webb's Near-Infrared Spectrograph (NIRSpec) instrument to map the temperature and density of ions found around 3,000 miles (5,000 kilometers) above Uranus's cloud tops. The findings, published in Geophysical Research Letters, reveal how the planet's eccentric magnetic field influences its auroras and offer new insight into how energy behaves in the upper layers of ice giants.

"This is the first time we've been able to see Uranus's upper atmosphere in three dimensions," Paola Tiranti, a PhD student at Northumbria University in the U.K., and lead author of the study, said in a statement. "With Webb's sensitivity, we can trace how energy moves upward through the planet's atmosphere and even see the influence of its lopsided magnetic field."

Giant weirdo

Uranus has a rather unusual magnetic field. The planet's rotation axis is tilted over 90 degrees, causing the planet to rotate on its side. The magnetic axis also has a large tilt, nearly 60 degrees away from its rotation axis. Its sideways magnetic field gives Uranus a more variable magnetosphere, meaning its auroras sweep across the surface in more complex ways, according to NASA.

The recent Webb observations detected two bright auroral bands near Uranus's magnetic poles, as well as a significant depletion of ion density and emissions in the region between the bands. This is likely due to how magnetic field lines guide charged particles through Uranus's atmosphere.

It was the Hubble Space Telescope that spotted auroras on Uranus for the first time in 2012. Since then, scientists have sought to understand how the planet's whacky magnetosphere influences its auroral displays.

"Uranus's magnetosphere is one of the strangest in the Solar System," Tiranti said. "Webb has now shown us how deeply those effects reach into the atmosphere."

Cold world

NASA's Voyager 2 spacecraft carried out the first close flyby of Uranus on January 24, 1986. The mission revealed a pale blue world that's very cold compared to its neighboring planets. At the time, temperatures in Uranus's upper atmosphere plunged below -353 Fahrenheit (-214 Celsius).

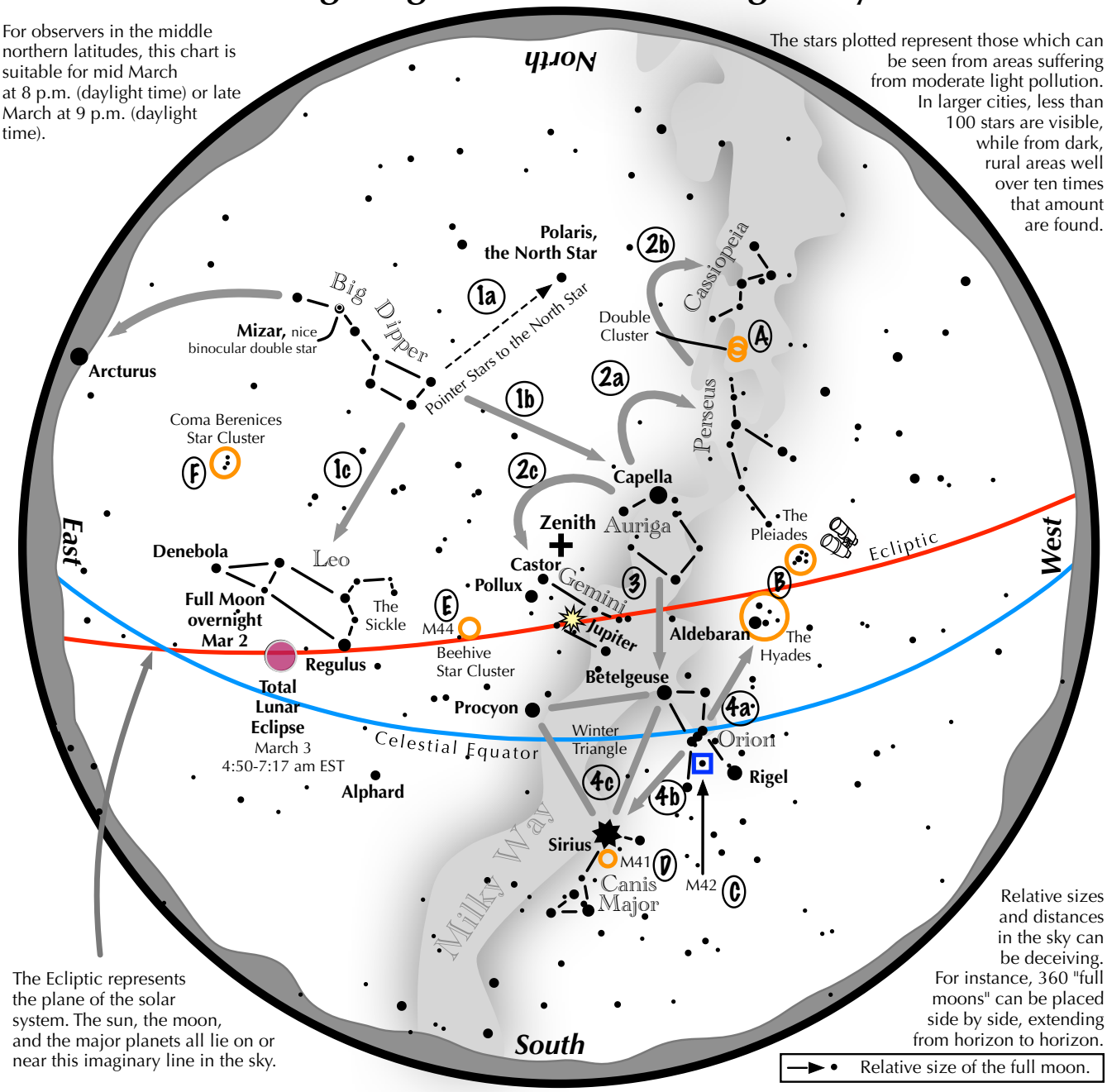
Webb's recent data also confirmed that Uranus's upper atmosphere is still cooling. Based on data collected by the Voyager 2 flyby, Uranus's upper atmosphere was found to be undergoing a long-term cooling trend, with temperatures dropping over time. The team measured temperatures around 302 Fahrenheit (150 Celsius) lower than ones recorded during previous attempts.

"By revealing Uranus's vertical structure in such detail, Webb is helping us understand the energy balance of the ice giants," Tiranti said. "This is a crucial step towards characterizing giant planets beyond our solar system." ☀

Navigating the mid March Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid March at 8 p.m. (daylight time) or late March at 9 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.

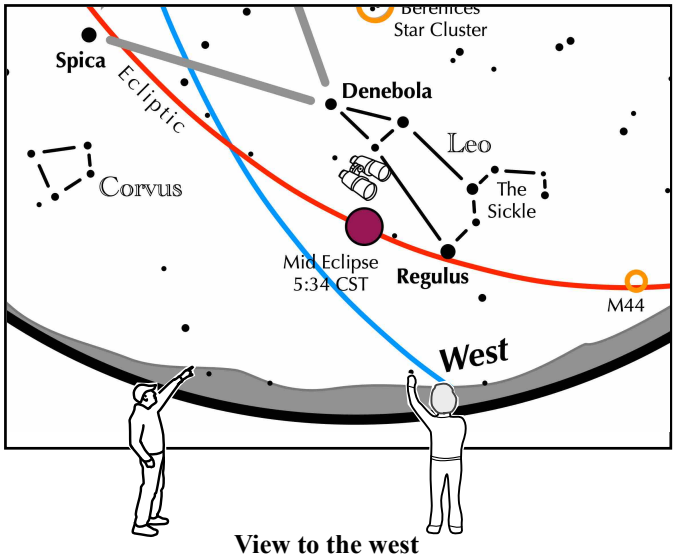
Navigating the March night sky: Simply start with what you know or with what you can easily find.

1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star. Its top bowl stars point west to Capella in Auriga, nearly overhead. Leo reclines below the Dipper's bowl.
2. From Capella jump northwestward along the Milky Way to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star Rigel.
4. Use Orion's three Belt stars to point northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius. It is a member of the Winter Triangle.

Binocular Highlights

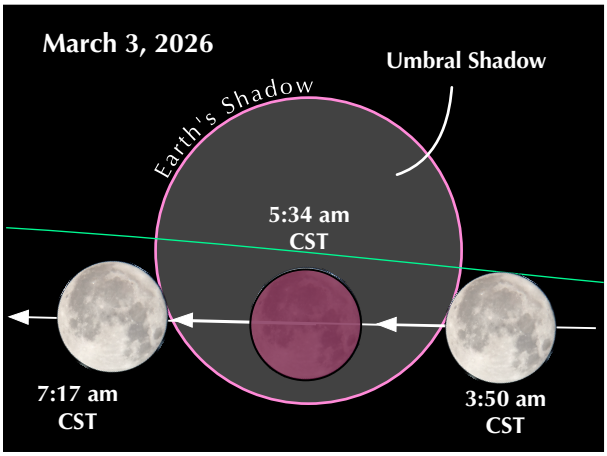
A: Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** M42 in Orion is a star forming nebula. **D:** Look south of Sirius for the star cluster M41. **E:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **F:** Look high in the east for the loose star cluster of Coma Berenices.

If you can observe only one celestial event in the morning this March, see this one.



View to the west on March 3 at 5 am CST

Eclipse times
Partial eclipse begins: 3:50 a.m. CST
Total eclipse begins: 5:04
Mid eclipse: 5:34
Total eclipse ends: 6:03
Partial eclipse ends: 7:17



The Moon slides through a total eclipse

In the hours before dawn on March 3, the brilliant full moon slides into Earth's shadow.

- Even though the partial umbral eclipse begins at 3:50 a.m. CDT, darkening might not be noticed for another 5 minutes.
- When totality is reached, the full moon's brilliance is gone, allowing the stars to appear. Can you see that the moon lies east of Regulus and below Leo?
- At mid eclipse, what color is the moon? How red is it?
- During the partial phases, can you notice that the shadow's edge is not straight, but curved?

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.