

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence



Coming Events

Monthly Meeting

February 22, 2026, 7:00PM

Baker Wetlands Discovery Center

Public Observing

February 22, 2026, 8:00PM

Baker Wetlands Discovery Center

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Report From the Officers

By Rick Heschmeyer

Our January Club Meeting and Public Observing was cancelled due to a Winter Storm that included temperatures near zero and wind chills below zero, plus about 4 inches of snow. Our January meeting presentation "The Useful Stars: The Night Sky as Calendar, Navigational Aid, and Cultural Repository" has been moved to our club meeting on Sunday, March 29.

On Sunday, February 22 Dr. Brian Thomas of Washburn University will be presenting "Terrestrial Effects of Nearby Supernovae and Gamma-Ray Bursts". The meeting will start at 7 PM at Baker Wetlands Discovery Center and will be followed by public telescope observing if the weather permits. As always, if you have any ideas for future events or meetings, reach out to me.

The KU Astronomy Public Telescope and Planetarium Schedule has been released. The Spring 2026 dates are:

Thursday, February 12, Thursday March 12,

Thursday, April 16, Thursday, May 7

Planetarium shows start at 7:30, 8:00, and 8:30 pm. Stargazing and telescopes after the shows as conditions allow.

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

Keep looking up! Stay warm! See everyone in February!

Clear Skies!

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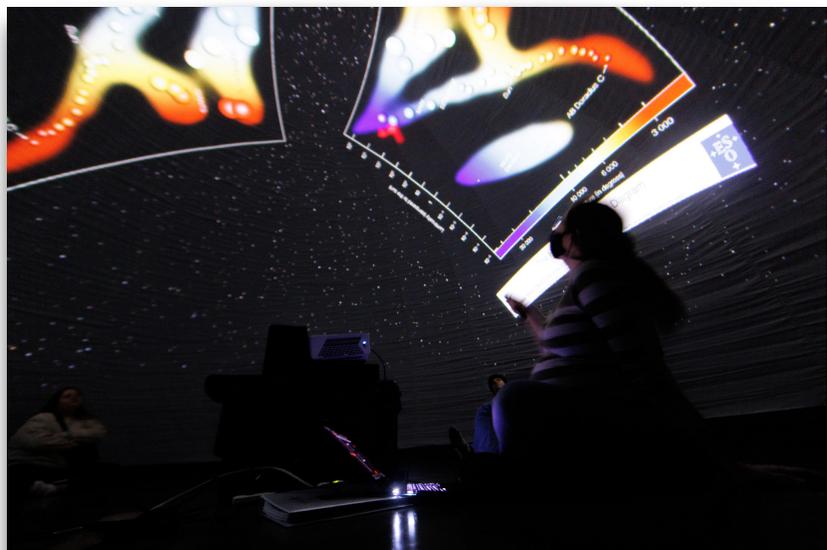
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NASA's Hubble Reveals Largest Found Chaotic Birthplace of Planets

HUBBLESITE, DEC 23, 2025

Astronomers using NASA's [Hubble Space Telescope](#) have imaged the largest protoplanetary disk ever observed circling a young star. For the first time in visible light, Hubble has revealed the disk is unexpectedly chaotic and turbulent, with wisps of material stretching much farther above and below the disk than astronomers have seen in any similar system. Strangely, more extended filaments are only visible on one side of the disk. The findings, which published Tuesday in *The Astrophysical Journal*, mark a new milestone for Hubble and shed light on how planets may form in extreme environments, as NASA's missions lead humanity's exploration of the universe and our place in it.

Located roughly 1,000 light-years from Earth, IRAS 23077+6707, nicknamed "Dracula's Chivito," spans nearly 400 billion miles — 40 times the diameter of our solar system to the outer edge of the Kuiper Belt of cometary bodies. The disk obscures the young star within it, which scientists believe may be either a hot, massive star, or a pair of stars. And the enormous disk is not only the largest known planet-forming disk; it's also shaping up to be one of the most unusual.

"The level of detail we're seeing is rare in protoplanetary disk imaging, and these new Hubble images show that planet nurseries can be much more

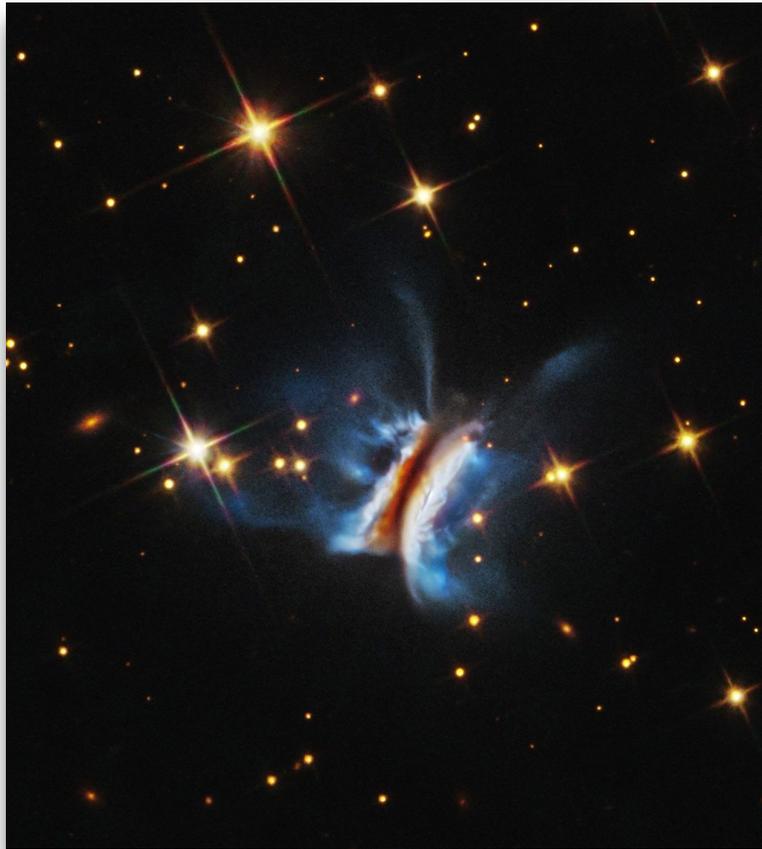
active and chaotic than we expected," said lead author Kristina Monsch of the Center for Astrophysics | Harvard & Smithsonian (CfA). "We're seeing this disk nearly edge-on and its wispy upper layers and asymmetric features are especially striking. Both Hubble and NASA's [James Webb Space Telescope](#) have glimpsed similar structures in other disks, but IRAS 23077+6707 provides us with an exceptional perspective — allowing us to trace its substructures in visible light at an unprecedented level of detail. This makes the system a unique, new laboratory for studying planet formation and the environments where it happens."

The nickname "Dracula's Chivito" playfully reflects the heritage of its researchers—one from Transylvania and another from Uruguay, where the national dish is a sandwich called a chivito. The edge-on disk

resembles a hamburger, with a dark central lane flanked by glowing top and bottom layers of dust and gas.

Puzzling asymmetry

The impressive height of these features wasn't the only thing that captured the attention of scientists. The new images revealed that vertically imposing filament-like features appear on just one side of the disk, while the other side appears to have a sharp edge and no visible filaments. This peculiar, lopsided structure suggests that dynamic processes, like the recent infall of dust and gas, or interactions with its surroundings, are shaping the disk.



This Hubble Space Telescope image shows the largest planet-forming disk ever observed around a young star. It spans nearly 400 billion miles — 40 times the diameter of our solar system.

"We were stunned to see how asymmetric this disk is," said co-investigator Joshua Bennett Lovell, also an astronomer at the CfA. "Hubble has given us a front row seat to the chaotic processes that are

shaping disks as they build new planets — processes that we don't yet fully understand but can now study in a whole new way.”

All planetary systems form from disks of gas and dust encircling young stars. Over time, the gas accretes onto the star, and planets emerge from the remaining material. IRAS 23077+6707 may represent a scaled-up version of our early solar system, with a disk mass estimated at 10 to 30 times that of Jupiter — ample material for forming multiple gas giants. This, plus the new findings, makes it an exceptional case for studying the birth of planetary systems.

“In theory, IRAS 23077+6707 could host a vast planetary system,” said Monsch. “While planet formation may differ in such massive environments, the underlying processes are likely similar. Right now, we have more questions than answers, but these new images are a starting point for understanding how planets form over time and in different environments.”

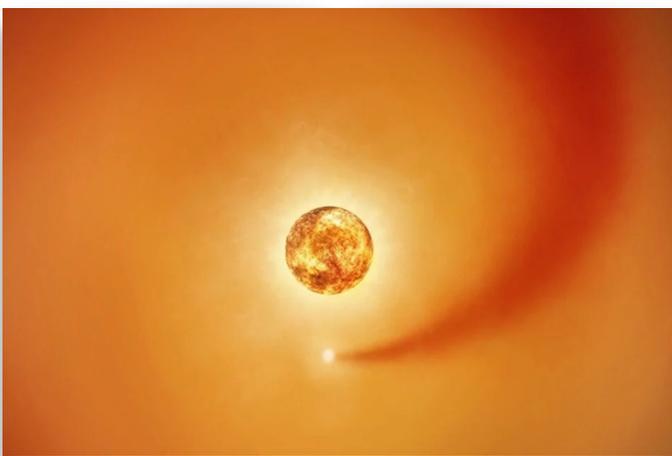


Betelgeuse's Hidden Companion May Finally Be Revealing Itself

With this new evidence, the existence of “Betelbuddy” is closer than ever to being confirmed.

By Elyn Lapointe

GIZMODO, JANUARY 6, 2026



An artist's concept of the red supergiant star Betelgeuse and an orbiting companion star. The companion orbits clockwise from this point of view, generating a dense wake of gas that expands outward

The [bizarre dimming patterns of Betelgeuse](#), an enormous red supergiant star in the constellation Orion, have bewildered astronomers for decades. Now, researchers are closer than ever to proving that a [companion star is the cause of this strange behavior](#).

Researchers at the Center for Astrophysics | Harvard & Smithsonian (CfA) detected a pattern of changes in Betelgeuse using NASA's Hubble Space Telescope and ground-based telescopes. They observed changes in the star's spectrum—the various colors of light emitted by its composition of elements—and in the speed and direction of gases in its outer atmosphere driven by a trail of denser material.

These changes are the direct result of the companion star, Siwarha, plowing through Betelgeuse's outer atmosphere. The dense trail the researchers observed is Siwarha's wake, appearing just after the star crosses in front of Betelgeuse every six years.

“It's a bit like a boat moving through water. The companion star creates a ripple effect in Betelgeuse's atmosphere that we can actually see in the data,” lead author Andrea Dupree, an astronomer at the CfA, said in a [NASA release](#). “For the first time, we're seeing direct signs of this wake, or trail of gas, confirming that Betelgeuse really does have a hidden companion shaping its appearance and behavior.”

Dupree and her colleagues presented their [findings](#) during a news conference at the 247th meeting of the American Astronomical Society in Phoenix, Arizona, on Monday. The study has been accepted for publication by *The Astrophysical Journal*, according to NASA.

The hunt for Betelgeuse's buddy

Astronomers have tracked Betelgeuse's brightness for decades, observing two distinct periods of variation: a short 400-day cycle and a long 6-year secondary period. Their interest in the star intensified in 2020 when it suddenly dimmed to just 40% of its normal brightness, prompting renewed efforts to understand its unusual behavior.

Studies have since determined that the 2020 event, now known as The Great Dimming, was caused by a [massive ejection of blazing hot material](#) from Betelgeuse's surface. As for the star's periodic

variations in brightness, scientists have proposed several possible explanations, including large convection cells and clouds of dust, magnetic activity, and the presence of a hidden companion star.

In recent years, astronomers have found mounting evidence to support the [companion star hypothesis](#). In July, a team at NASA's Ames Research Center actually managed to [capture a faint image](#) of what appeared to be the companion, nicknaming it "Siwarha." It was the strongest evidence yet, though other experts [cautioned](#) that further observations would be needed to confirm Siwarha's existence.

Now, Hubble and ground-based telescopes at the Fred Lawrence Whipple Observatory in Arizona and the Roque de Los Muchachos Observatory in Spain have provided those observations.

Tracing the trail

Using these telescopes, Dupree and her colleagues spent nearly eight years tracking changes in Betelgeuse's spectrum and outer atmosphere. The patterns they observed matched what would be expected from a companion star moving through Betelgeuse's outer atmosphere, producing a wake of disturbed gas, and aligned with the timing of Siwarha's predicted orbit.

"The idea that Betelgeuse had an undetected companion has been gaining in popularity for the past several years, but without direct evidence, it was an unproven theory," Dupree said. "With this new direct evidence, Betelgeuse gives us a front-row seat to watch how a giant star changes over time. Finding the wake from its companion means we can now understand how stars like this evolve, shed material, and eventually explode as supernovae."

With that said, astronomers are still hoping to capture a clear, direct image of Betelgeuse's buddy. They should get another chance in November 2027, when Siwarha returns to its farthest point of separation from Betelgeuse and is easiest to detect. Until then, scientists will continue to monitor the red supergiant's behavior, looking for even more evidence of its stellar companion. ☀

Astronomers baffled by 'mysterious disruptor' with a mass of 1 million suns and a black hole for a heart

By Robert Lea

SPACE.COM, JANUARY 12, 2026

"This is a structure we've never seen before, so it could be a new class of dark object."



A completely dark and mysterious body with the mass of 1 million suns and a possible black hole heart continues to baffle and intrigue astronomers despite further investigation.

This "mysterious disruptor" is located around 11 billion light-years away and was discovered in 2025 thanks to its gravitational influence. It is now the most distant body ever detected due to its gravitational effects alone.

But astronomers aren't completely in the dark about the mysterious disruptor, however. In fact, they are sure they know what lies at the heart of this strange cosmic body. "The inner central part is consistent with a [black hole](#) or dense stellar core, which surprisingly makes up about a quarter of the object's total mass," Vegetti explained. "As we move away from the center, however, the object's density flattens into a large disk-like component. This is a structure we've never seen before, so it could be a new class of dark object."

This strange structure was found in the gravitational lens system JVAS B1938+666. [Gravitational lensing](#) is a phenomenon first predicted by Einstein in the 1915 theory of gravity known as [general relativity](#). It occurs when light from a background source passes the

curvature of space caused by a massive foreground object, known as a gravitational lens, causing its usually straight path to become curved. The way light is influenced doesn't just allow objects to be seen at great distances via light amplification, but also tells scientists a great deal about the way mass is distributed within the lensing system itself.

The gravitational lens JVAS B1938+666 consists of massive bodies ranging from 6.5 billion to 11 billion light-years away, including this "mysterious disruptor," the most distant element of Jvas B1938+666. A team of astronomers attempted to reconstruct the distribution of mass in the object, revealing its so-called "density profile."

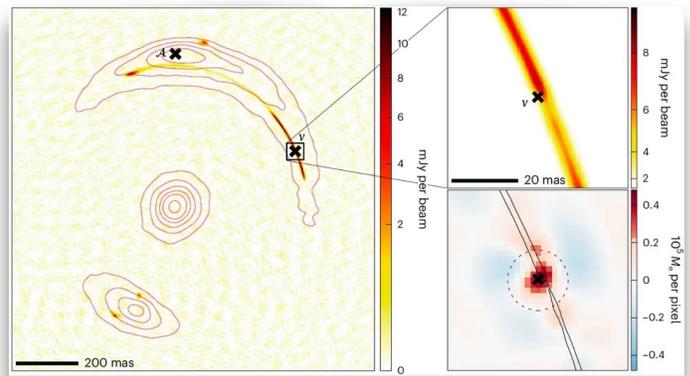
That's a highly complex procedure considering JVAS B1938+666 consists of many different bodies, the main component of which is a massive elliptical galaxy. Unlike those other bodies, however, the mysterious disruptor is completely invisible.

"Trying to separate all the different mass components of such a distant, low-mass object using gravitational lensing was extremely challenging and incredibly exciting," team leader Simona Vegetti of the Max Planck Institute for Astrophysics, Germany, said in a statement. "We're working with high-quality data and complex models, and just when I thought we had it all figured out, its properties threw up another surprise. "It's precisely this combination of difficulty and mystery that makes this object so fascinating."

What do we know about the mysterious disruptor so far?

To investigate the mysterious disruptor, Vegetti and colleagues first set about analyzing the small disturbances, or perturbations, that it makes to the overall arc of the gravitational lens JVAS B1938+666. They then compared data collected by an array of telescopes, including the [Green Bank Telescope](#), to various models of dark matter. This revealed that none of these models could explain the mysterious disruptor.

"It has a very strange profile, because it's particularly dense at the center, but it extends enormously," team member Davide Massari of the National Institute for Astrophysics said. "So it's not uniformly distributed: it's as if there were an extremely compact object at the center, but then the profile continues to extend to distances much greater than those typically observed in galaxies or star systems of comparable mass."



(Left) The gravitational arc of the JVAS B1938+666 system. The two 'X's' indicate the positions of two low-mass perturbers. (Right) The approximately one-million-solar-mass perturber.

Though investigations of the mysterious disruptor have thus far involved radio telescopes, future studies and a potential solution to this conundrum could come courtesy of telescopes operating in other wavelengths of light, including the powerful infrared vision of the [James Webb Space Telescope](#) (JWST). "If we were finally able to observe some form of light emission in the visible or infrared range, we could conclude, for example, that it is a somewhat anomalous ultracompact dwarf galaxy, with an unusually extended stellar halo," team member Cristiana Spingola of the National Institute for Astrophysics. "But if even with JWST we still fail to see starlight or other visible matter, then it would mean that we are dealing with an object whose properties are difficult to explain with current dark matter models." ☀

Physicists prove the Universe isn't a simulation after all

Researchers have mathematically proven that our universe cannot be a simulation.

SCIENCEDAILY, NOVEMBER 10, 2025

New research from UBC Okanagan mathematically demonstrates that the universe cannot be simulated. Using Gödel's incompleteness theorem, scientists found that reality requires "non-algorithmic understanding," something no computation can replicate. This discovery challenges the simulation hypothesis and reveals that the

universe's foundations exist beyond any algorithmic system.

Physicists have proven that the universe's laws can't be fully described by computation. Reality itself depends on a deeper, non-algorithmic understanding that no simulation could reproduce. Credit:

Shutterstock



The idea that our universe might be nothing more than an elaborate computer simulation has been a favorite theme in science fiction for decades. Yet new research from UBC Okanagan suggests that not only is this concept implausible -- it is mathematically impossible.

Dr. Mir Faizal, an Adjunct Professor at UBC Okanagan's Irving K. Barber Faculty of Science, and his collaborators, Drs. Lawrence M. Krauss, Arshid Shabir, and Francesco Marino, have shown that the underlying fabric of reality operates in a way no computer could ever replicate.

Their study, published in the *Journal of Holography Applications in Physics*, doesn't just dispute the idea of a simulated universe like *The Matrix*. It goes further, demonstrating that the cosmos itself is built upon a kind of understanding that lies outside the reach of any algorithm.

The Simulation Hypothesis Meets Mathematics

"It has been suggested that the universe could be simulated. If such a simulation were possible, the simulated universe could itself give rise to life, which in turn might create its own simulation. This recursive possibility makes it seem highly unlikely that our universe is the original one, rather than a simulation nested within another simulation," says Dr. Faizal. "This idea was once thought to lie beyond the reach of scientific inquiry. However, our recent research has demonstrated that it can, in fact, be scientifically addressed."

The team's findings rest on the evolving understanding of what reality truly is. Physics has moved far beyond Isaac Newton's view of solid objects moving through space. Einstein's theory of relativity replaced that classical model, and quantum mechanics transformed it yet again. Now, at the forefront of theoretical physics, quantum gravity proposes that even space and time are not fundamental elements. Instead, they arise from something deeper -- pure information.

The Hidden Realm Beneath Reality

Physicists describe this informational layer as a "Platonic realm," a mathematical foundation more real than the physical world we perceive. According to the new research, it is from this realm that space and time themselves emerge.

However, the scientists demonstrated that even this information-based structure cannot fully describe reality through computation alone. By applying advanced mathematical principles, including Gödel's incompleteness theorem, they proved that any consistent and complete model of existence requires what they call "non-algorithmic understanding."

To grasp this idea, imagine how a computer works -- it follows a set of defined instructions step by step. Yet, some truths exist that cannot be reached by following any sequence of logical operations. These are known as "Gödelian truths," and while they are real, they cannot be proven using computation.

Where Computation Fails

Consider the statement, "This true statement is not provable." If it were provable, it would be false, contradicting logic. If it cannot be proven, then it is true, which means any logical system attempting to prove it is incomplete. In either case, computation alone falls short.

"We have demonstrated that it is impossible to describe all aspects of physical reality using a computational theory of quantum gravity," says Dr. Faizal. "Therefore, no physically complete and consistent theory of everything can be derived from computation alone. Rather, it requires a non-algorithmic understanding, which is more fundamental than the computational laws of quantum gravity and therefore more fundamental than spacetime itself."

Why the Universe Cannot Be Simulated

If the underlying rules of the Platonic realm seem similar to those governing a computer simulation, could that realm itself be simulated? The answer, according to the researchers, is no.

"Drawing on mathematical theorems related to incompleteness and indefinability, we demonstrate that a fully consistent and complete description of reality cannot be achieved through computation alone," explains Dr. Faizal. "It requires non-algorithmic understanding, which by definition is beyond algorithmic computation and therefore cannot be simulated. Hence, this universe cannot be a simulation."

Co-author Dr. Lawrence M. Krauss notes that the implications of this finding extend deep into the foundations of physics. "The fundamental laws of physics cannot be contained within space and time, because they generate them. It has long been hoped, however, that a truly fundamental theory of everything could eventually describe all physical phenomena through computations grounded in these laws. Yet we have demonstrated that this is not possible. A complete and consistent description of reality requires something deeper -- a form of understanding known as non-algorithmic understanding."

Reality Beyond Algorithms

As Dr. Faizal summarizes, "Any simulation is inherently algorithmic -- it must follow programmed rules. But since the fundamental level of reality is based on non-algorithmic understanding, the universe cannot be, and could never be, a simulation."

For years, the simulation hypothesis was regarded as untestable, confined to the realms of philosophy and speculative fiction. This new research, however, anchors it firmly in mathematical and physical theory -- delivering what may be the final, definitive answer to one of science's most intriguing questions.

The Backyard Observer, February 2026

By Rick Heschmeyer

Lepus

When Orion the Hunter stands high in the southern winter sky, the best time to observe this month's feature constellation has arrived. Located below the feet of Orion is the constellation Lepus, the Hare. Because of its southern declination this constellation's best observing time comes when it lies directly south, on the meridian, and reaches its highest elevation in the night sky for observers in the Northern Hemisphere. Lepus contains quite an assortment of interesting objects for the backyard observer.

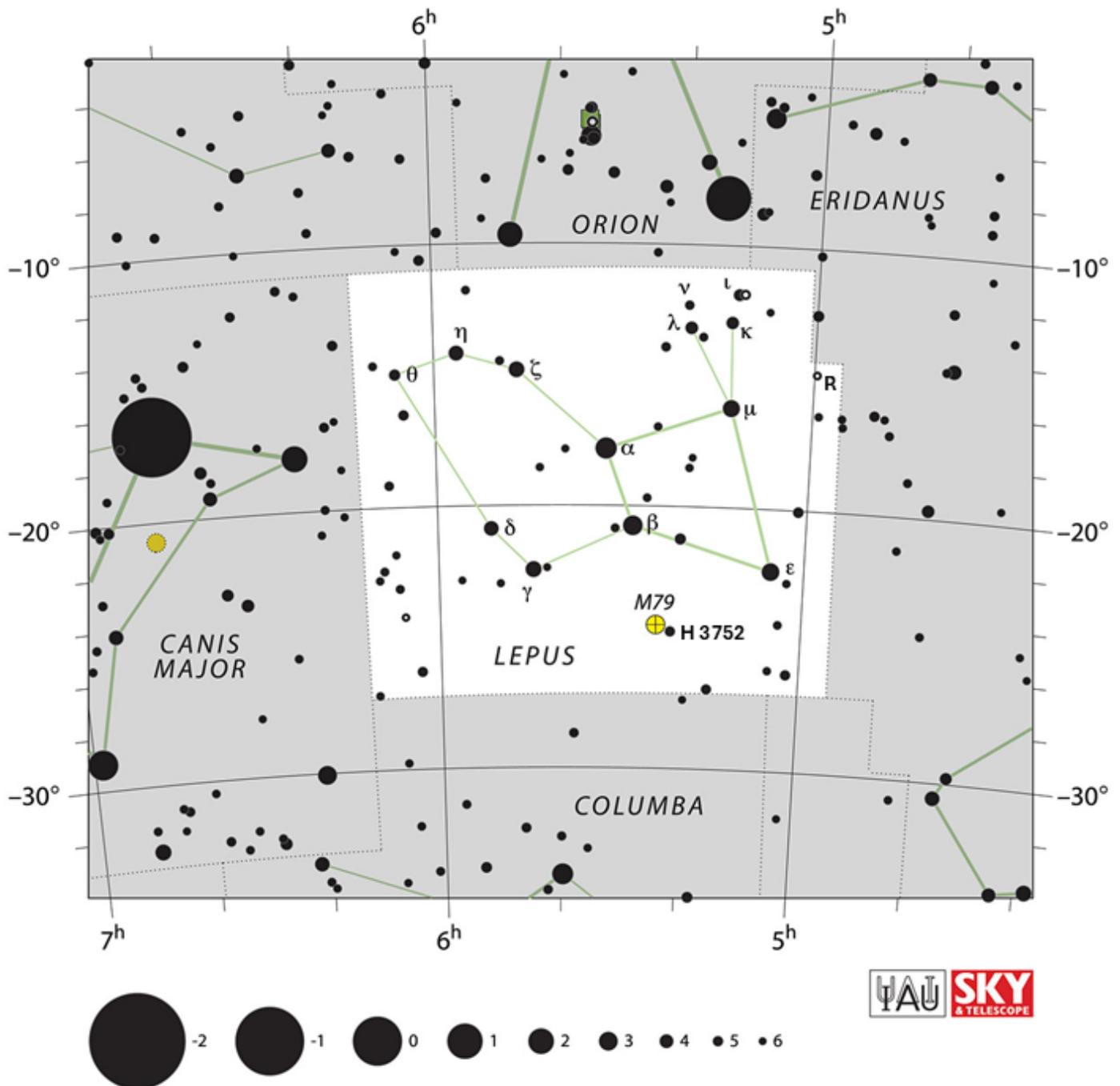
Gamma Leporis is relatively bright, naked eye star in Lepus and is relatively close as well at only 29 light years away. Gamma Leporis was once considered a prime target in the search for exoplanets, but subsequent study has proven otherwise. It does have a companion though, as it is travelling through space with Gamma Leporis B. While the A component is much brighter than B, the pair can be seen in binoculars.

R Leporis is better known as "Hind's Crimson Star" after the London astronomer who discovered it in 1845. This star is a long-period variable star, but the most remarkable aspect of R Leporis is its intense red color. Its discoverer described it "of the most intense crimson, resembling a blood-drop on the black background of the sky". R Leporis is a "carbon star". Stars of this type show strong bands of carbon-based compounds in their spectra, indicating cool temperatures. With a period of 427 days and a brightness range from magnitude 5.5 to magnitude 11.7, a telescope is needed to follow R Leporis through its entire cycle of variation. Like most red variable stars the red color is most intense when the star is at minimum brightness. You will not have to wait long for the next minimum, which is expected in late February or early March 2026.

h 3752 is a gorgeous triple star system located $1/2^\circ$ southwest of Messier 79 (discussed below). The AB pair is visible in small telescopes, but you will have to crank up the magnification to split the very close AC pair.

Messier 79 is located just northeast of h3752. When you need a globular fix on mid-winter evenings, Messier 79 is a moderately bright, very compact cluster with a dense core surrounded by an expansive halo of faint. Although not one of the most impressive globular clusters in Messier’s catalogue, it is nonetheless the only one visible in the night sky of winter, and by default, the brightest. Some astronomers think our galaxy poached M79 from the Canis Major Dwarf Galaxy. Tidal interactions have stretched the former dwarf into a ring of related star clusters (including Messier 79) that wraps around the Milky Way. The greatest concentration of stars is just 25,000 light-years away, making the shredded dwarf the closest external galaxy to Earth. Soon it will lose its identity altogether as the Milky Way slowly devours its contents. Life just isn't fair.

With all the bright stars and well-known constellations in the winter sky, many constellations worthy of note, but less conspicuous, often get left out in the cold. There are other constellations, like Lepus, which deserve a portion of your observing time. Don't ignore them or you will miss out on some of the more beautiful sights in the night sky.

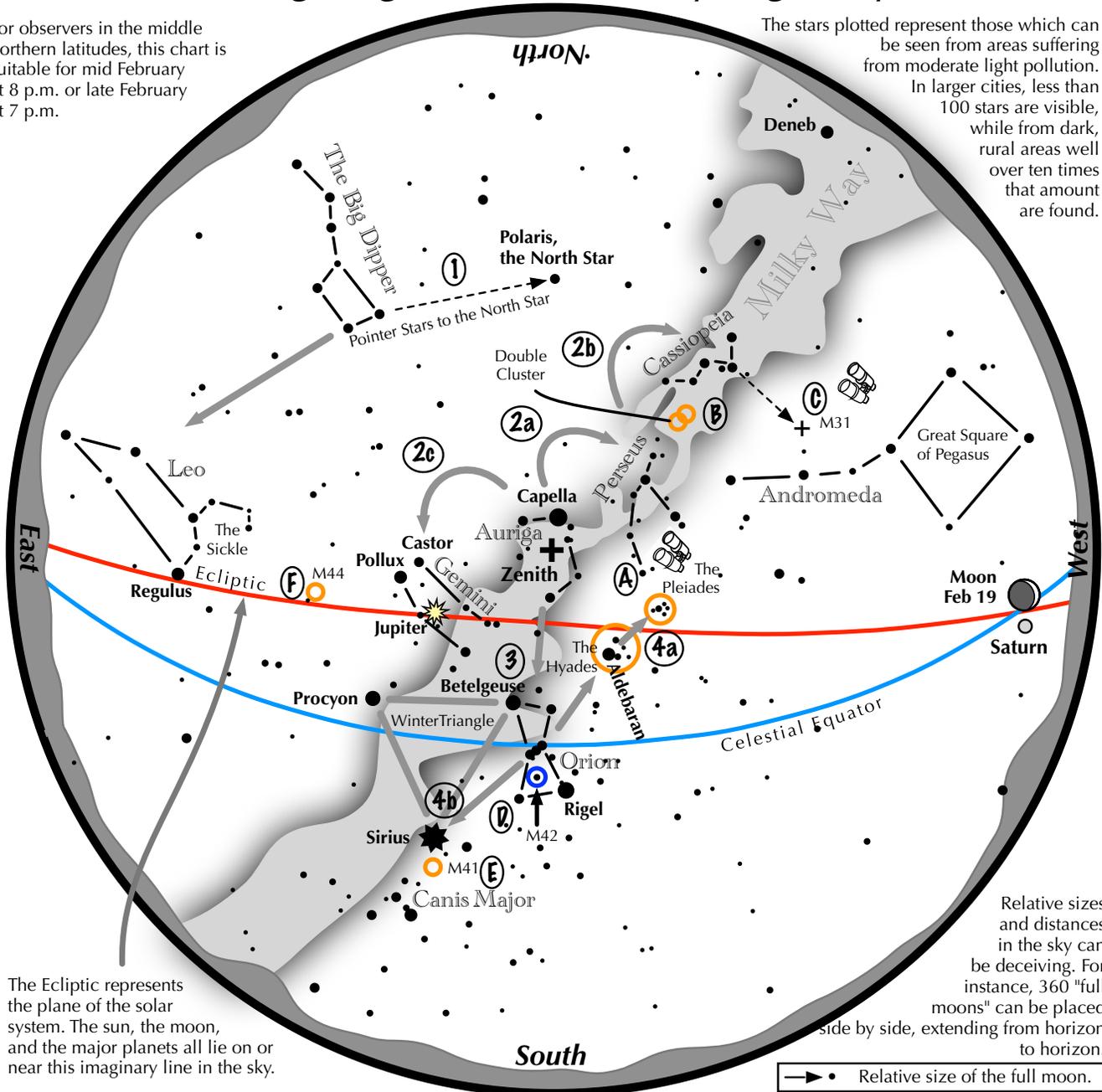


Navigating the mid February Night Sky

2026

For observers in the middle northern latitudes, this chart is suitable for mid February at 8 p.m. or late February at 7 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 February 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.
- 2 Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first 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, a member of the Winter Triangle.

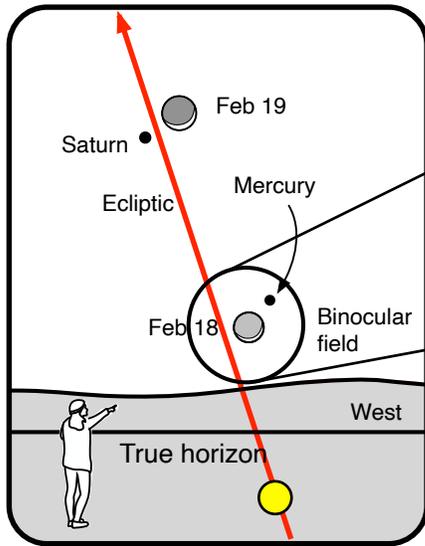
Binocular Highlights

- A: Examine the stars of two naked eye star clusters, the Pleiades and the Hyades.
- B: Between the "W" of Cassiopeia and Perseus lies the Double Cluster.
- C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
- D: M42 in Orion is a star forming nebula. E: Look south of Sirius for the star cluster M41. F: M44, a star cluster barely visible to the naked eye, lies southeast of Pollux.

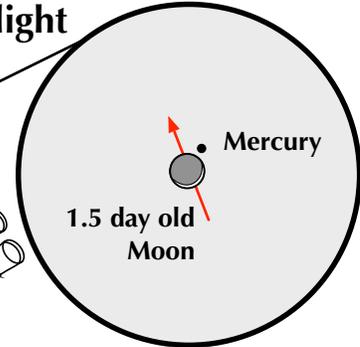


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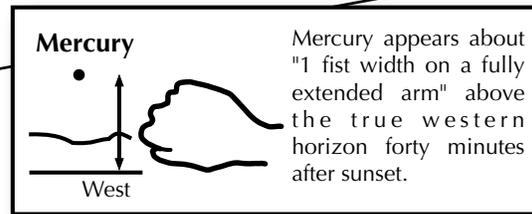
Mercury and the young moon in the bright evening twilight



**February 18 and 19, 2026:
Mercury and the young crescent moon
forty minutes after sunset in the west**



View through
10x50 binoculars
on February 18



Mercury appears about
"1 fist width on a fully
extended arm" above
the true western
horizon forty minutes
after sunset.

The young moon & Mercury in the evening twilight

Have you ever spotted Mercury? Many stargazers have not. The early evening scene on February 18 presents a good opportunity to catch the elusive little planet. Look low into the western twilight forty minutes after sunset.



- Using binoculars, look on February 18 for the very thin crescent Moon floating either below or left of Mercury. Can you see Earthshine on the Moon's dark side or is the twilight too bright? The Moon may be difficult to spot appearing as a washed-out sliver. Some areas in the extreme southcentral US might see the moon occult the planet before the twilight brightens too much.
- On the next evening, Mercury is in the same place, but the moon has moved higher and next to Saturn.

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](#).