Volume 51 Number 9 September 2025

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Coming Events

Monthly Meeting
September 28, 2025, 7:00PM
Baker Wetlands Discovery Center

Public Observing
September 28, 2025, 8:00PM
Baker Wetlands Discovery Center

Club Officers

President
Rick Heschmeyer email

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NSN Coordinator
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Inside This Issue

Report From the Officers

Rick Heschmeyer

Our August Club Meeting took place on Sunday, August 24, 2025, at 7:00 PM at the Baker Wetlands Discovery Center. The presentation, by Rick Heschmeyer, was a talk about both the Astronomical League's AstroCon 2025, which he attended in Bryce Canyon, Utah in June, and the Mid-Sates Region of the Astronomical League's 2025 Conference held in Little Rock, AR eight days earlier.

The weather cooperated and we had a public observing session following the meeting. The Discovery Center's 14 inch dome was opened for attendees to gaze through and there were 4 others scopes available as well.

As a result of the interest shown in our scheduled events at the KU Field Station this year, we have scheduled two more events there 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.

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.

David Kolb will be talking about Cecilia Payne-Gaposckin and her discovery of the composition of stars at our September Club Meeting on Sunday, September 28, 2025. The meeting starts at 7:00 PM and will be followed, weather permitting, by public telescope observing.

Looking forward to seeing everyone at our upcoming events.

Clear Skies!

Space photo of the week: Cotton candy clouds shine in one of Hubble's most beautiful images ever

By Jamie Carter

LIVESCIENCE, MAY 18, 2025

The Large Magellanic Cloud, which is visible only from the Southern Hemisphere, has been caught in the crosshairs of the Hubble Space Telescope.

The "cotton-candy" clouds of gas and dust in the Large Magellanic Cloud, as seen by the Hubble Space Telescope.

Why it's so special: If you need an excuse to visit the Southern Hemisphere, the Hubble Space Telescope has just provided one. This spectacular new image, taken with Hubble's Wide Field Camera 3, showcases the Large Magellanic Cloud (LMC), the biggest satellite galaxy of the Milky Way. It is visible only from the Southern Hemisphere.

This dense star field appears as a big, fuzzy patch in the night sky from anywhere in the Southern Hemisphere. Hubble's new view uses five filters to isolate different wavelengths of light, including ultraviolet and infrared light, which the human eye cannot see.

The result is a starry cloudscape of wispy gas that resembles multicolored cotton candy against a background of orange and blue stars. There's also a zoomable version available online.

Despite being a dwarf galaxy, the LMC may be pivotal in the Milky Way's future. Within the next 10 billion years, our galaxy is expected to collide with Andromeda — a spiral galaxy 2.5 million light-years away and the nearest major galaxy to the Milky Way. In 2019, scientists predicted that the LMC is also heading toward the Milky Way and could begin to interact with it in 2.4 billion years.

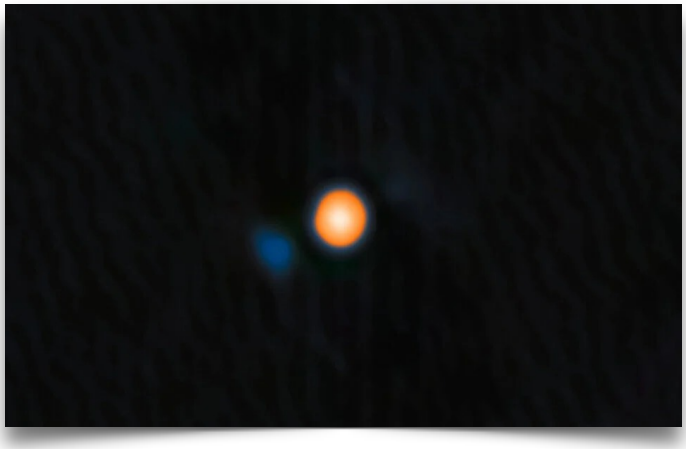
The LMC is one of many dwarf galaxies that orbit the Milky Way, but it's one of only two that are visible to the naked eye. The other is the Small Magellanic Cloud (SMC), which can be seen close to the LMC between October and February from the Southern Hemisphere.

The LMC and the SMC are connected by a bridge of gas called the Magellanic Bridge, indicating that they may have interacted in the past. Both dwarf galaxies have been orbiting the Milky Way for about 1.5 billion years. Recent research indicates that the SMC is being torn apart and may in fact be two galaxies. Both dwarf galaxies are named after Portuguese explorer Ferdinand Magellan. ☀

Astronomers Spot Companion Star in Orbit Around Iconic Star Betelgeuse, Confirming Suspicions

Astronomers have confirmed the existence of a companion star in a tight orbit around Betelgeuse, resolving a long-standing mystery about the star's varying brightness.

By Gayoung Lee
Gizmodo, July 21, 2025

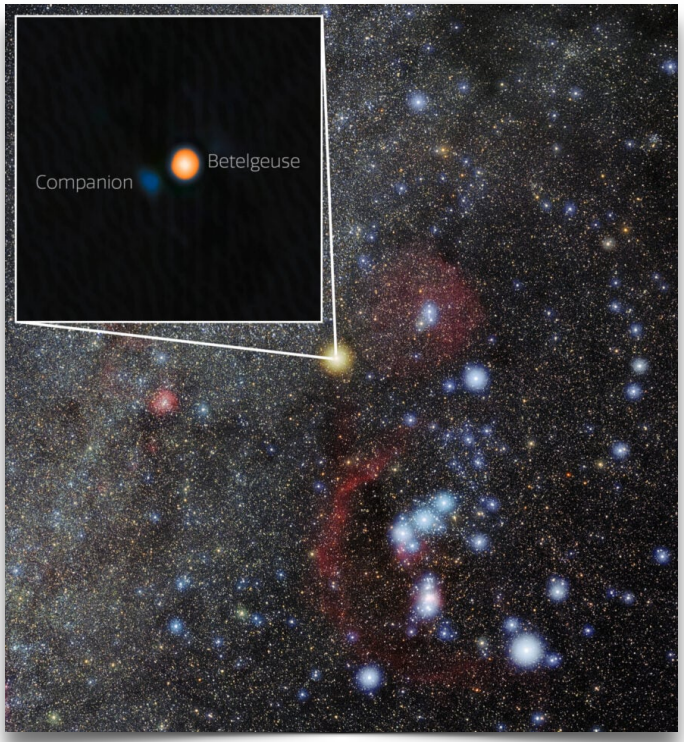


In 2024, astronomers surmised that Betelgeuse might have a stellar "buddy." If this hypothetical companion existed, it would help answer some questions about the red supergiant's strange glowing patterns. As it turns out, these suspicions were correct.

After numerous false signals and empty search results, astronomers with NASA's Ames Research Center have confirmed that Betelgeuse does, in fact, have a tiny buddy star. The young star, with a mass about 1.5 times that of the Sun, likely exerts some unsolicited influence on the larger star's gravitational field and the cosmic dust floating in its vicinity. The interactions between the two stars make it appear as though Betelgeuse—unlike most stars of its kind—undergoes an additional, extended period of intermittent dimming roughly every six years.

"Papers that predicted Betelgeuse's companion believed that no one would likely ever be able to image it," Steve Howell, an astronomer who led the team that discovered the star, said in a statement. "This now opens the door for other observational pursuits of a similar nature."

For the discovery, astronomers used the Gemini North telescope in Hawaii, employing a technique known as speckle imaging, which uses very short exposure times to wipe out distortions in space images caused by Earth's atmosphere. This allowed the researchers to directly capture the companion star at a high enough resolution to identify some key characteristics about the newly discovered star, such as its mass and temperature.



Betelgeuse and Its Stellar Companion in Orion.

What's fascinating about "BetelBuddy"—as the researchers who predicted its existence called it in a past interview with Gizmodo—is that it was probably born around the same time as Betelgeuse. To put this into perspective, Betelgeuse, a red supergiant, is nearing the end of its stellar lifespan, and astronomers predict it could explode into a fiery supernova within a decade or so. But the newly discovered companion star is so young that it hasn't even started igniting hydrogen at its core, implying that it's still at the earliest stages of stellar evolution. This is likely because Betelgeuse, which is somewhere between 10 and 20 times the mass of our Sun, has a far shorter lifespan compared to its lightweight buddy.

Given Betelgeuse's relative proximity to Earth, astronomers have studied it more closely than most other stars for centuries. From their observations, astronomers found that the star's brightness varies on a cycle of about 400 days, with a secondary period lasting around six years. Variable stars are relatively common, but astronomers had long struggled to explain why Betelgeuse had an extended dimming period.

To be clear, this is different from the "Great Dimming" of Betelgeuse from 2019 to 2020, which scientists suspect is the result of the star ejecting a large cloud of dust that subsequently blurred its brightness.

With the new discovery, astronomers now have a good answer to the mystery behind the years-long dimming and brightening pattern of the huge star Betelgeuse. They expect, however, that Betelgeuse's intense gravitational pull will gobble up the young star within the next 10,000 years.

Thankfully, this won't be the first and last time we see BetelBuddy alive. Astronomers expect the young star to pass within our telescopes' detection range in November 2027, when it flies the farthest away from Betelgeuse. ☀

This real 'Eye of Sauron' spits out ghost particles in space. Here's what it looks like

By Monisha Ravisetti

SPACE.COM, AUGUST 13, 2025

"We have never seen anything quite like it."

For about 15 years, a powerful radio telescope on planet Earth dutifully recorded data about a location in the cosmos billions of light-years away from us — and, at last, astronomers managed to stitch together those extensive observations to reveal a full picture of what this telescope has been looking at.

It's … the Eye of Sauron! Well, sort of.

Though the image you're seeing bears a striking resemblance to the jarring symbol associated with the main villain in the Lord of the Rings trilogy of novels by J.R.R. Tolkien, it's actually something far more fear-inducing. At face value, at least.

What you're looking at is actually a blazar, which requires a couple of layers to explain. Out in the universe, there are these things called quasars, which refer to the extremely luminous centers of active galaxies (meaning they emit a lot of electromagnetic radiation) that are powered by supermassive black holes. These galactic cores are called active galactic nuclei, or AGNs; and in fact, the monster black holes powering these phenomena can also funnel matter outward in the form of highly energetic jets of particles moving at nearly the speed of light. It's all very intense. Quasars can be so bright that they outshine the collective light of every single star in the galaxy surrounding them.

Blazars, on the other hand, are pretty much quasars — except with those supermassive-black-hole-rooted jets pointing within 10 degrees of our planet. That doesn't exactly mean we're about to be obliterated by a jet, though. Remember how I said the fear remains at face value? The only reason we're seeing the jet pointing straight toward us is because of our vantage point, and this doesn't necessarily increase its danger. Still, blazars, because of this serendipitous orientation, tend to appear even brighter than the already ridiculously bright quasars. Not that it matters, but Sauron would sure love them.

"When we reconstructed the image, it looked absolutely stunning," Yuri Kovalev, lead author of the study and principal investigator of the Multi-messenger Studies of Extragalactic Super-colliders project at the Max Planck Institute for Radio Astronomy (MPIfR), said in a statement. "We have never seen anything quite like it — a near-perfect toroidal magnetic field with a jet, pointing straight at us."

"This alignment causes a boost in brightness by a factor of 30 or more," explains Jack Livingston, a study co-author at MPIfR. "At the same time, the jet appears to move slowly due to projection effects — a classic optical illusion."

And this particular blazar could be the one blazar to rule them all. Scientists have formed a clear image of it using observations from the Very Long Baseline Array (named PKS 1424+240), and it may very well be one of the brightest sources of high-energy gamma rays and cosmic neutrinos ever observed.

Neutrinos are mind-blowing items themselves, while we're at it. They're nicknamed "ghost particles" because they're invisible, zippy bits that penetrate the entirety of our cosmos yet remain tremendously difficult to detect. Trillions of these particles are flowing through your body as you read this, but you can't tell because they don't interact with any of the particles that make up your body. They slide right through.

The IceCube Neutrino Observatory near the South Pole, specifically built to pin down neutrinos, is actually the institution that discovered PKS 1424+240 in the first place because of its super high neutrino emission levels. Solving this puzzle confirms that active galactic nuclei with supermassive black holes are not only powerful accelerators of electrons, but also of protons — the origin of the observed high-energy neutrinos.

Reconstructing the spectacular blazar, according to the discovery team, also allows astronomers to peer directly into the "heart" of this jet — and that could be great news for scientists trying to understand the dynamics of these awesome objects. Kovalev explains that it confirms AGNs with supermassive black holes don't only accelerate electrons (negatively charged particles that make up atoms) but also protons. This is a big find, the researcher explains, because that explains the origin of the high-energy neutrinos PKS 1424+240 appears to be spitting out.

A study about these results was published on Tuesday (Aug. 12) in the journal Astronomy & Astrophysics Letters. ☀

How alien ‘canals’ sparked debate over life on Mars

By Emily Conover

Sciencenews, August 14, 2025

Beginning in 1877, Italian astronomer Giovanni Schiaparelli observed narrow lines on Mars that he called canali, Italian for “channels.” His observations helped set off a turn-of-the-century Mars craze.

It’s not aliens. It’s never aliens.

From the late 1800s through the early 1900s, a Mars mania gripped the world, and the United States in particular. Newspapers blared with sensationalist headlines. (One example: “Scientists now know positively that there are thirsty people on Mars.”) Astronomy lectures tantalized the public. Theater performances envisioned hypothetical interactions with Martians. Advertisers hitched themselves to the trend to sell their products. Even Alexander Graham Bell was convinced.

The frenzy was sparked by apparent linear features on Mars, observed by multiple astronomers through various telescopes. The lines were dubbed “canals,” which were claimed by one faction of astronomers, despite shaky evidence, to have been constructed by intelligent life for irrigation. The canals, we now know, were illusions. More detailed observations taken in 1909 suggested that they were either irregular natural features or didn’t exist at all. But until then, the canals seemed very real to some particularly vocal observers.

Among the most notable proponents was American astronomer Percival Lowell, an aristocrat who used his wealth to fund his observations of the planet. Alongside Lowell, the book follows several other scientists, including inventor Nikola Tesla, who claimed to have detected Martian messages to Earth.

Other Mars enthusiasts make cameos, including science fiction writer H.G. Wells, who published his famous extraterrestrial-invasion story, The War of the Worlds, during this period, and journalist Garrett Serviss, who was agnostic about the canals' existence but supplied eager readers with the latest information.

Greedily encouraged by the yellow journalism of the era, canal believers engaged in wild speculation, debating the possibilities for Martians' appearance, their culture and the purported vegetation of the planet they supposedly inhabited. That clamor mostly drowned out the sober voices of many other scientists, who argued there was no evidence for canals, much less for life that created them.

The idea of life on Mars lodged itself in the public consciousness in ways that persist today. Baron recounts a comment by zoologist Edward S. Morse, who suggested that Martians might be similar to creatures on Earth that thrive under diverse conditions, including ants. Henceforth, Martians became antennaed.

Baron doesn't shy away from calling out the racism in the public's view of Martians, which sometimes seemed an extension of the exotification of people of color: During a trip to Algeria, Lowell compared the locals to Martians. And Martians were sometimes depicted with exaggerated features reminiscent of racist imagery of Black people.

The saga of Mars' canals poses a cautionary tale for scientists who followed Lowell. He aimed to follow scientific principles but was misled by his own bias. Still, his work pushed science forward. He financed an expedition to take hundreds of photos of the Red Planet. The Mars craze also inspired innumerable children who would grow up to be scientists or science popularizers, including rocketry pioneer Robert Goddard, astronomer Carl Sagan and science fiction editor Hugo Gernsback.

Baron mostly confines his commentary to the era of the Mars craze, but in reading, one can't help but consider current events. In recent years, prominent astronomers have claimed to have seen potential signs of life on an exoplanet and evidence of an alien spacecraft in the solar system in announcements that quickly drew criticism from other scientists. More broadly, the warping of science to argue for unsubstantiated but sensational conclusions — that vaccines cause autism or that climate change is a hoax, for example — is a persistent problem.

Part of the reason the Martian craze took off, Baron argues, was because people wanted to believe. The creatures, apparently capable of irrigating their entire planet and sharing water with one another, were depicted as wise and good, living in harmony — a vision of a civilization earthlings could only dream of. ☀

The Backyard Observer, September 2025

By Rick Heschmeyer

SAGITTARIUS, PART 2

When looking towards Sagittarius in the direction of the center of our own galaxy, we are viewing a very crowded part of the night sky. As a result, we broke our tour of the constellation into two parts. In July we focused our attention on the eastern half of the constellation. This month we will focus on the westernmost objects within the constellation.

We will start this month with Messier 22, the Sagittarius Globular Cluster. If this object were located higher in the northern skies, its magnificence would rival that of the Great Globular Cluster in Hercules, M13! While scanning the night sky in search of Saturn in August of 1665, the German amateur astronomer Abraham Ihle made a surprise discovery-the globular cluster Messier 22. It was one of the first globular clusters ever discovered. Located about 10,500 light-years from Earth, the cluster's relatively bright apparent magnitude of 5.1 makes it a popular target for today's amateur astronomers. In ideal conditions, M22 can be seen with the naked eye. In addition to its more than 100,00 stars, it also contains not one, but at least two, stellar mass black holes.

Messier 24 is also known as the Small Sagittarius Star Cloud (or Cluster). But it is not really a cluster at all. When we peer into the heart of the galaxy our view is obscured by clouds of gas and dust making it impossible for us to see the grandeur of our galaxy in its fullest. But through a tunnel like clear space between the dust clouds we can see a portion of the

otherwise obscured Sagittarius arm of our galaxy, and this portion is Messier 24! Several clusters and nebulae can be seen as a "part of" M24.

About 2000 light years from us lies Messier 25, a bright open cluster in Sagittarius. The cluster appears to be bisected by a dark lane. From a dark location M25 is visible to the naked eye. Small telescopes will reveal about 30 stars, while larger instruments (8 inches or more) will double that star count.

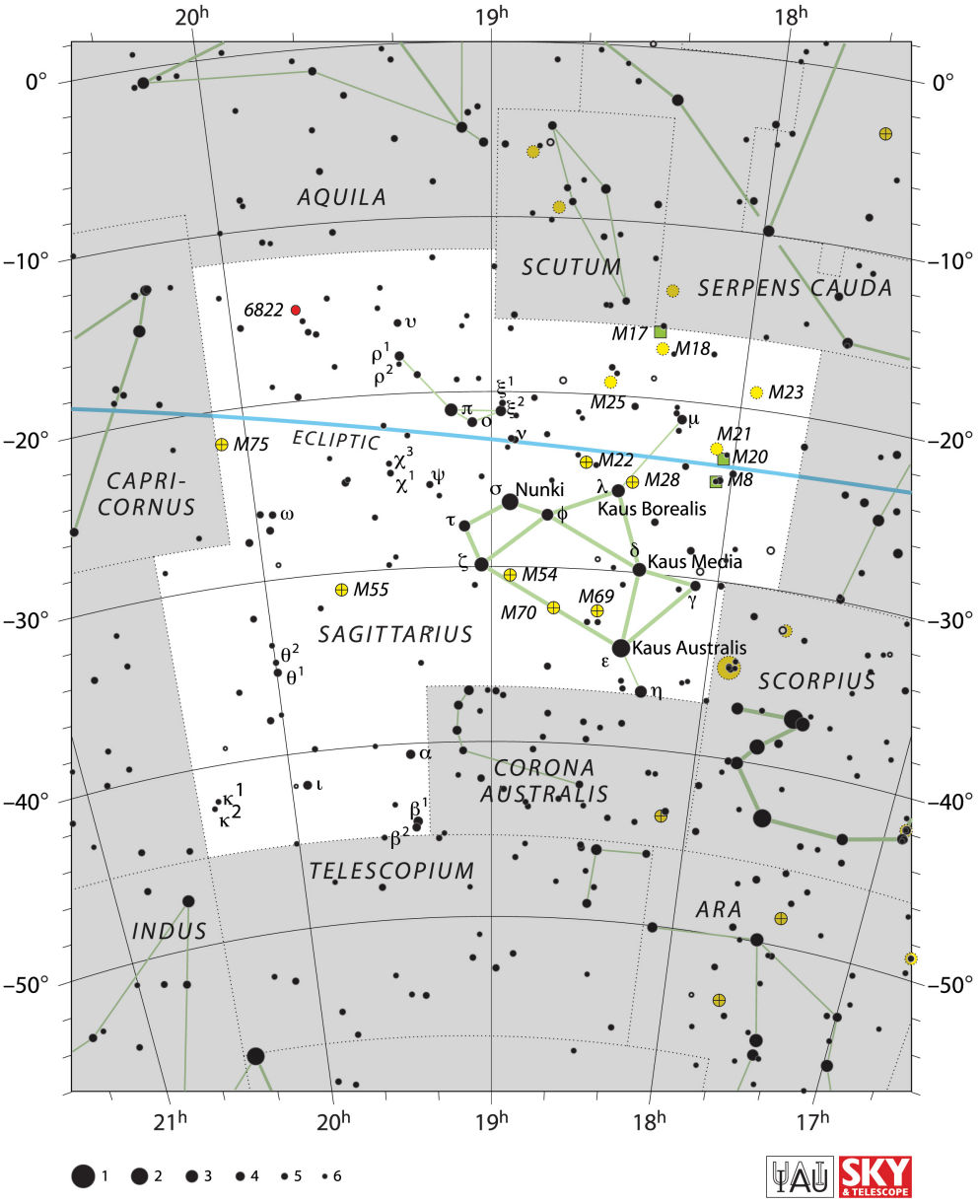
Messier 28 was discovered in 1764 by the French astronomer Charles Messier. The globular cluster is visible as a faint hazy patch in binoculars. It lies about 18,000 light years from us. In 1986, using the Lovell Radio Telescope in England, a millisecond radio pulsar was discovered inside the cluster, a first.

Messier 54 is another globular cluster located in the Sagittarius constellation. For years, it was assumed that M54 was a distant part of the Milky Way galaxy, lying at over 50,000 light years distant. But, in 1994, it was discovered that the cluster was probably a member of the Sagittarius Dwarf Elliptical Galaxy. As such it is the first object thought to be a part of our galaxy to be "reassigned" to another galaxy! In telescopes it appears small, bright, and round with a star-like nucleus.

Messier 55 sits low in the sky for northern hemisphere observers, making it a challenging object to observe, despite its large size and relative brightness. Telescopes can make out some individual stars within the cluster, but in binoculars it appears as a dim hazy patch of light.

Containing about 400,000 stars, the highly condensed globular cluster Messier 75, while easily visible in telescopes and binoculars, may appear now more than a bright, slightly out-of-focus star in the latter. It takes a telescope of at least 10 inches to start to resolve any individual stars. M75 is the second most distant Messier globular, second only to Messier 54 (see above) which lies beyond our galaxy.

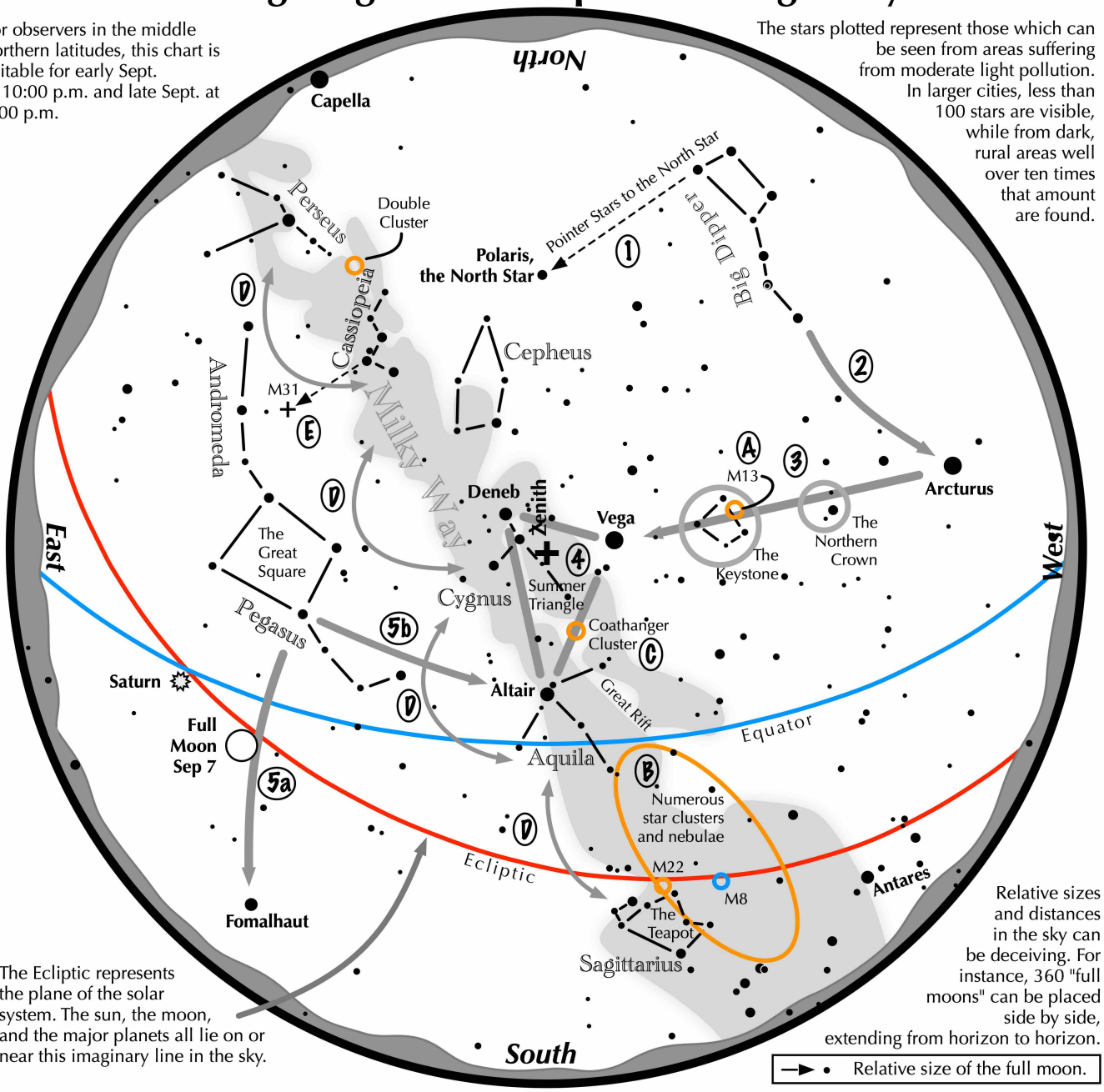
This concludes out two-part tour of the deep sky delights of Sagittarius. Here's hoping you can get out and view the many objects this summer constellation has to offer. And remember that when you are looking in their direction you are gazing into the heart of our own Milky Way galaxy. Enjoy!



Navigating the mid September Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Sept. at 10:00 p.m. and late Sept. at 9:00 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

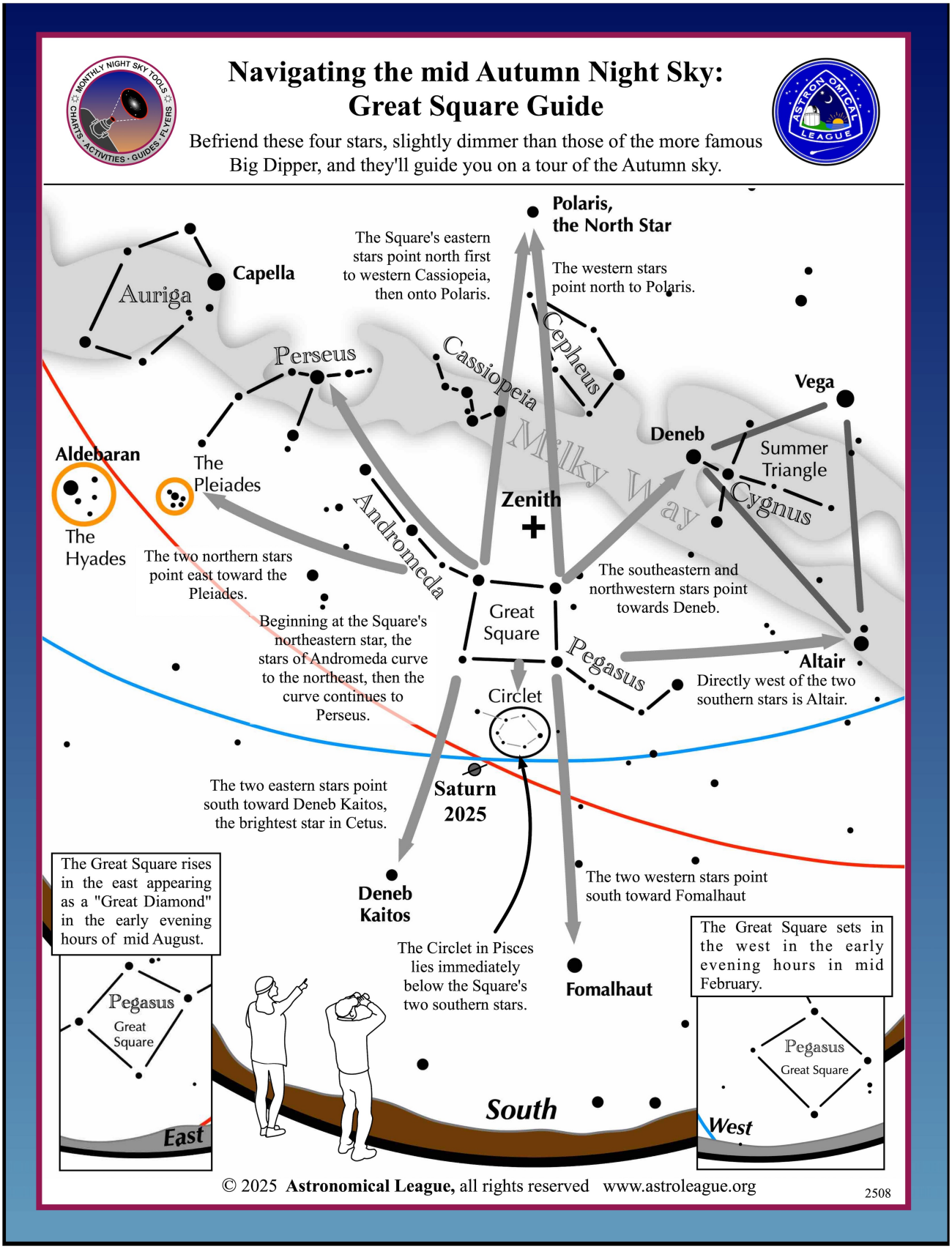
—► • Relative size of the full moon.

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

1. Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
2. Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the September evening sky.
3. Nearly overhead shines a star of similar brightness as Arcturus, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
4. The stars of the summer triangle, Vega, Altair, and Deneb, shine overhead.
5. The westernmost two stars of the Great Square, which lies high in the east, point south to Fomalhaut. The southernmost two stars point west to Altair.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
D: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.
E: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.


Navigating the mid Autumn Night Sky:
Great Square Guide
Befriend these four stars, slightly dimmer than those of the more famous Big Dipper, and they'll guide you on a tour of the Autumn sky.
Polaris, the North Star
The Square's eastern stars point north first to western Cassiopeia, then onto Polaris.
The western stars point north to Polaris.
Auriga
Capella
Perseus
Cassiopeia
Cepheus
Vega
Deneb
Summer Triangle
Cygnus
Milky Way
Aldebaran
The Pleiades
The Hyades
Andromeda
Zenith
The two northern stars point east toward the Pleiades.
Beginning at the Square's northeastern star, the stars of Andromeda curve to the northeast, then the curve continues to Perseus.
Great Square
Pegasus
The southeastern and northwestern stars point towards Deneb.
Altair
Directly west of the two southern stars is Altair.
Circlet
Saturn 2025
The two eastern stars point south toward Deneb Kaitos, the brightest star in Cetus.
Deneb Kaitos
The two western stars point south toward Fomalhaut
Fomalhaut
The Circlet in Pisces lies immediately below the Square's two southern stars.
The Great Square rises in the east appearing as a "Great Diamond" in the early evening hours of mid August.
Pegasus
Great Square
East
South
The Great Square sets in the west in the early evening hours in mid February.
Pegasus
Great Square
West
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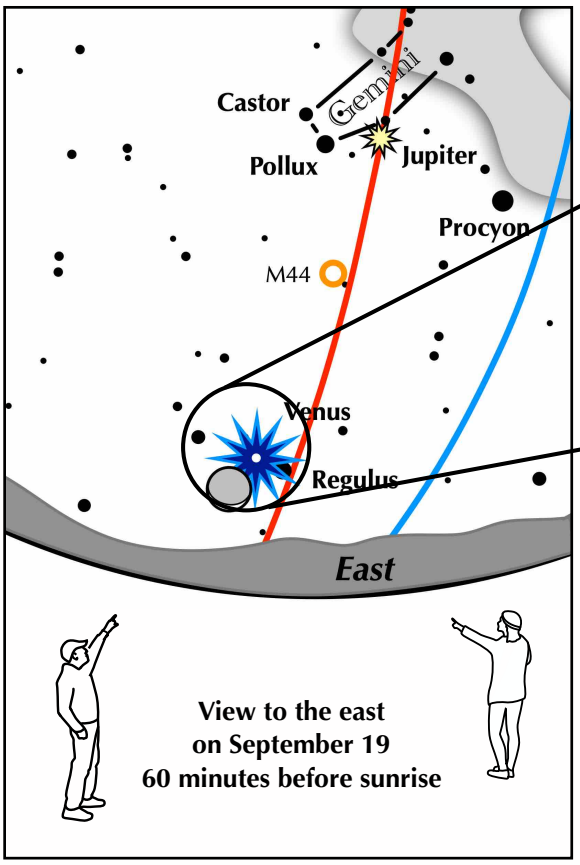
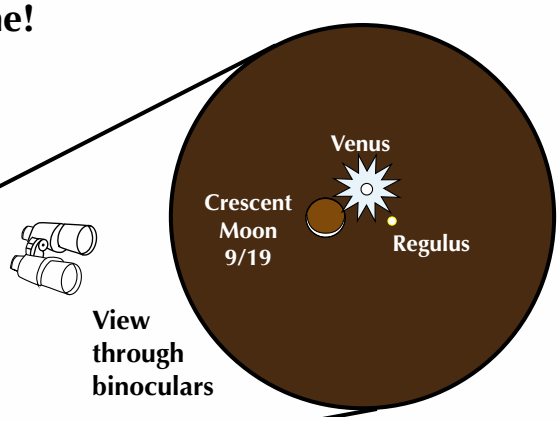
If you can see only one celestial event in the morning this September, see this one!





Crescent moon meets brilliant Venus and the star Regulus

On the morning of September 19, the crescent moon, full with earthshine, joins brilliant Venus and the brightest star in Leo, Regulus, for a dramatic sight. Look low in the east-northeast 60 minutes before sunrise.

Be sure to use binoculars to cleanly separate this celestial trio!

Above them all shines bright Jupiter, itself forming an attractive isosceles triangle with the twin stars of Gemini, Castor and Pollux. To their lower right shines the bright star Procyon.

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.