Volume 51 Number 6 June 2025

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Coming Events

Monthly Meeting
No Meeting This Month
Baker Wetlands Discovery Center

Public Observing
No Observing This Month
Baker Wetlands Discovery Center

Club Officers
President
Rick Heschmeyer email

AICOR
William Winkler 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

Welcome to summer. School is out, summer vacations have started, and our club summertime activities have started (sort of). As we have discussed, the Post-Summer Band Concert Observing sessions have been disappointing for the past several years. Earlier this year we tested a new location for observing, the KU Field Station. For our February event we had 53 attendees! So we decided to schedule a couple more events at the Field Station over the summer. Unfortunately, our first event which was scheduled for May 23 was rained out, as was our scheduled rain date the following night. That's the bad news! The good news is that 68 people rsvp'd for the event! We have one more event scheduled at the Field Station this summer, on Friday, July 11, starting at 9PM. In the event of inclement weather, the rain date will be the following day, Saturday, July 12, same time.

We have also scheduled a Solar Observing event "Solar Power: Sungazing and Cyanotypes" in partnership with the KU Spencer Museum of Art on Thursday, June 5 from 4-6 pm. We will be doing solar observing outside and have a table with information about the club inside. Let me know if you would be interested in helping with this event.

If you have any other ideas for summer events, please let me know.

Our next Monthly Club Meeting will take place on Sunday, August 31, 2025, at 7PM at the Baker Wetlands Discovery Center. It will be followed by public telescope observing at 8PM, weather permitting.

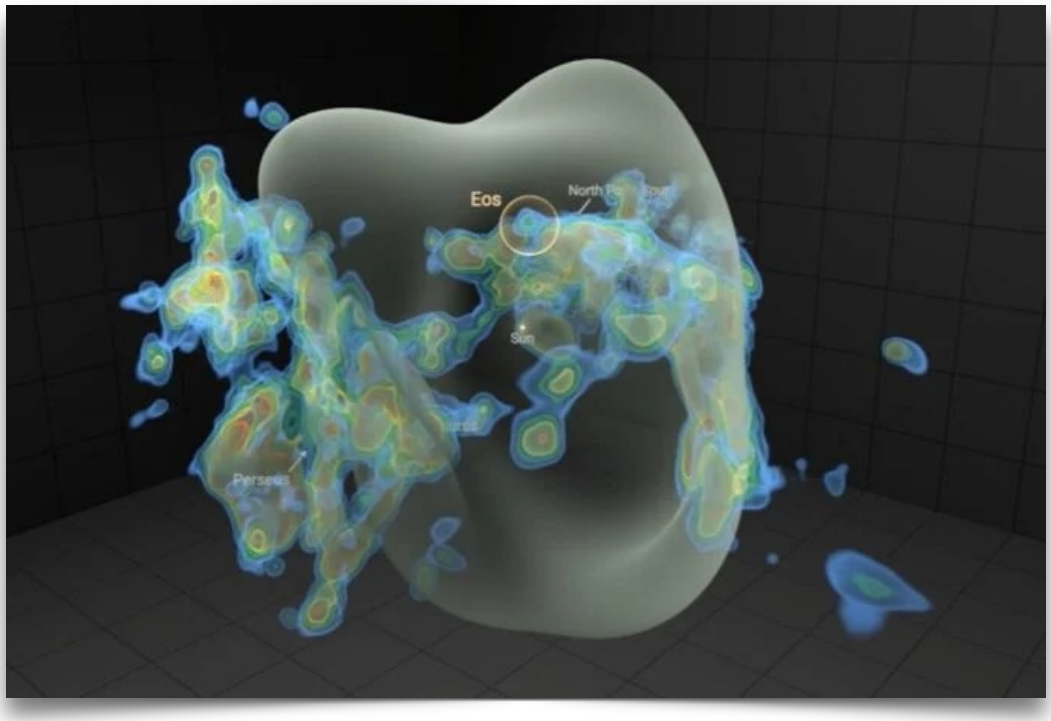
Looking forward to seeing everyone at our summer events.

Clear Skies!

Scientists Discover a Massive, Glowing Blob of Hydrogen Very Close to Our Solar System

The molecular cloud is brimming with material that could birth baby stars.

By Passant Rabie
Gizmodo, April 29, 2025



The birthplace of stars begins within large, cold clouds of gas and dust, which eventually collapse under the weight of gravity. Molecular clouds are vast cosmic entities that often stretch for hundreds of light-years, and scientists just discovered a massive one lurking in our celestial neighborhood.

The cloud, named Eos after the Greek goddess of dawn, was discovered around 300 light-years away from our solar system. It is one of the largest single structures in the sky, and may be the closest molecular cloud to Earth, according to a paper published this week in Nature Astronomy. Because it's so close, it offers astronomers a unique front row seat to the star-forming process and to observe the molecular universe.

Stellar nurseries in our general galactic neighborhood lie along the surface of the Local Bubble, a large, hot cavity of plasma surrounded by a shell of gas and dust. In order to find the molecular clouds within that bubble, scientists have had to rely on observations of dust emissions. For the recent discovery, however, scientists found the nearby molecular cloud by detecting the fluorescent nature of hydrogen in the far-ultraviolet realm of the electromagnetic spectrum, according to the paper.

"This is the first-ever molecular cloud discovered by looking for far ultraviolet emission of molecular hydrogen directly," Blakesley Burkhart, a physics and astronomy professor at the Rutgers School of Arts and Sciences and lead author of the study, said in a statement.

Molecular hydrogen, which is made up of two hydrogen atoms stitched together, is the most abundant molecule in the universe. It is also, however, difficult to detect as it glows in far ultraviolet wavelengths that get absorbed by Earth's atmosphere. "The data showed glowing hydrogen molecules detected via fluorescence in the far ultraviolet," Burkhart added. "This cloud is literally glowing in the dark."

Aside from its glowing appearance, Eos is crescent-shaped and sits on the edge of the Local Bubble. It spans an apparent size of 40 full Moons in the sky, and with a mass that's around 3,400 times that of the Sun. Using the same technique that revealed this previously invisible cloud, scientists could discover more hidden clouds across the Milky Way galaxy.

"When we look through our telescopes, we catch whole solar systems in the act of forming, but we don't know in detail how that happens," Burkhart said. "Our discovery of Eos is exciting because we can now directly measure how molecular clouds are forming and dissociating, and how a galaxy begins to transform interstellar gas and dust into stars and planets." ☀

Hubble Comes Face-to-Face with Spiral's Arms

HUBBLESITE, MAY 9, 2025

The spiral galaxy NGC 3596 is on display in this NASA/ESA Hubble Space Telescope image that incorporates six different wavelengths of light. NGC 3596 is situated 90 million light-years from Earth in the constellation Leo, the Lion. British astronomer Sir William Herschel first documented the galaxy in 1784.

NGC 3596 appears almost perfectly face-on when viewed from Earth, showcasing the galaxy's neatly wound spiral arms. These bright arms hold concentrations of stars, gas, and dust that mark the area where star formation is most active, illustrated by the brilliant pink star-forming regions and young blue stars tracing NGC 3596's arms.

What causes these spiral arms to form? It's a surprisingly difficult question to answer, partly because spiral galaxies are so diverse. Some have clear spiral arms, while others have patchy, feathery arms. Some have prominent bars across their centers, while others have compact, circular nuclei. Some have close neighbors, while others are isolated.

Early ideas of how spiral arms formed stumped astronomers with the 'winding problem'. If a galaxy's spiral arms are coherent structures, its arms would wind tighter and tighter as the galaxy spins, until the arms are no longer visible. Now, researchers believe that spiral arms represent a pattern of high-density and low-density areas rather than a physical structure. As stars, gas, and dust orbit within a galaxy's disk, they pass in and out of the spiral arms. Much like cars moving through a traffic jam, these materials slow down and bunch up as they enter a spiral arm, before emerging and continuing their journey through the galaxy. ☀

Turning down starlight to spot new exoplanets

SCIENCEDAILY, APRIL 18, 2025

Researchers have developed a new coronagraph -- an optical device that blocks out light from a bright source -- that could make it possible to see distant exoplanets obscured by light from their parent stars. The new device could reveal exoplanets beyond our solar system that today's telescopes cannot resolve, providing insights into the possibility of life beyond Earth.

"Earth-like planets in the habitable zone -- the region around a star where temperatures could allow liquid water to exist -- can easily be up to a billion times dimmer than their host star," said research team leader Nico Deshler from the University of Arizona. "This makes them difficult to detect because their faint light is overwhelmed by the star's brightness. Our new coronagraph design siphons away starlight that might obscure exoplanet light before capturing an image."

In *Optica*, the researchers show that the new coronagraph can theoretically achieve the fundamental limits of exoplanet detection and localization set by quantum optics. They also used it to capture images that allowed them to estimate the position of artificial exoplanets with distances from their host star up to 50 times smaller than what the telescope's resolution limit would normally allow.

"Compared to other coronagraph designs, ours promises to supply more information about so-called sub-diffraction exoplanets -- those which lie below the resolution limits of the telescope," said Deshler. "This could allow us to potentially detect biosignatures and discover the presence of life among the stars."

Blinded by the light

Optically analyzing exoplanets poses a formidable challenge because, at astronomical scales, they are often too close to their parent star for current telescopes to resolve. Exoplanets can also be orders of magnitude dimmer than their host star. Although astronomers have developed various ways to indirectly infer the presence of a planet around a prospective star, directly observing exoplanets in images would be ideal.

With NASA's next-generation space telescope, the Habitable Worlds Observatory (HWO), being dedicated to exoplanet science, many coronagraph designs have emerged, each with different practical and theoretical performance trade-offs. At the same time, recent work has shown that traditional notions of resolution for telescopes do not reflect fundamental limits and can be circumvented with careful optical pre-processing.

Inspired by these developments, the researchers decided to use a spatial mode sorter available in their lab to develop an improved coronagraph that theoretically rejects all the light from an on-axis star while achieving maximal throughput of an off-axis exoplanet.

Much like piano notes emit different acoustic frequencies, light sources in space excite different spatial modes -- unique shapes and patterns of oscillation -- depending on their position. The researchers separated these different modes using a mode sorter to isolate and eliminate light from a star and an inverse mode sorter to recompose the optical field after the starlight is rejected. This made it possible to capture an image of the exoplanet without the star.

"Our coronagraph directly captures an image of the exoplanet, as opposed to measuring only the quantity of light from the exoplanet without any spatial orientation," said Deshler. "Images can provide context and composition information that can be used to determine exoplanet orbits and identify other objects that scatter light from a star such as exozodiacal dust clouds."

Imaging faint exoplanets

After configuring their coronagraph in the lab, the researchers constructed an artificial star-exoplanet scene in which the exoplanet was positioned close enough to the star to be unresolvable with a traditional telescope. The contrast ratio between the star and the planet was set to 1000:1.

The researchers scanned the position of the exoplanet to simulate an orbit where the planet traverses in front of the star and then tried to determine its position in each frame. The images captured with their experimental setup incorporating the new coronagraph allowed them to estimate the position of the exoplanet at sub-diffraction planet-star separations.

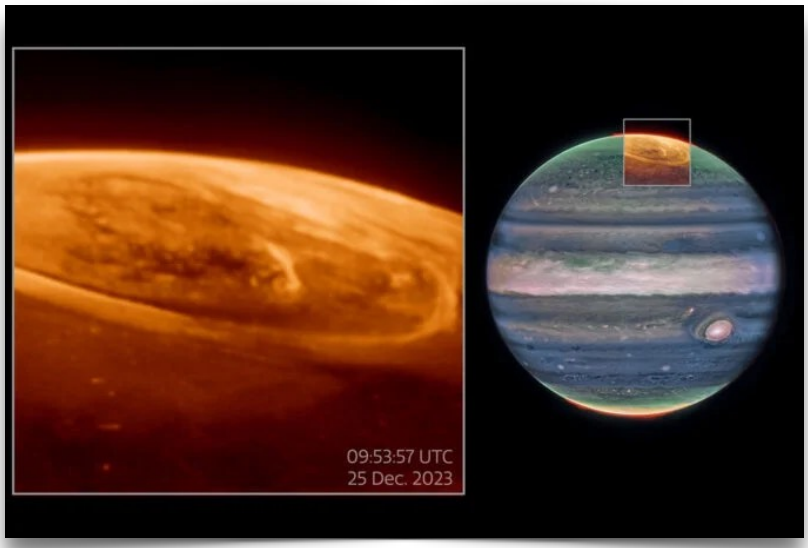
The researchers are working to improve the mode sorter to reduce crosstalk, a type of interference in which light leaks across different optical modes. For scenes with moderate contrast levels, crosstalk is not very problematic. However, the extreme contrasts found in exoplanet science would require a very high-fidelity spatial mode sorter to sufficiently isolate light from the star.

The researchers say that this proof-of-principle experiment could inspire further exploration of optical pre-processing with spatial mode sorters in future astronomical instrumentation. For example, the spatial mode filtering methods they used could address more complex scenarios, such as treating stars as extended objects, and may also lead to new imaging methods for quantum sensing, medical imaging and communications. ☀

Detailed New Images of Jupiter's Aurora Reveal Strange and Unexplained Brightness

By Passant Prabie

Gizmodo.com, may 13, 2025



The image on the right shows the planet Jupiter to indicate the location of the observed auroras, which was originally published in 2023.

NASA's Webb space telescope has captured haunting new views of Jupiter's auroral display, revealing the bright light show in exquisite, never-before-seen details. Using the telescope's most recent observations of the gas giant, scientists uncovered a curious discrepancy between how Jupiter's auroras appear to Webb versus Hubble.

Webb's NIRCam (Near-Infrared Camera) zoomed into Jupiter's poles to capture the planet's fast-varying auroral features, which are 100 times brighter than the ones seen on Earth.

"We wanted to see how quickly the auroras change, expecting them to fade in and out ponderously, perhaps over a quarter of an hour or so," Jonathan Nichols, a researcher at the University of Leicester in the United Kingdom, and lead author of a new paper published in the journal Nature Communications, said in a statement. "Instead, we observed the whole auroral region fizzing and popping with light, sometimes varying by the second."

On Earth, auroras take place when energetic particles from the Sun interact with the planet's magnetic field and its atmosphere, creating shimmering displays of light across the skies known as the Northern and Southern Lights. Aside from the Sun's particles, Jupiter has an additional source that creates its auroras. Jupiter's strong magnetic field grabs charged particles from its surroundings and accelerates them to high speeds. These speedy particles, some of which are thrown into space by Jupiter's orbiting moon Io, slam into the planet's atmosphere at high energies and excite the gas, causing it to glow.

Using Webb's recent observations of Jupiter's aurora, the scientists studied emissions from a molecule called trihydrogen cation. The special molecule is formed when energetic particles rip an electron off of a hydrogen molecule, and that molecule then reacts with other hydrogen molecules. The study found that the trihydrogen cation emissions are far more variable than they previously believed. Understanding the behavior of the special molecule helps scientists better understand how Jupiter's atmosphere cools and heats.

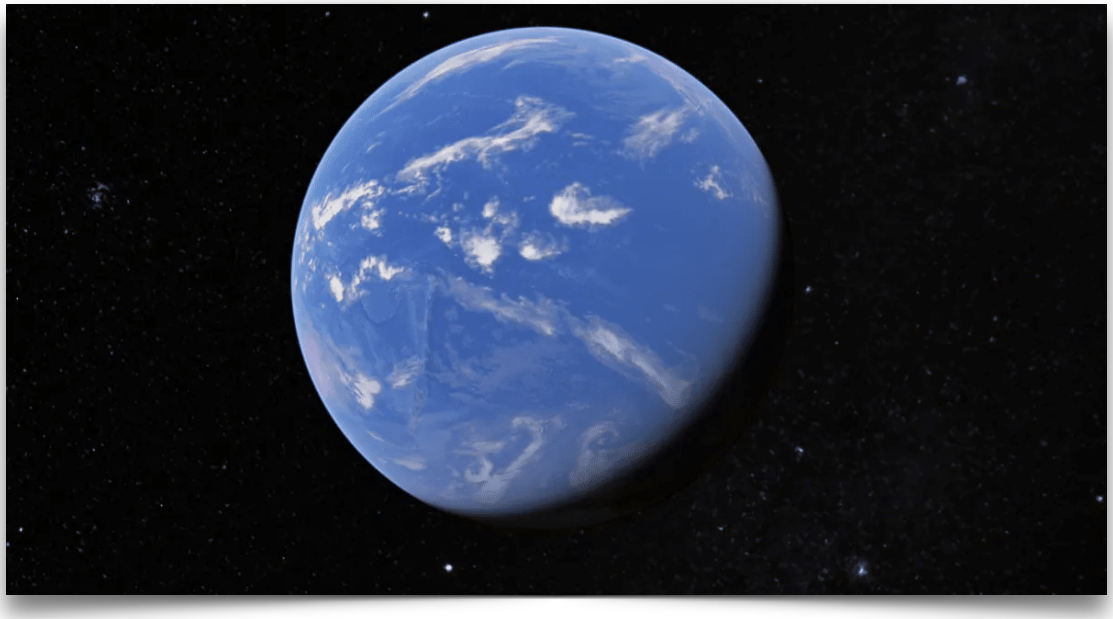
The scientists also took images of Jupiter's auroras with NASA's Hubble Space Telescope at the same time Webb made its observations, capturing them in ultraviolet light. They uncovered a strange discrepancy between the two sets of data, the brightest light observed by Webb had no real counterpart in the Hubble images.

"This has left us scratching our heads," Nichols said. "In order to cause the combination of brightness seen by both Webb and Hubble, we need to have a combination of high quantities of very low-energy particles hitting the atmosphere, which was previously thought to be impossible. We still don't understand how this happens."

The team plans on carrying out follow-up observations of Jupiter's auroras using Webb and compare them to data collected by the ongoing Juno mission. The spacecraft has been orbiting the gas giant since 2016, capturing Jupiter and its moons in exquisite detail. Webb previously captured images of Jupiter's glowing auroras at its north and south poles, providing scientists with a new perspective of the planet's light display in infrared wavelengths. ☀

New Footage Shows a Never-Seen-Before Side of Earth That Will Change How You See Our Planet

This shocking new view of Earth will change everything you thought you knew about our planet.



By Jessica Bennett

DAILYGALAXY, MAY 17, 2025

A striking image captured by Google Earth shows Earth from a perspective that reveals the planet's vast blue surface in unprecedented detail. The image emphasizes why Earth is often called the "blue marble," highlighting the overwhelming dominance of water on the planet's surface. From this vantage point, the extensive coverage of oceans becomes undeniable, illustrating the fundamental role of water in shaping Earth's environment and climate systems.

The Overwhelming Scale of Earth's Water Coverage

About 71 percent of the Earth's surface is covered by water, a fact that becomes strikingly clear when seen from this unique vantage point. The ocean's sheer size and influence are staggering. The National Oceanic and Atmospheric Administration (NOAA) estimates the Pacific Ocean alone covers more than 155 million square kilometers (60 million square miles), making it the largest and deepest ocean basin on the planet. This massive body of water holds more than half of Earth's open water supply and plays a critical role in sustaining life, regulating climate, and shaping weather patterns worldwide. Its depth and expanse are unmatched, including the deepest known point on Earth, the Challenger Deep in the Mariana Trench, which plunges nearly 11 kilometers beneath the surface.

Why This View Challenges Our Perception of Earth

From the perspective shown in the image, Earth appears as a smooth, glowing blue sphere, resembling distant ice giants in our solar system rather than the richly textured planet we are accustomed to. The absence of large landmasses at the center of this view underscores how much ocean dominates the planet's surface. This challenges the common perception of Earth as primarily land-based and reveals the planet's water-driven identity. The blue color is a result of sunlight interacting with the water's surface, giving Earth its distinctive hue when viewed from space. It's a humbling reminder of the fragile and vast ecosystem that exists within this seemingly endless blue expanse.

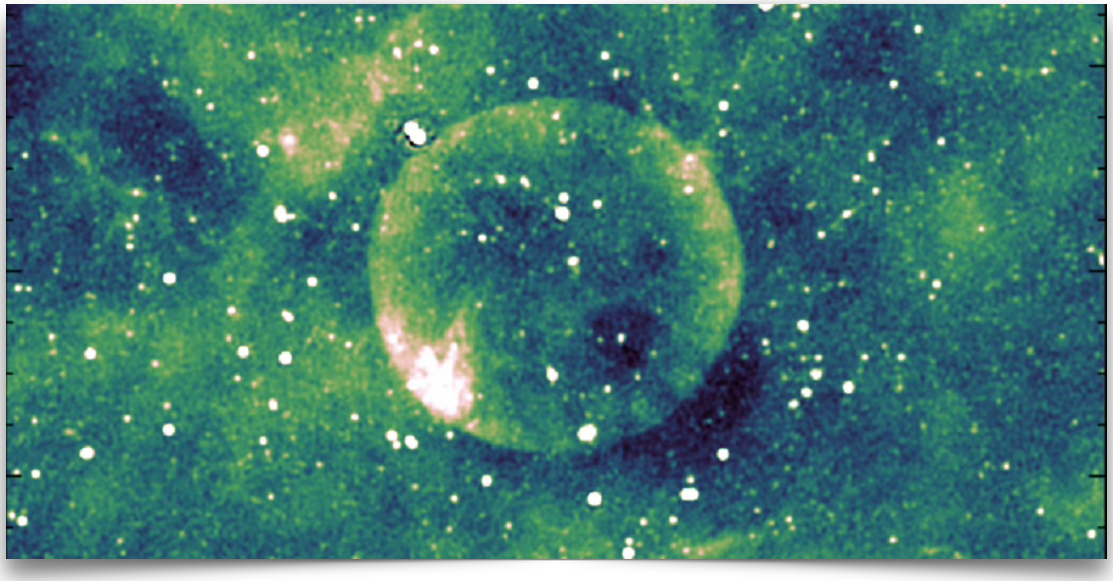
The Critical Role of Oceans in Earth's Climate System

Oceans act as Earth's climate regulators, absorbing vast amounts of heat and carbon dioxide and distributing energy around the globe through currents. The Pacific Ocean, in particular, drives some of the most significant climate phenomena such as El Niño and La Niña, which have far-reaching impacts on global weather. These events influence droughts, floods, and temperature fluctuations across continents. The ocean's temperature and pressure variations alter atmospheric conditions and can lead to extreme weather events, making the study of ocean dynamics essential for understanding and predicting climate change. This interconnected system reveals how the ocean's seemingly tranquil surface conceals a powerful force shaping life on Earth. ☀

Astronomers Spot a Strangely Perfect Sphere Thousands of Light-Years Away

BY Darren Orf

POPULARMECHANICS, MAY 21, 2025



Here's what you'll learn in this story.

Scientists using radio wavelength data from the Australian Square Kilometre Array Pathfinder (ASKAP) spotted a strangely symmetrical sphere located thousands of light-years away.

The "sphere" is likely the result of a Type 1a supernova shockwave, though astronomers aren't sure exactly how far away the this supernova remnant is from Earth—either 7,175 light-years or 25,114 light-years.

The amount humanity has learned about the cosmos in just the past century is truly staggering. A little over a century ago, American astronomer Edwin Hubble announced to the world that the **Milky Way** was actually just one galaxy among many in the known universe. Now, we know the universe contains hundreds of **billions—if not trillions—of galaxies**, and engineers have developed space-based telescopes capable of spying some of the oldest ones in existence.

Of course, that doesn't mean mysteries don't remain—both large *and* small. On the big side of the equation, dark matter and dark energy remain perplexing conundrums, but science's array of detectors often posit smaller puzzles. One such mystery is the curious case of supernova remnant (SNR) G305.4–2.2, nicknamed Teleios. A Greek word meaning "perfect," Telelios references the near-perfect symmetry of what appears to be a sphere of ejected star material—aka **a supernova** remnant. Regardless of this distance discrepancy, the near-perfect spherical nature of the remnant gives scientists the opportunity to learn more about one of the most energetic events in the universe.

Initially captured by the Australian Square Kilometre Array Pathfinder (ASKAP), Teleios's origin isn't the real head-scratcher. Instead, scientists like Miroslav Filipović, an astrophysicist from Western Sydney University in Australia, are more perplexed by its near-perfect shape, an extreme rarity for such an SNR throughout the universe.

"The supernova remnant will be deformed by its environment over time," Filipovic, along with a cadre of other Australian astrophysicists, wrote in an article on *The Conversation* in March. "If one side of the explosion slams into an interstellar cloud, we'll see a squashed shape. So, a near-perfect circle in a messy universe is a special find."

In an analysis submitted to the *Publications of the Astronomical Society of Australia* and published on the preprint server arXiv, Filipović—the lead author of the study—and his team discovered that Teleios only glows faintly in radio wavelengths. Armed with this information, the astronomers could reasonably deduce that Telelios originated from a Type 1a supernova, which typically form from binary star systems where one of the stars is a white dwarf. Because these types of supernovae are consistent in their peak brightness, astronomers have used them for decades to measure cosmic distances (with none other than the Hubble telescope among others).

However, in this instance, astronomers haven't been able to quite nail down Teleios's exact distance, but they've drawn up three best guesses. If it is the results of a Type 1a supernova, then its likely that this symmetrical mystery is either 7,175 light-years or 25,114 light-years away, making the sphere either 46 light-years across or 157 light-years across, respectively. This distance also reflects its age, meaning it's either less than 1,000 years old or greater than 10,000 years old. So, lots of room for further exploration.

The study also posits the idea that it could be a Type 1ax supernova where the supernova instead leaves behind a "zombie star" remnant, according to Live Science. However, in this scenario, the supernova would be only 3,262 light-years away and around 11 light-years across.

Whatever the scenario, Teleios—which is just one of the many interesting things discovered by ASKAP—still presents a remarkable opportunity to learn more about supernovae.

"This presents us with an opportunity to make inferences about the initial supernova explosion, providing rare insight into one of the most energetic events in the universe," Filipovic co-authors in The Conversation.

In 100 years from now, who knows what the universe might look like to our 22nd-century enlightened minds.

'Cosmic joust': Astronomers observe pair of galaxies in deep-space battle

Sciencedaily, may 21, 2025

In the distant depths of the Universe, two galaxies are locked in a thrilling war. Over and over, they charge towards each other at speeds of 500 km/s on a violent collision course, only to land a glancing blow before retreating and winding up for another round. "*We hence call this system the* '*cosmic joust*'," says study co-lead Pasquier Noterdaeme, a researcher at the Institut d'Astrophysique de Paris, France, and the French-Chilean Laboratory for Astronomy in Chile, drawing a comparison to the medieval sport. But these galactic knights aren't exactly chivalrous, and one has a very unfair advantage: it uses a quasar to pierce its opponent with a spear of radiation.

Quasars are the bright cores of some distant galaxies that are powered by supermassive black holes, releasing huge amounts of radiation. Both quasars and galaxy mergers used to be far more common, appearing more frequently in the Universe's first few billion years, so to observe them astronomers peer into the distant past with powerful telescopes. The light from this 'cosmic joust' has taken over 11 billion years to reach us, so we see it as it was when the Universe was only 18% of its current age.

"Here we see for the first time the effect of a quasar's radiation directly on the internal structure of the gas in an otherwise regular galaxy," explains study co-lead Sergei Balashev, who is a researcher at the Ioffe Institute in St Petersburg, Russia. The new observations indicate that radiation released by the quasar disrupts the clouds of gas and dust in the regular galaxy, leaving only the smallest, densest regions behind. These regions are likely too small to be capable of star formation, leaving the wounded galaxy with fewer stellar nurseries in a dramatic transformation.

But this galactic victim isn't all that is being transformed. Balashev explains: "These mergers are thought to bring huge amounts of gas to supermassive black holes residing in galaxy centres." In the cosmic joust, new reserves of fuel are brought within reach of the black hole powering the quasar. As the black hole feeds, the quasar can continue its damaging attack.

This study was conducted using ALMA and the X-shooter instrument on ESO's VLT, both located in Chile's Atacama Desert. ALMA's high resolution helped the astronomers clearly distinguish the two merging galaxies, which are so close together they looked like a single object in previous observations. With X-shooter, researchers analysed the quasar's light as it passed through the regular galaxy. This allowed the team to study how this galaxy suffered from the quasar's radiation in this cosmic fight.

Observations with larger, more powerful telescopes could reveal more about collisions like this. As Noterdaeme says, a telescope like ESO's Extremely Large Telescope "will certainly allow us to push forward a deeper study of this, and other systems, to better understand the evolution of quasars and their effect on host and nearby galaxies." ☀

The Backyard Observer, June 2025

By Rick Heschmeyer

VIRGO

This month's constellation, VIRGO the Maiden, can be found between and south of two brighter spring constellations Boötes and Leo. Both the Ecliptic and the Celestial Equator travel through Virgo, and in fact, intersect within the constellation, marking the spot where the Sun will reside on the Autumnal Equinox. It is the largest zodiacal constellation and the second largest of all the constellations. Everyone has heard the classic star hopping phrase "Arc to Arcturus then speed (spike) on to Spica". And Spica is where our tour will start.

The brightest star in Virgo is Alpha Virginis, more commonly called Spica, and is one of the 20 brightest stars in the night sky. Since it is so close to the Ecliptic, Spica will occasionally be occulted, covered up, by the Moon or even more rare, by the planet Venus. Mark your calendars for September 2, 2197, for the next such occultation. Spica is a close spectroscopic binary, so close that both components' shapes are distorted into ellipsoids. It lies about 50 light-years from us.

At about 2/3 the distance of Spica, Beta Virginis, could host 2-3 Jupiter-sized planets.

Gamma Virginis, commonly called Porrima, is a binary star that is difficult to split. Around the turn of the century the two stars were too close to split, but that has been improving a bit each year as the stars do their orbital dance.

The brighter stars of Virgo form two asterisms. The first, "The Bowl of Virgo", is composed of the stars Beta, Gamma, Delta, Epsilon, and Eta Virginis. The second can be made by adding the stars Spica and Theta Virginis, thus forming a Y-shaped asterism.

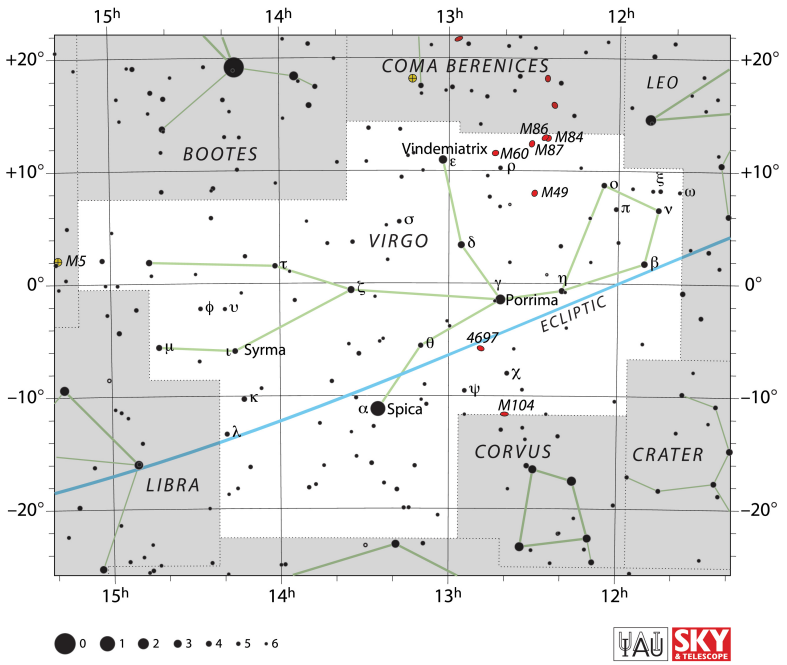
Near the mouth of "The Bowl of Virgo" lies a dense area of galaxies that are part of the Virgo Cluster of Galaxies. A few of these are visible in amateur telescopes. Just west of Epsilon Virginis, Vindemiatrix, lies the galaxy Messier 60. This elliptical galaxy lies 54 million light years away and is the third brightest galaxy in the Virgo Cluster. It could be interacting with a fainter galaxy, NGC 4647, a spiral galaxy similar in size to our Milky Way. Lurking at the center of M60 lies a massive black hole, 4.5 billion times as massive as the Sun, and one of the most massive black holes ever found.

Further west from M60 is the galaxy Messier 84. This elliptical galaxy was discovered in 1781 by Charles Messier and lies at a distance of 60 million light years. The Hubble Space Telescope has observed two energetic jets emanating from the core, indicating the presence of a massive black hole in its core.

Messier 86 is another galaxy in the vast collection of over 1300 galaxies that make up the Virgo Cluster. It is another bright elliptical galaxy discovered by Messier in 1781. It forms a conspicuous pair with M84.

Messier 87 is an enormous elliptical galaxy containing several trillion stars. It also contains over 150,000 globulars clusters. Compare that to the 150-200 in the Milky Way. A jet of plasma can be seen in certain wavelengths that extends from the supermassive black hole at the core out to a distance of almost 5000 light years! The black hole was imaged using 2027 data collected by the Event Horizon Telescope. The galaxy is a strong source of radio waves as well, known as Virgo A.

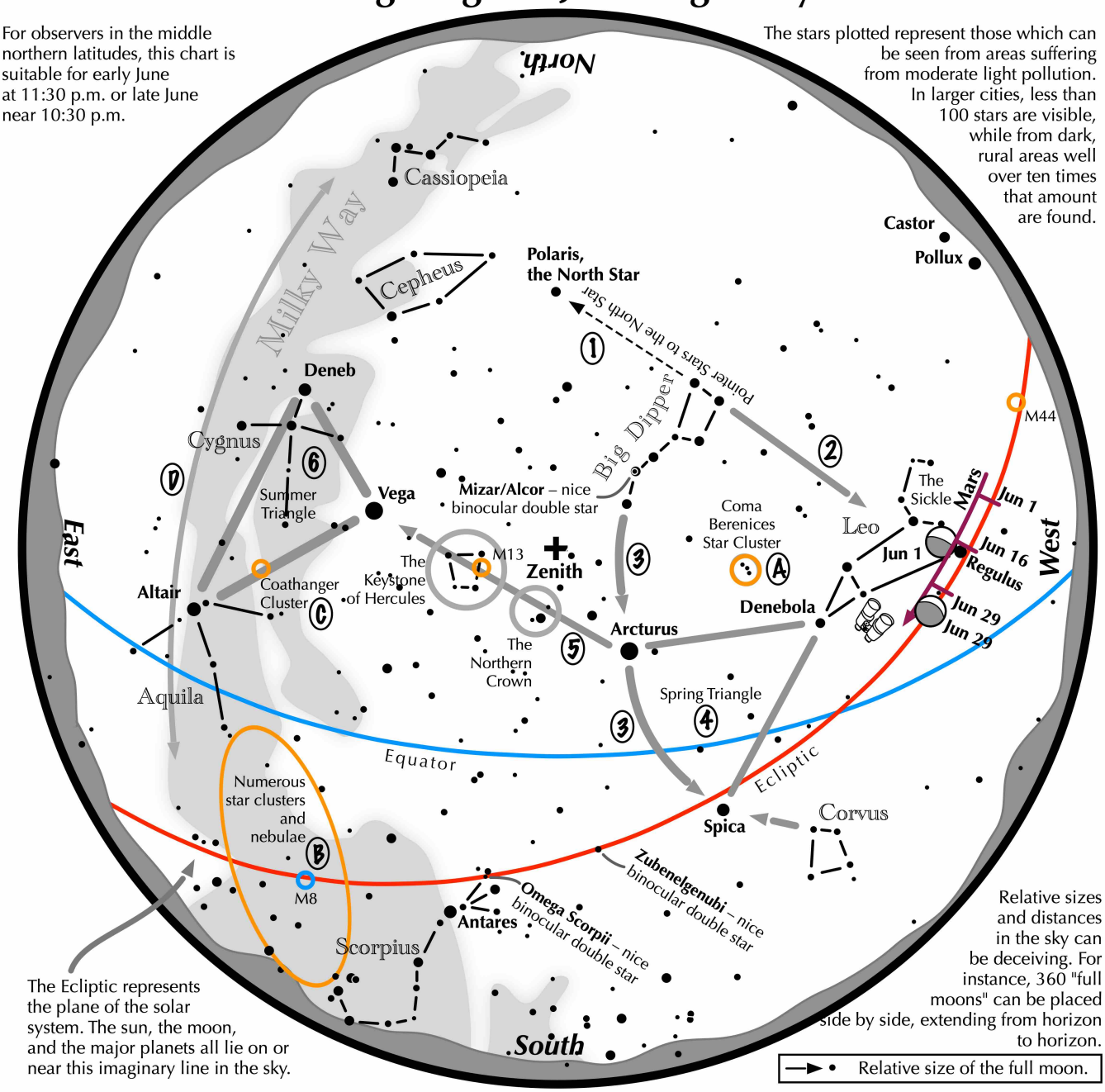
Caldwell 52, or NGC 4697 is another elliptical galaxy in the Virgo Cluster. It is smaller than the ellipticals we have encountered on our tour so far. Its distance is not well understood, currently estimated at between 38 million light years and 50 million light years.



Navigating the June Night Sky

For observers in the middle northern latitudes, this chart is suitable for early June at 11:30 p.m. or late June near 10:30 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.

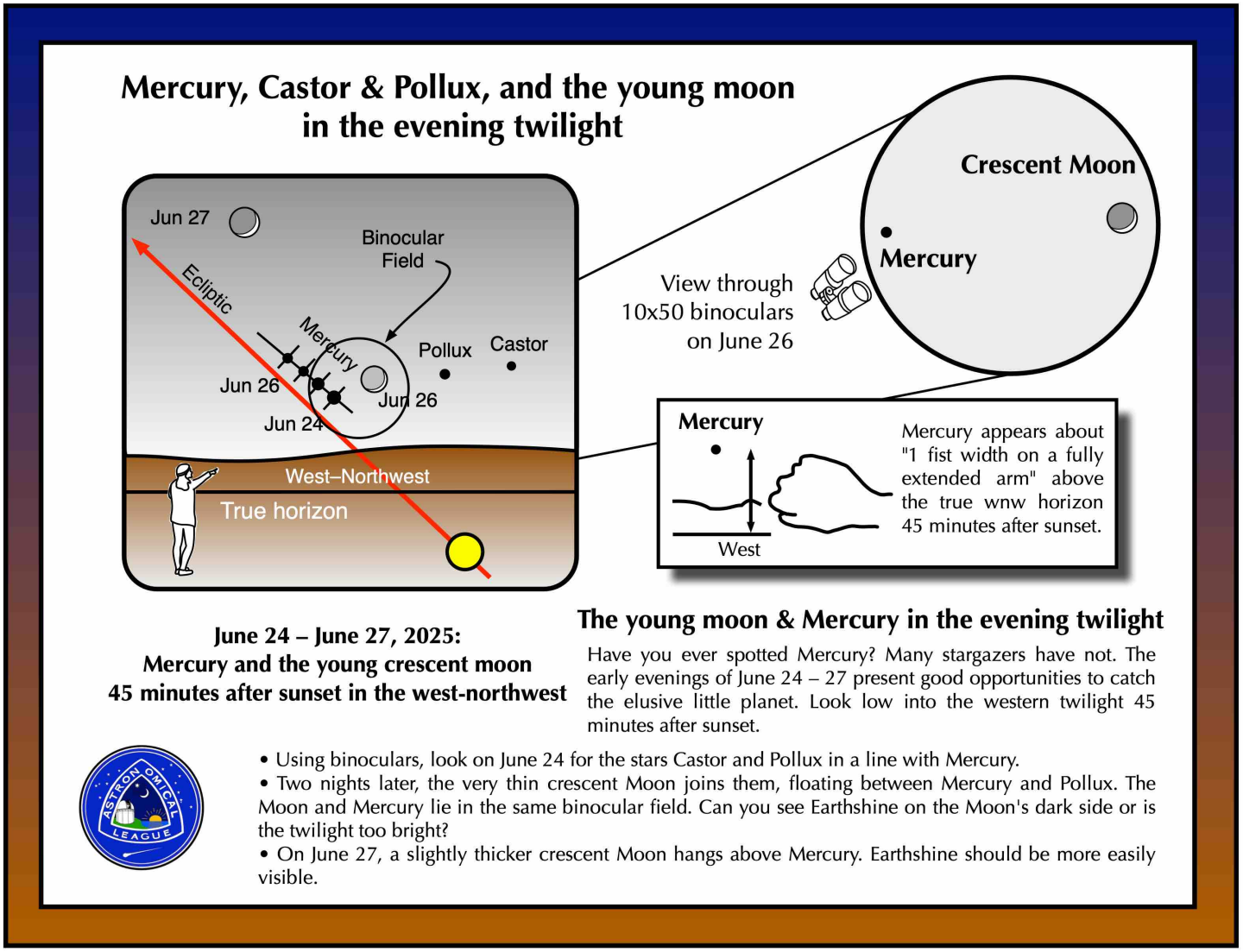
Relative size of the full moon.

Navigating the June 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. Draw another line in the opposite direction. It strikes the constellation Leo high in the west.
3. Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the June evening sky, then Spica.
4. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
5. 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.
6. High in the east are the three bright stars of the Summer Triangle: Vega, Altair, and Deneb.

Binocular Highlights

A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
B: Between the bright stars of 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.



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.