Volume 51 Number 3 March 2025

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Coming Events

Monthly Meeting
March 30, 2025, 7:00PM
Baker Wetlands Discovery Center

Public Observing
March 30, 2025, 8:00PM
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.

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Chuck Wehner email

Inside This Issue

Report From the Officers

By Rick Heschmeyer

It finally seems that the worst of winter has ended (knock on wood!). Here's hoping for good observing weather the rest of the year.

We had a light turnout for our February club meeting "BYOT-Bring Your Own Telescope" even though the temperature was significantly warmer than the previous weekend, and the skies were beautifully clear. We did discuss some options for summer activities, since the post-City Band Concert observing sessions have not been very successful during the past several summers. If anyone has any ideas of alternative summer observing activities/locations feel free to send me your suggestions.

Our March 30th club meeting will feature the Mid-States Region of the Astronomical League's Regional Representative Peggy Walker talking about the 100+ Observing Programs now available from the Astronomical League. Every member of AAL is automatically enrolled as a member of the Astronomical League, so any member interested in pursuing any of these programs can learn how at our March meeting. As usual, the meeting will start at 7:00 PM at the Baker Wetlands Discovery Center and will be followed, weather permitting, by public observing.

The next KU Public Telescope Night is scheduled for Thursday, March 13, 2025. Observing will take place on the south side of Slawson Hall at 7:30 PM. The two planetarium shows will take place in G174 Slawson and will start at 7:30 and 8:00 PM.

On that same date, there will be a Total Lunar Eclipse. The eclipse starts at 10:57 PM, with maximum eclipse at 1:58 AM on the 14th. The eclipse ends at 5:00 AM on the 14th. The entire eclipse will be visible from Lawrence, assuming the weather cooperates.

Clear Skies!

February Night Sky Notes: How Can You Help Curb Light Pollution?

By Dave Prosper
Updated by Kat Troche

NIGHTSKYNETWORK, FEBRUARY 2025

Before and after pictures of replacement lighting at the 6th Street Bridge over the Los Angeles River. The second picture shows improvements in some aspects of light pollution, as light is not directed to the sides and upwards from the upgraded fixtures, reducing skyglow. However, it also shows the use of brighter, whiter LEDs, which is not generally ideal, along with increased light bounce back from the road.

Light pollution has long troubled astronomers, who generally shy away from deep sky observing under full Moon skies. The natural light from a bright Moon floods the sky and hides views of the Milky Way, dim galaxies and nebula, and shooting stars. In recent years, human-made light pollution has dramatically surpassed the interference of even a bright full Moon, and its effects are now noticeable to a great many people outside of the astronomical community. Harsh, bright white LED streetlights, while often more efficient and long-lasting, often create unexpected problems for communities replacing their older street lamps. Some notable concerns are increased glare and light trespass, less restful sleep, and disturbed nocturnal wildlife patterns. There is increasing awareness of just how much light is too much light at night. You don't need to give in to despair over encroaching light pollution;

you can join efforts to measure it, educate others, and even help stop or reduce the effects of light pollution in your community.

Amateur astronomers and potential citizen scientists around the globe are invited to participate in the Globe at Night (GaN) program to measure light pollution. Measurements are taken by volunteers on a few scheduled days every month and submitted to their database to help create a comprehensive map of light pollution and its change over time. GaN volunteers can take and submit measurements using multiple methods ranging from low-tech naked-eye observations to high-tech sensors and smartphone apps.

Globe at Night citizen scientists can use the following methods to measure light pollution and submit their results:

- Their own smartphone camera and dedicated app
- Manually measure light pollution using their own eyes and detailed charts of the constellations
- A dedicated light pollution measurement device called a Sky Quality Meter (SQM).
- The free GaN web app from any internet-connected device (which can also be used to submit their measurements from an SQM or printed-out star charts)

Night Sky Network members joined a telecon with Connie Walker of Globe at Night in 2014 and had a lively discussion about the program's history and how they can participate. The audio of the telecon,

Astronaut Samantha Cristoforetti took the above photo from the ISS cupola in 2015. The newly installed white LED lights in the center of the city of Milan are noticeably brighter than the lights in the surrounding neighborhoods.

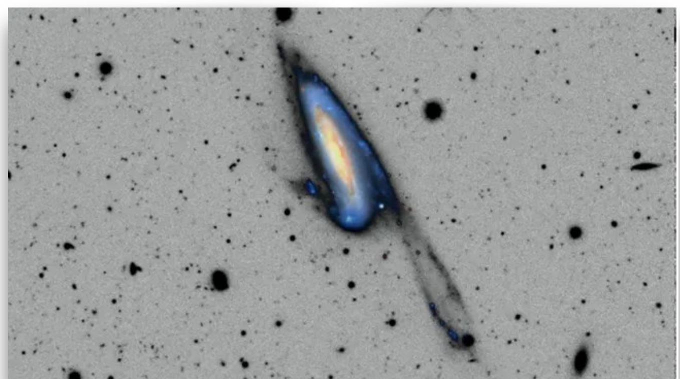
transcript, and links to additional resources can be found on their dedicated resource page.

The International Dark-Sky Association (IDA) has long been a champion in the fight against light pollution and a proponent of smart lighting design and policy. Their website provides many resources for amateur astronomers and other like-minded people to help communities understand the negative impacts of light pollution and how smart lighting policies can not only help bring the stars back to their night skies but also make their streets safer by using smarter lighting with less glare. Communities and individuals find that their nighttime lighting choices can help save considerable sums of money when they decide to light their streets and homes "smarter, not brighter" with shielded, directional lighting, motion detectors, timers, and even choosing the proper "temperature" of new LED light replacements to avoid the harsh "pure white" glare that many new streetlamps possess. Their pages on community advocacy and on how to choose dark-sky-friendly lighting are extremely helpful and full of great information. There are even local chapters of the IDA in many communities made up of passionate advocates of dark skies.The IDA has notably helped usher in "Dark Sky Places", areas around the world that are protected from light pollution. "Dark Sky Parks", in particular, provide visitors with incredible views of the Milky Way and are perfect places to spot the wonders of a meteor shower. These parks also perform a very important function, showing the public the wonders of a truly dark sky to many people who may have never before even seen a handful of stars in the sky, let alone the full glorious spread of the Milky Way. More research into the negative effects of light pollution on the health of humans and the environment is being conducted than ever before. Watching the nighttime light slowly increase in your neighborhood, combined with reading so much bad news, can indeed be disheartening! However, as awareness of light pollution and its negative effects increases, more people are becoming aware of the problem and want to be part of the solution. There is even an episode of PBS Kid's SciGirls where the main characters help mitigate light pollution in their neighborhood!
Astronomy clubs are uniquely situated to help spread awareness of good lighting practices in their local communities to help mitigate light pollution. Take inspiration from Tucson, Arizona, and other dark sky-friendly communities that have adopted good lighting practices. Tucson even reduced its skyglow by 7% (as of 2018) after its own citywide lighting conversion, proof that communities can bring the stars back with smart lighting choices. ☀

Scientists find hints of the dark universe in 3D maps of the cosmos

By Keith Cooper
SPACE.COM, JANUARY 28, 2025

A new way to study 3D maps of galaxies in the cosmos without compressing the data is revealing new information about the dark universe.



A diagram-type image representing stellar shells and tidal streams in haloes of nearby galaxies.

Hidden information in maps of galaxies spread across the universe could soon come forth, thanks to a new way of interrogating the data that preserves the three-dimensional nature of these maps.

The hidden information could be vital in telling us whether the standard model of cosmology is correct, or whether there are deviations from it that could affect our understanding of the "dark universe," which comprises dark matter and dark energy.

The research, led by astronomer Minh Nguyen of the University of Tokyo, utilizes powerful computer algorithms that are able to compare the relative positions of galaxies in a 3D map of the universe with detailed simulations that depict the growth and behavior of galaxies and haloes of dark matter.

Back in the old days, astronomers would conduct galaxy surveys by taking deep space images on photographic plates and then measuring directly on the plates, in two-dimensions, the spatial distribution of the galaxies. They'd try answering questions like "How close are these galaxies to their neighbors?" and "How well-aligned are they with one another?"

In modern times, a third dimension can be added to these surveys. It's all thanks to multi-object spectroscopy, which measures the redshift of these galaxies, and hence the distance to them in an expanding universe, in an observed volume of space. With such galactic distance measurements, it's actually possible to create a three-dimensional map of the universe.

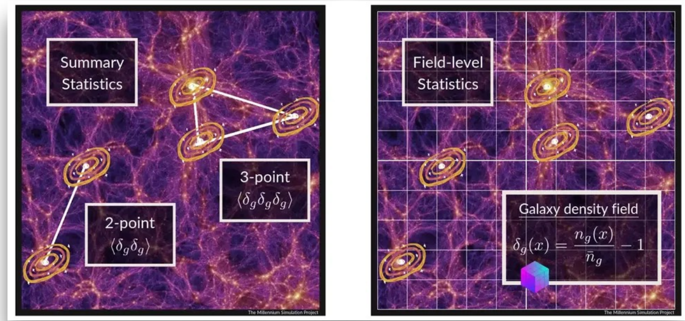
However, the calculating power required to statistically analyze this three-dimensional galaxy data is fiendish, and so, for efficiency, the 3D data has traditionally been compressed down into what are called "n-point correlation functions," the "n" referring to a number (usually two or three points of data as mentioned above).

That's all well and good in most cases, but there has also been a nagging suspicion that compressing and analyzing the data this way results in information being missed — or hidden. And now, using a technique called "field-level inference" (FLI) in combination with a suite of algorithms in a framework called "LEFTfield" that models galaxy growth and clustering from the early universe to the present day, Nguyen's team has shown that vital information is indeed being suppressed by the compression. The team won third place in the Buchalter Cosmology Prize for this result.

"In field-level inference, we work directly with a 3D map of galaxies," Nguyen told Space.com. The map is represented on the computer by voxels, which are like three-dimensional pixels in a lattice grid. The FLI then depicts in this voxel lattice what it predicts the 3D structure of galaxies and underlying dark matter should look like according to the standard model of cosmology (which describes how large-scale structure in the universe evolves under the influence of dark matter and dark energy).

"With the help of powerful computer algorithms, FLI aims to match those predictions with the observed galaxy position at every point on the 3D lattice," said Nguyen.

N-point functions are popular because they speed up processing time and are more efficient to use, but today's algorithms are sophisticated enough to bridge the gap and enable the full, uncompressed data to be analyzed.



On the left are shown two and three-point correlation functions. On the right, FLI analyzes the entire information in the galaxy field.

"Fortunately, there are modern computer algorithms that can speed up the exploration, or sampling, of this vast parameter space," said Nguyen.

Nguyen and his colleagues — Fabian Schmidt, Beatriz Tucci, Martin Reinecke and Andrija Kostić of the Max Planck Institute for Astrophysics in Germany — initially tested FLI on simulated maps of dark matter haloes, which are vast clouds of dark matter that surround galaxies and galaxy clusters. Think of the haloes as the scaffolding inside which visible matter assembles into galaxies. More recently, as part of "Beyond Two-Point Collaboration," Nguyen and Schmidt applied FLI on simulated galaxies as well, with the results soon to be published in The Astrophysical Journal Supplement Series.

Their results show a factor of between three and five improvement in detail and accuracy in the FLI analysis compared to two- and three-point correlation functions. This extra detail indicates that there is information that is being hidden in the old way of doing things.

And what can this hitherto hidden information tell us? Large-scale structures in the universe — the great chains of galaxy clusters that span the cosmos — can be traced back to the quantum fluctuations in the big bang that led to over-densities that grew under gravity into galaxies. FLI could reveal asymmetries in these fluctuations that have become frozen in time in the form of the distribution of galaxies, or how anomalies in the gravitational evolution of galaxies in the more recent universe could reveal details about dark matter, or in fact gravity itself.

In addition, "By having access to the entire underlying field of dark matter associated with the observed galaxy field, we might be more sensitive to local effects," said Nguyen. "Such local effects are averaged-over in analyses using n-point functions."

The next step is to put FLI to the test with real data from the Dark Energy Spectroscopic Instrument at Kitt Peak National Observatory, the Subaru Prime Focus Spectrograph and the European Space Agency's Euclid mission, and in the future the Vera C. Rubin Observatory that should see first light later this year in Chile, as well as the Nancy Grace Roman Space Telescope that's set to launch in 2027. All will conduct redshift surveys of galaxies to assemble vast 3D maps of galactic distribution.

When it comes to the dark universe and how it has affected the growth of galaxies in large-scale structures across the universe, there's still much that we're, well, in the dark about. But with FLI, it's possible to describe the dark-matter distribution associated with the galaxies in the map.

"That's quite neat, given that we can't observe dark matter directly, and is complementary to dark-matter maps constructed from gravitational lensing," said Fabian Schmidt.

Ultimately, galaxy mapping isn't just about pictorially describing the universe; it could ultimately plot the path towards revelations about the origins of everything that we see in the cosmos. ☀

Straight Shot: Hubble Investigates Galaxy with Nine Rings

HUBBLESITE, FEBRUARY 4, 2025

NASA's Hubble Space Telescope has captured a cosmic bullseye! The gargantuan galaxy LEDA 1313424 is rippling with nine star-filled rings after an "arrow" — a far smaller blue dwarf galaxy — shot through its heart. Astronomers using Hubble identified eight visible rings, more than previously detected by any telescope in any galaxy, and confirmed a ninth using data from the W. M. Keck Observatory in Hawaii. Previous observations of other galaxies show a maximum of two or three rings.

"This was a serendipitous discovery," said Imad Pasha, the lead researcher and a doctoral student at Yale University in New Haven, Connecticut. "I was looking at a ground-based imaging survey and when I saw a galaxy with several clear rings, I was immediately drawn to it. I had to stop to investigate it." The team later nicknamed the galaxy the "Bullseye."

Hubble and Keck Observatory's follow-up observations also helped the researchers prove which galaxy plunged through the center of the Bullseye — a blue dwarf galaxy to its center-left. This relatively tiny interloper traveled like a dart through the core of the Bullseye about 50 million years ago, leaving rings in its wake like ripples in a pond. A thin trail of gas now links the pair, though they are currently separated by 130,000 light-years.

"We're catching the Bullseye at a very special moment in time," said Pieter G. van Dokkum, a co-author of the new study and a professor at Yale. "There's a very narrow window after the impact when a galaxy like this would have so many rings."

Galaxies collide or barely miss one another quite frequently on cosmic timescales, but it is extremely rare for one galaxy to dive through the center of another. The blue dwarf galaxy's straight trajectory through the Bullseye later caused material to move both inward and outward in waves, setting off new regions of star formation.

How big is the Bullseye? Our Milky Way galaxy is about 100,000 light-years in diameter, and the Bullseye is almost two-and-a-half times larger, at 250,000 light-years across.

The researchers used Hubble's crisp vision to carefully to pinpoint the location of most of its rings, since many are piled up at the center. "This would have been impossible without Hubble," Pasha said.

They used Keck Observatory to confirm one more ring. The team suspects a 10th ring also existed, but has faded and is no longer detectable. They estimate it might lie three times farther out than the widest ring in Hubble's image.

A One-to-One Match with Predictions

Pasha also found a stunning connection between the Bullseye and a long-established theory: The galaxy's rings appear to have moved outward almost exactly as predicted by models.

"That theory was developed for the day that someone saw so many rings," van Dokkum said. "It is immensely gratifying to confirm this long-standing prediction with the Bullseye galaxy."

If viewed from above, it would be more obvious that the galaxy's rings aren't evenly spaced like those on a dart board. Hubble's image shows the galaxy from a slight angle. "If we were to look down at the galaxy directly, the rings would look circular, with rings bunched up at the center and gradually becoming more spaced out the farther out they are," Pasha explained.

To visualize how these rings may have formed, think about dropping a pebble into a pond. The first ring ripples out, becoming the widest over time, while others continue to form after it.

The researchers suspect that the first two rings in the Bullseye formed quickly and spread out in wider circles. The formation of additional rings may have been slightly staggered, since the blue dwarf galaxy's flythrough affected the first rings more significantly.

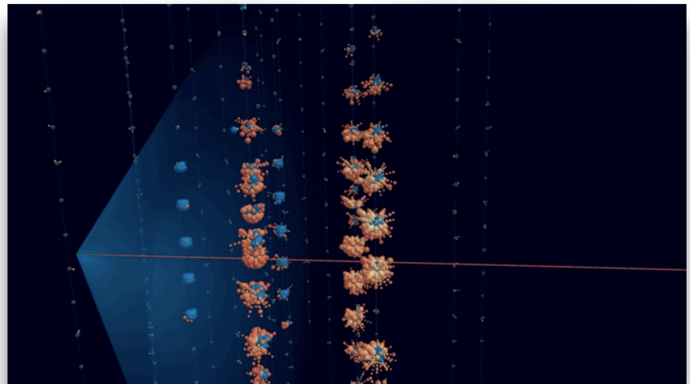
Individual stars' orbits were largely undisturbed, though groups of stars did "pile up" to form distinguishable rings over millions of years. The gas, however, was carried outward, and mixed with dust to form new stars, further brightening the Bullseye's rings.

There's a lot more research to be done to figure out which stars existed before and after the blue dwarf's "fly through." Astronomers will now also be able to improve models showing how the galaxy may continue to evolve over billions of years, including the disappearance of additional rings.

Although this discovery was a chance finding, astronomers can look forward to finding more galaxies like this one soon. "Once NASA's Nancy Grace Roman Space Telescope begins science operations, interesting objects will pop out much more easily," van Dokkum explained. "We will learn how rare these spectacular events really are." ☀

A cosmic neutrino of unknown origins smashes energy records

Such high-energy neutrinos could offer insight into the universe's most cataclysmic phenomena



In February 2023, a muon zoomed through the forest of underwater cables in a KM3NeT telescope. As the muon crossed the detector (path in red), it gave off a faint glow detected by light sensors along the cables (activated sensors in blue and orange).

By Maria Temming

SCIENCENEWS, FEBRUARY 12, 2025

A neutrino from space recently plunged into the Mediterranean Sea with an energy that blows all other known neutrinos out of the water.

Packing a punch of some 220 million billion electron volts, this particle was around 20 times as energetic as the highest energy cosmic neutrinos seen before, researchers report in the Feb. 13 Nature. The particle was glimpsed by the partially built Cubic Kilometre Neutrino Telescope, or KM3NeT.

“They hit the jackpot,” says Francis Halzen, a physicist at the University of Wisconsin–Madison and principal investigator of the IceCube Neutrino Observatory in Antarctica. “We have been taking data with a much bigger detector for 10 years. We’ve never seen such an event.”

Physicists are keen to catalog cosmic neutrinos because these lightweight, electrically neutral particles can cross vast stretches of space nearly undisturbed. The most energetic ones could offer unmatched insights into the powerful phenomena that spit them out, such as supermassive black holes. But netting particles that barely interact with matter requires giant telescopes made of sensors encased in ice, like IceCube, or submerged in water, like KM3NeT.

KM3NeT's two neutrino detectors — one off the coast of Sicily, the other near southern France — are still under construction but already collecting data. Both contain cables hundreds of meters tall, which are strung with bundles of light sensors anchored to the seafloor.

When cosmic neutrinos interact with matter in or near a KM3NeT detector, they spawn charged particles such as muons. As those muons careen through water, they give off feeble flashes of bluish light that KM3NeT's sensors can pick up. Clocking when different sensors spot this light can reveal a particle's path; the brightness of the blue hue reflects the particle's energy.

On February 13, 2023, the detector near Sicily was run through by an extremely energetic muon traveling nearly parallel to the horizon. At the time, only 21 of the planned 230 sensor cables were in place. Based on the muon's energy and trajectory, KM3NeT scientists determined it must have been spawned by a neutrino from space rather than a particle from the atmosphere.

Simulations suggest the neutrino's energy was around 220 petaelectron volts. The previous record holder boasted around 10 petaelectron volts.

"It's a kind of shocking situation," says KM3NeT team member Luigi Antonio Fusco, a physicist at the University of Salerno in Fisciano, Italy. It's like neutrino physicists have only ever seen fires fueled by a few sticks of kindling, "and then someone comes with a flamethrower." The KM3NeT researchers estimate that they expect to see a neutrino of this caliber once every 70 years or so.

"I definitely went in kind of skeptically," says Erik Blaufuss, a physicist at the University of Maryland in College Park who wrote a commentary on the study in the same issue of Nature. "But they make a pretty convincing case in the paper that it's real."

To trace the neutrino's origins, the KM3NeT team scoured data from gamma ray, X-ray and radio telescopes. Twelve objects stood out in the region of the sky from whence the neutrino came. "Most of them are active galactic nuclei," Fusco says — bright cores of galaxies where supermassive black holes are guzzling gas and dust. "The problem is that there are so many," he says. "You cannot really pinpoint a single one."

Another possibility is that this is the first observed cosmogenic neutrino, created when ultrahigh energy cosmic rays mingle with photons from the cosmic microwave background, the afterglow of the Big Bang.

"At this point, it's very difficult to make conclusions about the origins," says Kohta Murase, a theoretical physicist at Penn State not involved in the research. "It's dangerous to rely on one event." ☀

Venus-Moon Conjunction

SPACEWEATHER.COM, FEBRUARY 2, 2025

The crescent Moon and Venus were close together in the sunset sky. Gwenael Blanck photographed the conjunction from Paris, France

"This is one of those rare celestial events that makes people look up," says Blanck. "A lot of tourists and passers-by were admiring the scene while I was shooting. They could not miss the bright Moon and Venus, but many of them could not see Saturn because of city lights. Here it is." ☀

The Backyard Observer, March 2025

By Rick Heschmeyer

GEMINI

Very nearly overhead during the cold winter months is the constellation GEMINI, the Twins. Considered the Guardians of Rome, the brothers have given their names, Castor and Pollux, to the two bright stars that crown the constellation.

Alpha Geminorum, the star Castor, is the northernmost of the two stars at the top of the constellation and is a fine example of a multiple star system for the small telescope. The two primary components are blue/white, while the third visible component is dimmer and slightly orange in color. The third component, Castor C, is slightly south of the main pair. It is also known that each of these three stars has another star orbiting it that cannot be seen in any telescope, so that what appears to be a magnitude 1.58 single star to the naked eye is in reality six suns, each rotating around the others in a neat, little solar "family". Castor lies 51 light years from Earth.

Pollux, while designated Beta Geminorum, is actually one-half degree brightest than Alpha, Castor. At magnitude 1.58 Pollux is one of the brightest stars in the night sky. It is an orange-hued red giant star. At 34 light years distant it is the closest red giant star to the Sun. Eighteen years ago a planet, now named Thestias for Pollux's mother, was discovered orbiting the star. Shining at magnitude 1.14, Pollux is the 17^{th} brightest star in the night sky.

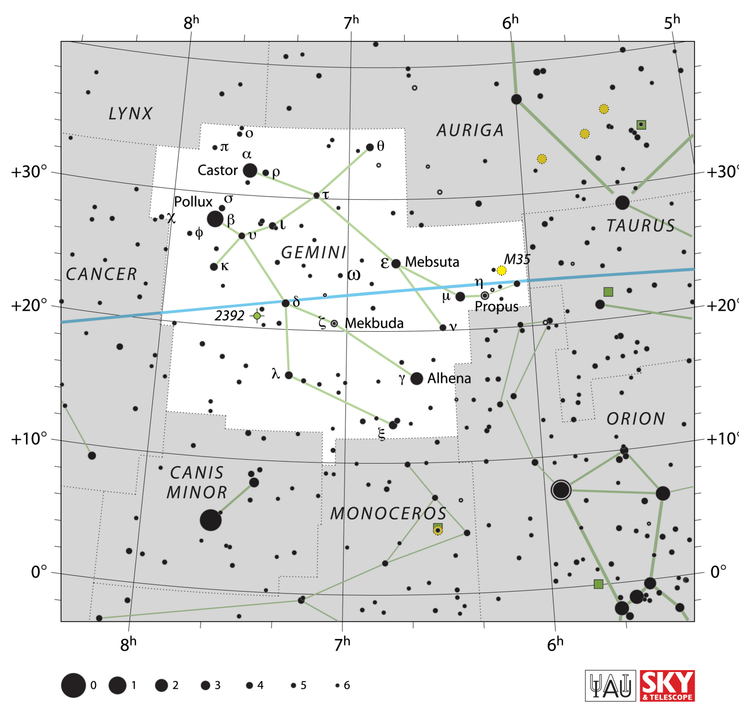
Eta Geminorum is also called Propus. This star marks the left foot of Castor in the constellation. This star has a special place in history, for it was near Eta on March 13, 1781 that Sir William Herschel discovered the planet Uranus.

Messier 35 is an open cluster that, from a dark site, is visible to the naked eye as a faint patch of light. M35 is one of the best open or galactic clusters in the sky, rivalling even the "Double Cluster in Perseus". Binoculars will show the brightest stars in the cluster, but the best views are with small- and medium-sized telescopes, with close to one hundred stars visible with a six-inch scope. Some observers have noted patterns of stars emanating from the center of the cluster. Do you see any?

NGC 2392: Just south and east of the double star Delta Geminorum is the planetary nebula NGC 2392. Visible in a four-inch telescope, you may also be able to glimpse the central star of this nearly circular, bluish nebula. Sometimes called the "Eskimo" or "Clown Face" nebula because dark markings resemble a face. These are visible in large telescopes and in photographs. The casual observer should not expect to see much detail through most amateur instruments.

NGC 2158: For those with medium to large telescopes (6-10 inch or larger) NGC 2158 is a small compact cluster just south and west of M35. It will appear as a mere patch of fuzzy light, like a dim comet, because of its great distance. At 15,000 light years, it is nearly five times as distant as M35.

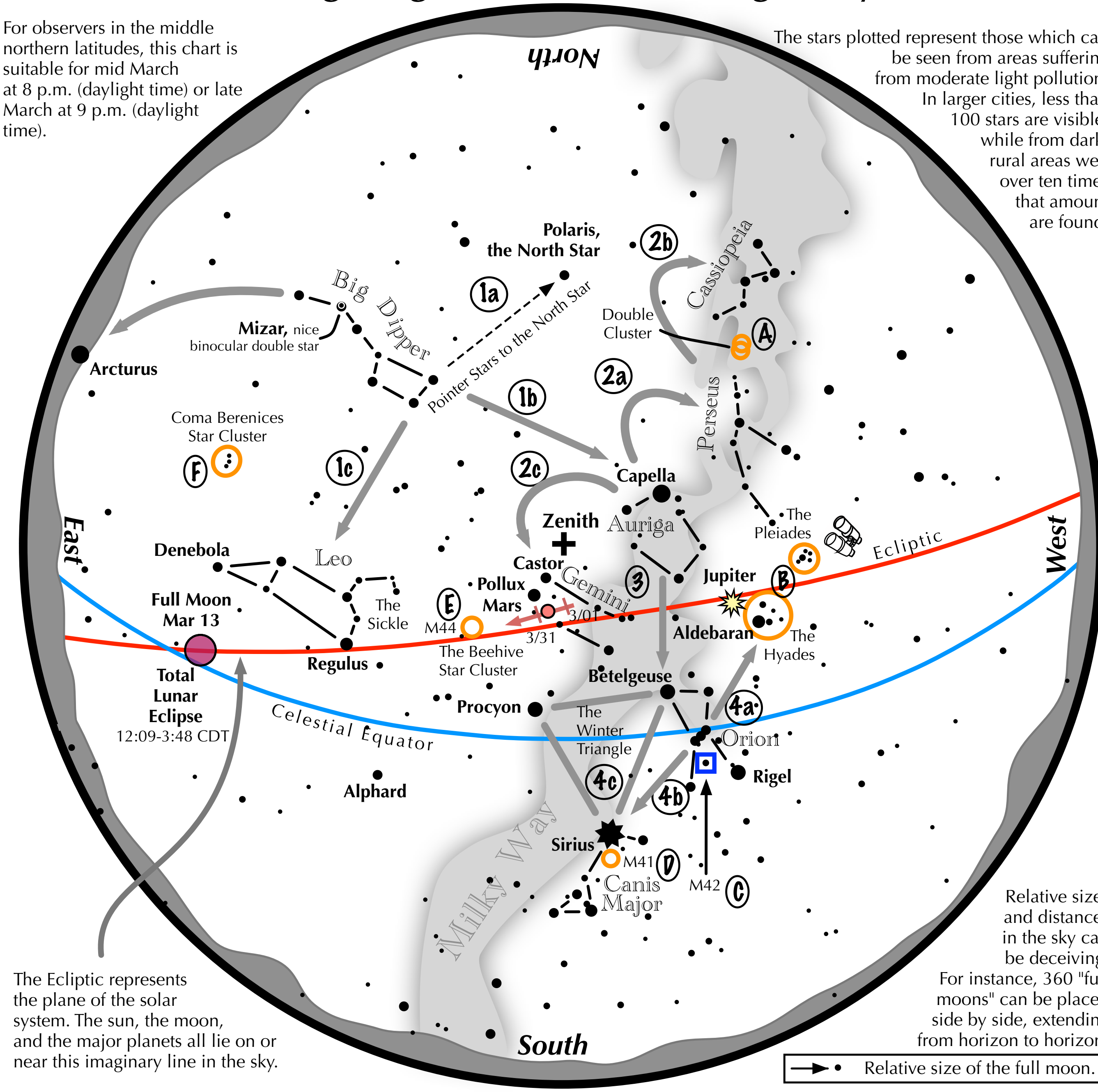
And finally, you have probably noticed a bright orange/red "star" outshining the rest of the constellation this winter. That "star" is the planet Mars and it forms a bright triangle with Castor and Pollux. If you get a chance to view the Red Planet through a telescope please do so. Having just reached opposition in mid-January it is larger and brighter now than it will be until early in 2027.



Navigating the mid March Night Sky

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

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



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

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

→ • Relative size of the full moon.

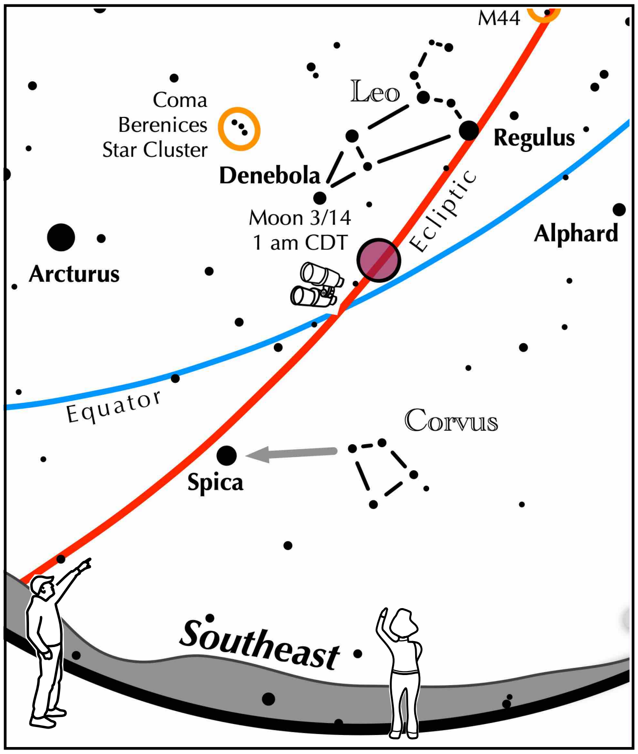
Navigating the March night sky: Simply start with what you know or with what you can easily find.

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

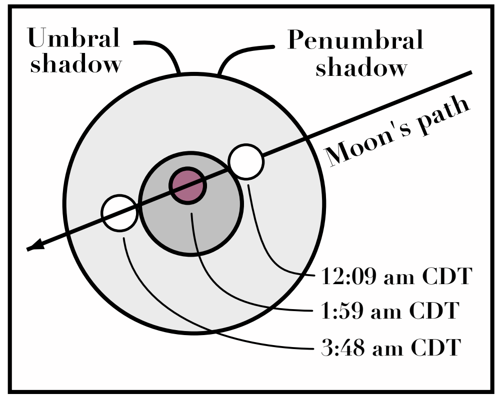
Binocular Highlights

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

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



View to the southeast
on March 14
at 1 am CDT



The Moon slides through a total eclipse

In the hours just after midnight on March 14, the brilliant full moon slides into Earth's shadow.

- Even though the partial umbral eclipse begins at 12:09 am CDT, darkening might not be noticed for another 5 minutes.
- When totality is reached, the full moon's brilliance is gone, allowing the stars to appear. Can you see that the moon lies mid-way between Regulus to the upper right and Spica to the lower left?
- At mid eclipse, what color is the moon? How red is it?
- During the partial phases, can you notice that the shadow's edge is not straight, but curved?

About Astronomy Associates

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

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

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