

The Bays Mountain Astronomy Club Newsletter

A night sky photograph showing the Milky Way galaxy arching across the frame, with dark silhouettes of trees in the foreground.

Table of Contents

Table of Contents	2
Cosmic Reflections	3
BMAC Notes	7
<i>Bays Mountain StarFest 2025 - Reminder.....</i>	<i>8</i>
<i>RASC 2026 Observer's Handbooks (USA) and Calendars Now Available on League Sales Web Store.....</i>	<i>12</i>
<i>News from the Astronomical League.....</i>	<i>14</i>
Stellar Observations	18
<i>The Great Square of Pegasus</i>	<i>19</i>
The Queen Speaks	28
<i>Book Review: Sew Sister.....</i>	<i>29</i>
The Space Place - NASA Night Sky Network	35
<i>Let's go, LIGO!.....</i>	<i>36</i>
BMAC Calendar & More	44
<i>Calendar:.....</i>	<i>45</i>
<i>Regular Contributors:.....</i>	<i>48</i>
<i>Connection:.....</i>	<i>49</i>
<i>Chapter Background Image Credits:.....</i>	<i>50</i>

Cosmic Reflections

Greg Penner - BMAC Chair



reetings BMAC'ers!

Hopefully everyone is enjoying the cooler weather as October is here, and we can start enjoying our beautiful East Tennessee fall season. October also means the return of StarWatch at the park on Saturday evenings through the end of November. If you've never been to StarWatch, I encourage you to attend and see how excited people are when they view celestial wonders through the telescopes. You might decide that you would like to help at StarWatch events. The volunteer application and orientation process is very easy to do, and then you can help share the sky as an official Bays Mountain volunteer astronomer!

Speaking of "Sharing the Sky", that is the theme for this year's 40th anniversary StarFest! If you haven't registered yet, you still have time. Registration is open until midnight on October 19th. We will have 4 outstanding speakers who will give

presentations about how they each use their unique talents to share the sky with the public. I'm certain anyone who attends will be inspired to find ways to share your love of the sky with other people. As always, there will be great food and all the park programs included in your registration fee. And this year every registrant will receive a special commemorative zip-up hoodie jacket to celebrate the 40th anniversary of StarFest!

Coming up at our October 3rd meeting, we will have our own Robin Byrne giving the presentation, "Nancy Grace Roman: The Telescope and the Woman". Robin's presentations are always very informative and help us to appreciate the astronomical contributions of the world's leading astronomers.

Every club meeting is also a time for any of our members to bring something to the club for "show and tell". This can be ANYthing that is related to astronomy, such as a new accessory

or gadget, a new project you're working on, or even astronomy news that you would like to share with the club. Speaking of astronomy news, on September 11th a new comet was discovered near the sun. So far (at the time I'm writing this on September 21st) Comet SWAN (C/2025 R2) has been too close to the setting sun to see, but by late September or early October it may be visible on long exposure photographs. I have seen some beautiful photos online by sky watchers in the southern hemisphere.

Keep looking up!

Greg

BMAC Notes

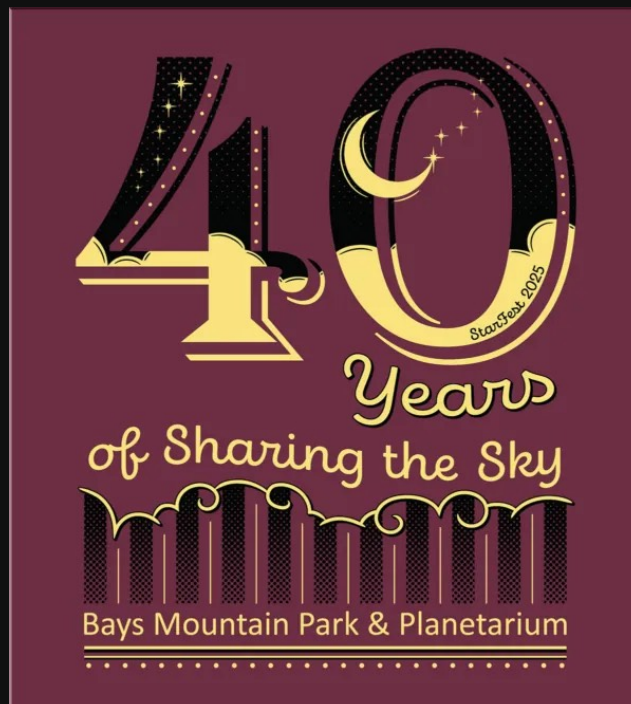


Bays Mountain StarFest 2025 - Reminder



ou have until October 19th, 11:59p to register for our amazing event. It is being held November 7-9, 2025. Registration is mandatory to attend. Sorry, no walk-ins allowed!

The theme this year is "Sharing the Sky" for our 40th Anniversary StarFest. Each of our keynote speakers will talk about their special unique way of sharing the sky with others. We really think you'll like this year's topic and speakers!



Caption

Keynote Speakers:

Richard Wright

Adventures of the Accidental Astronomer



Caption



Caption

Noreen Grice - Western Connecticut State University

Sharing the Sky: Using Tactile Materials to make Astronomy

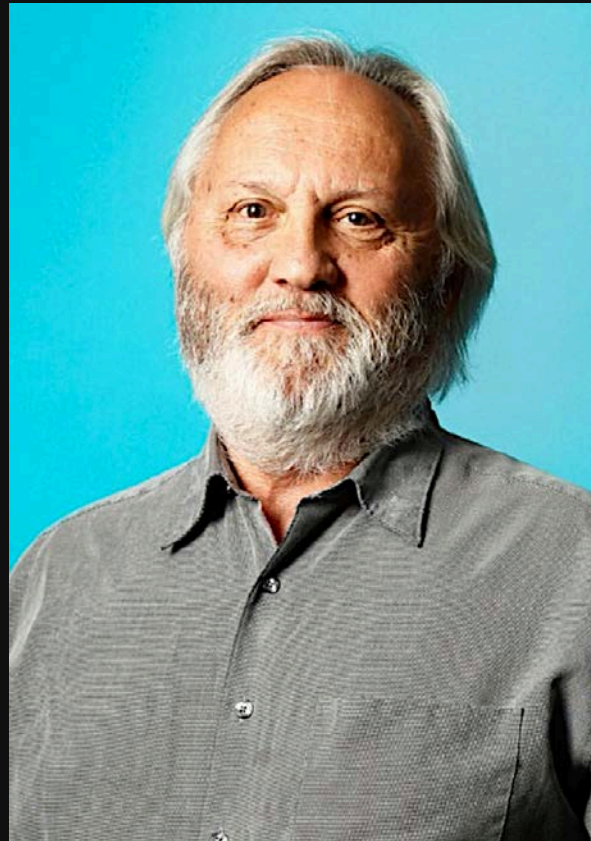
More Accessible

Jackie Baughman - Challenger Learning Center of Lockport

Beyond the Observable: How Artists Can Help Visualize the Cosmos



Caption



Caption

Mike Francis

In the Footsteps of Galileo

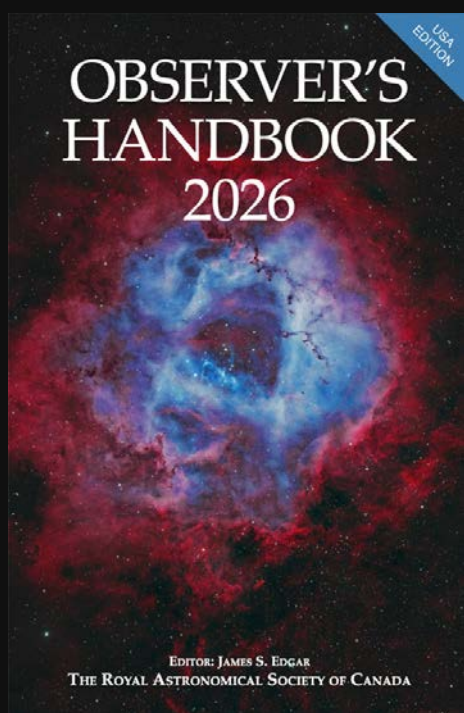
This year includes four wonderful speakers, five great meals, and for the 40th, we are doing a commemorative comfy zip-up hoodie included with registration! We will have door prizes, swap shop, and telescope viewing (of course, weather permitting!). There are also three levels of student discounts. The student discounts are quite generous to continue our long-term support of student involvement.

All the info and link to register can be found [HERE](#).

Mackenzie Henley, BMAC Newspaper Editor

RASC 2026 Observer's Handbooks (USA) and Calendars Now Available on League Sales Web Store

The RASC 2026 Observer's Handbooks (USA version) and Calendars are available for PRE-ORDER on the League Sales web store [HERE](#).



RASC 2026 Observer's Handbook (USA)



RASC 2026 Calendar

League Sales sells these items each fall at a great price with our members in mind. Stock usually arrives in November and ships in December in time for the holidays. We suggest ordering early to ensure availability. We order a limited number of these items and once they are sold we won't get any more. If your club wants to place a group order, you will find versions of the RASC Calendar for 6+ units and for the RASC Handbook for 10+ units, both on the League Sales web store. Be sure to look for the different items on our web store -- the single-copy item and the bulk-quantity item (10+ Handbooks or 6+ Calendars). Those will save you a bit on the per unit cost and you'll get free shipping on the order! Another bonus is that ordering from the Astronomical League saves you from paying import fees and shipping costs from Canada

News from the Astronomical League

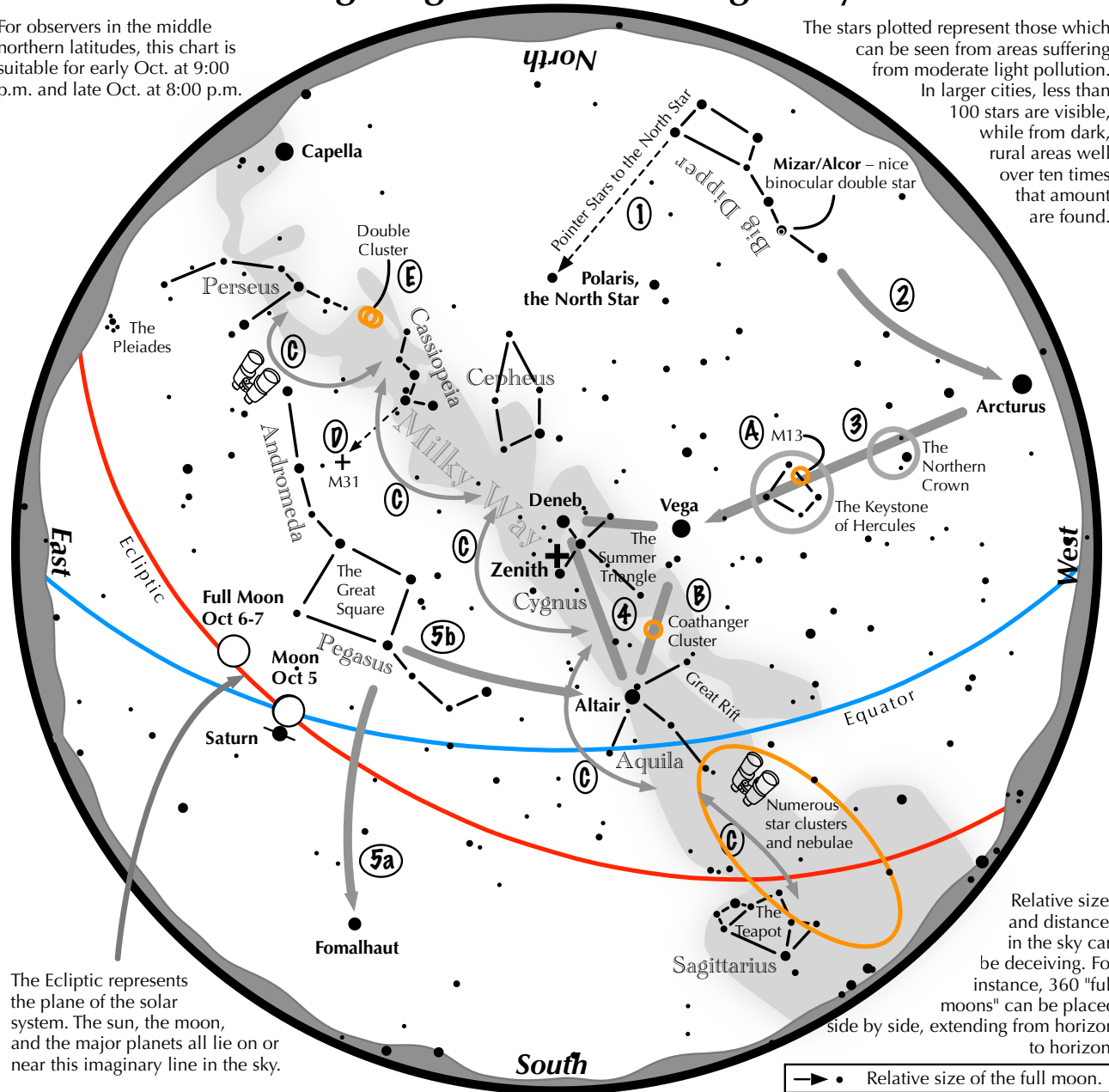


he Astronomical League has a plethora of educational content to help you learn and enjoy the night sky more. The following inserts are just a tiny bit of what they provide.

Navigating the October Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 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.



Navigating the October 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 early October evening sky.
- 3 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.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.

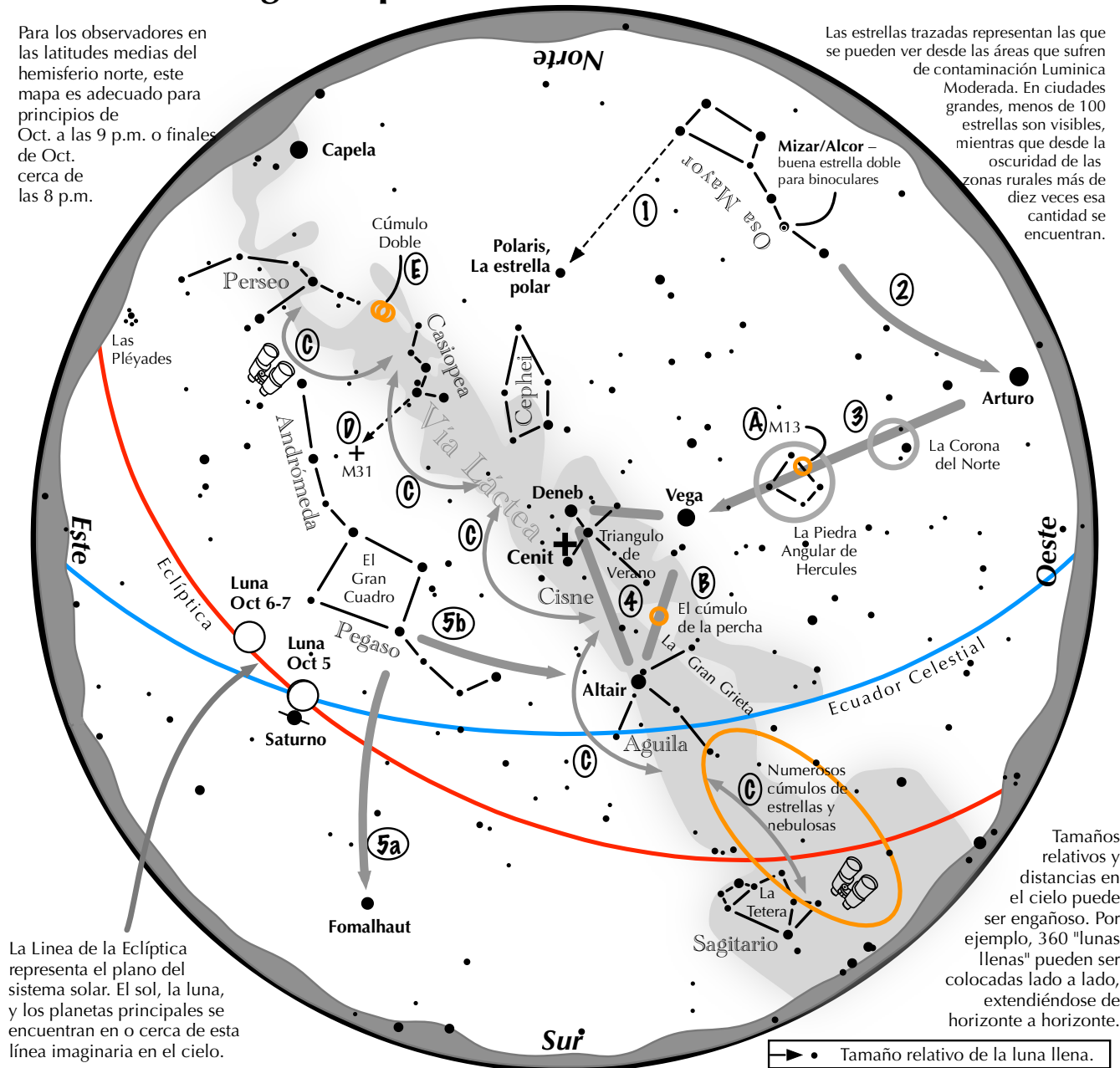
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Navegando por el cielo nocturno de Octubre

Para los observadores en las latitudes medias del hemisferio norte, este mapa es adecuado para principios de Oct. a las 9 p.m. o finales de Oct. cerca de las 8 p.m.

Las estrellas trazadas representan las que se pueden ver desde las áreas que sufren de contaminación Luminica Moderada. En ciudades grandes, menos de 100 estrellas son visibles, mientras que desde la oscuridad de las zonas rurales más de diez veces esa cantidad se encuentran.



La Línea de la Eclíptica representa el plano del sistema solar. El sol, la luna, y los planetas principales se encuentran en o cerca de esta línea imaginaria en el cielo.

Tamaños relativos y distancias en el cielo puede ser engañoso. Por ejemplo, 360 "Lunas llenas" pueden ser colocadas lado a lado, extendiéndose de horizonte a horizonte.

→ • Tamaño relativo de la luna llena.

Navegando por el cielo nocturno: simplemente comience con lo que sabe o con lo que puede encontrar fácilmente.

- 1 Haz una línea hacia el norte desde las dos estrellas en la punta de la Osa Mayor. Pasa por Polaris, la estrella polar.
- 2 Siga el arco del mango de la Osa Mayor. Se cruza con Arturo, la estrella más brillante en el cielo de la noche de octubre.
- 3 Dibuja una línea desde Arturo a Vega. Un tercio del camino se encuentra "La Corona del Norte". Dos tercios de esa distancia llevan a la "piedra angular de Hércules." Se necesita un cielo oscuro para ver estas dos configuraciones estelares tenues.
- 4 Las estrellas del Triángulo de verano, Vega, Altair y Deneb, brillan en el Cenit.
- 5 En lo alto del Este se encuentran las cuatro estrellas brillantes de la Gran Cuadro de Pegasus. (5a) Sus dos estrellas occidentales apuntan al Sur hacia Fomalhaut. (5b) Sus dos estrellas meridionales apuntan al Oeste hacia Altair.

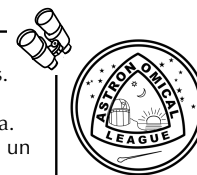
Puntos destacados con binoculares

- A:** En el lado occidental de la Piedra Angular brilla el Gran Cúmulo de Hércules, un círculo borroso de 500,000 estrellas.
B: Casi a la mitad de la distancia entre Altair y Vega, Brilla la "Percha," un grupo de estrellas que describe un perchero.
C: Recorre la Vía Láctea en busca de un número asombroso de destellos tenues y bahías oscuras, incluido La Gran Grieta.
D: Las tres estrellas más occidentales de las "W" de Casiopea apuntan hacia el sur hasta M31, la Galaxia de Andrómeda, un óvalo "borroso." **E:** Entre la "W" de Casiopea y Perseo se encuentra el Doble Cúmulo.

Traducción al español por Dr. Salvador Aguirre

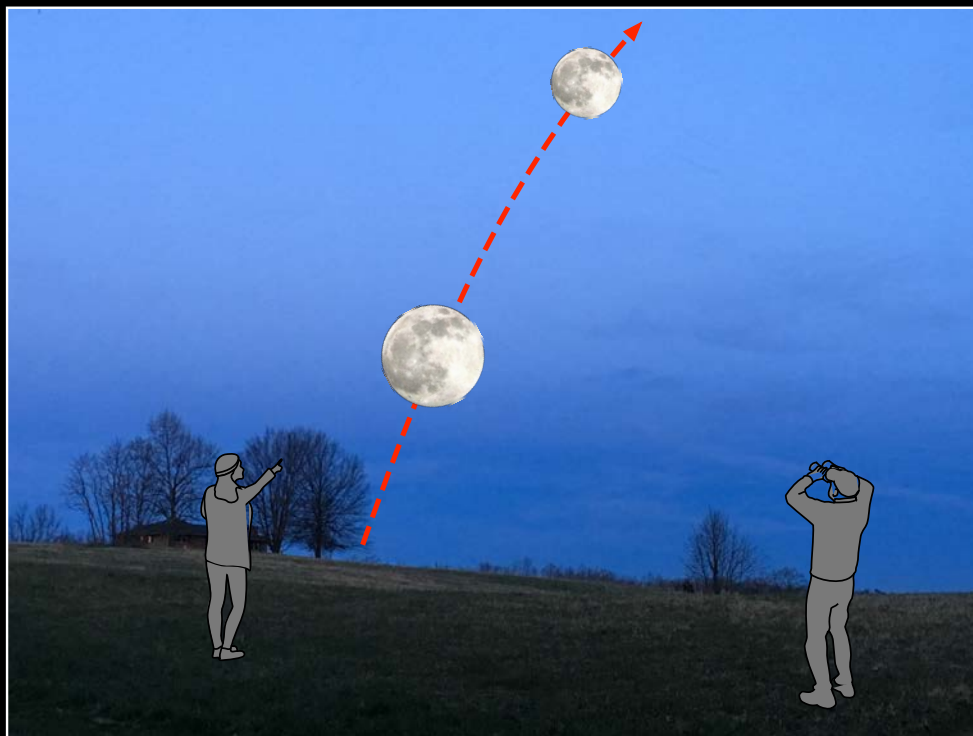
www.astroleague.org; Duplicación permitida y fomentada para toda distribución gratuita.

Liga Astronómica





Big Moon Rising: Is it real?



When the full moon rises, it seems to be unusually large. Later, when it has climbed higher in the sky, it returns to its expected apparent size. Why is this the case?

- A. When the moon is close to the horizon, its apparent size can be compared to those of distant landscape objects. So, it seems larger than it is.
- B. When it is near the horizon, it is closer to us than when it is overhead. So, it appears bigger.
- C. It is an unconscious psychological effect. The same effect occurs over a featureless sea.

Look at the moon through a drinking straw when it is rising, and later, when it has climbed a good distance above the horizon. Does the apparent size of the moon through the straw appear to change?

Stellar Observations

Greg Penner



The Great Square of Pegasus



One of the sure signs that Autumn is here is the appearance of the prominent "Great Square of Pegasus" rising high in the southeastern sky. The four stars that make up the square are all between 2nd and 3rd magnitude, bright enough to see from suburban light polluted skies. Noticing the square may not be obvious at first, not because it is small, but because it is so large. Each side of the square spans about 15 degrees, making the square bigger than the bowl of the Big Dipper. The star marking the northeast corner is actually alpha Andromedae (Alpheratz), the brightest star of the adjacent constellation Andromeda.



Great Square of Pegasus - Stellarium image



*Pegasus Object Finder Chart - Stellarium image
annotated by Greg Penner*

Once you have identified the Great Square you can utilize it as a tool to determine the quality (darkness) of your sky conditions. Let your eyes adjust to the darkness on a moonless night, then count how many stars you can see inside the square. Your sky condition can be classified as follows:

1 star visible, limiting magnitude 4.5, sky condition "poor"

4 stars visible, limiting magnitude 5.0, sky condition "average"

7 stars visible, limiting magnitude 5.5, sky condition "good"

13 stars visible, limiting magnitude 6.0, sky condition "very good"

35 stars visible, limiting magnitude 6.5, sky condition "excellent"

Once you have determined your local sky condition, you will have a better feel for what objects you can view in the vicinity of the great square. The first object of note, located just outside the square, is the star 51 Pegasi. Located about halfway between Markab and Scheat, 5.5 magnitude 51 Peg could be visible to the unaided eye if your sky condition is good to very good. Otherwise, you will easily see this star with binoculars or a small telescope. You won't actually see anything very notable when looking at this star, but the significance is in what we know about it. In 1995 astronomers announced the discovery of a planet orbiting around 51 Pegasi, the first planet outside our solar system (exoplanet) to be discovered! Swiss astronomers Michel Mayor and Didier Queloz made the discovery and shared the 2019 Nobel Prize in Physics for their discovery. To date, in addition to the exoplanet called 51 Pegasi b, nearly 6,000 confirmed exoplanets have been discovered.

If you do have very good sky conditions and a telescope of 6 inches aperture or greater, there are some interesting deep sky objects in and near the great square. The first two objects are galaxies that would best be viewed under very good to excellent conditions. NGC 7814 (also known as Caldwell 43) is located about 2.5 degrees northwest of the bright star Algenib. In larger aperture telescopes and photographs, this small galaxy has a distinctive appearance. We view it edge-on with the central bulge and pointed ends bisected by a dust lane, reminiscent of the more famous Messier galaxy M104 (Sombrero Galaxy). Thus, NGC 7814 has come to be known as the Little Sombrero Galaxy.



NGC 7814 - image by Jim Mazur

The next galaxy is outside of the Great Square, almost 10 degrees to the northwest of Scheat. NGC 7331 (also known as Caldwell 30) is larger and brighter than the Little Sombrero, so it should be easier to find with smaller telescopes. The galaxy's central region is bright enough to be seen in smaller telescopes as an oblong glow. Larger telescopes (or long exposure photographs) should bring out some structure in the spiral arms. NGC 7331 is about 47 million light-years away and has a diameter of about 130,000 light-years.



Caption NGC 7331 - image by Jim Mazur

The last object to view is one of the showpieces in the constellation Pegasus. Sky conditions for this object don't have to be so perfect, as it is very bright. The globular cluster M15 can be seen with the naked eye under dark skies, and binoculars will find this globular under almost any conditions. To find M15, follow Pegasus's nose. The stars Theta (Biham) and Epsilon (Enif) represent the head of the upside down mythical flying horse. An imaginary line from Theta through Epsilon (the

nose) will lead you straight to M15 about 5 degrees past the end of the horse's nose. Through a moderate size telescope, you will see a bright concentration of stars at the center, with "chains" of stars extending away. This globular cluster (located about 33,000 light-years away) is one of the densest ever discovered, with hot blue stars and cooler orange stars concentrated toward its bright core. M15 was the first globular cluster known to contain a planetary nebula, called Pease 1 after the discoverer Francis G. Pease who discovered it in 1928. To this date, only 4 planetary nebulae are known to exist within globular clusters. M15 is also noteworthy because it hosts a rare intermediate-size black hole at its center. Supermassive black holes at the center of galaxies are billions of solar masses, while stellar black holes are typically around 10 solar masses. The black hole at the center of M15 is about 4,000 solar masses.



*M15 (Pease 1 visible at lower left of core) - image by
Hubble Space Telescope*

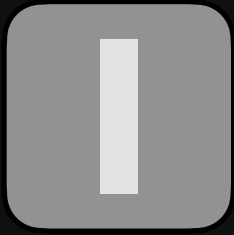
Take some time on pleasant Autumn evenings to gauge your sky conditions with the Great Square of Pegasus and then go explore the astronomical wonders surrounding this celestial steed!

The Queen Speaks

Robin Byrne



Book Review: Sew Sister



I often look to Amazon for buying books, and it has become fairly good at making additional recommendations. However, I also get inspiration from the regular emails I receive from A Mighty Girl. *Sew Sister: The Untold Story of Jean Wright and NASA's Seamstresses*, written and illustrated by Elise Matich, falls into the latter category.

Sew Sister is a children's book, recommended for ages 6-9, but, honestly, this adult enjoyed it very much. There is also a section at the end of the book that was clearly written for adults who might want to learn the story in more detail. While the portion of the book intended for children is illustrated with charming drawings by the author, the last part highlights photographs provided primarily by either Jean Wright or by NASA.

The story begins with telling a little about Jean Wright's childhood in Flint, Michigan, and how a neighbor taught both Jean and her sister how to sew. The young Jean became a very good seamstress, learning to make clothes for dolls, as well as learning how to quilt. When Jean was 13 years old, she watched as men first stepped onto the Moon. She became inspired by that achievement and developed a secret desire to somehow become a part of man's journey into space. Jean even created her own designs for mission patches and sent them to NASA. Although each time her suggestions were politely declined, Jean didn't stop hoping and dreaming.

With no means to attend college, and then marrying young, it would seem that Jean's future would never get her close to the space program. Her husband was in the Navy, so they were constantly moving to each new posting. When he finally had a chance to choose where to live next, Jean quickly suggested

Cape Canaveral, Florida. At the very least, she might as well live near the place she still dreamed about.

While reading the local newspaper, Jean saw a small article featuring a team of women sewing quilts that would be used in the construction of the Space Shuttle. Jean sent in her resumé, but there were no job openings at the time. Meanwhile, as she learned more about what the seamstresses did, she realized that they had to use blueprints for the Shuttle to create the designs for the quilts. Jean taught herself how to read blueprints to be even more qualified for a job that might never become available to her.

Jean sent in an updated resumé in the hopes that now she might have a chance. It just happened that one of the seamstresses had retired. Jean was interviewed and hired to work for NASA. Her dream had come true! She joined the small

group of women officially known as Aerospace Composite Technicians (Soft-Goods), but who called themselves The Sew Sisters.

Their work covered almost every part of the Space Shuttle. The upper portion of the Shuttle was covered with a quilt made from a quartz fabric, which protected the Shuttle during the heat of reentry. The underside of the Shuttle, which bore the brunt of reentry heating, was covered with protective tiles, but between every tile were hand-sewn gap-fillers to prevent the searing heat from breaching through. Even the Shuttle's interior was reliant upon the Sew Sisters' handiwork. The walls were coated with hand-quilted silver film and polyester mesh to protect the astronauts from solar radiation.

In October 2007, during the flight of Atlantis to the International Space Station, a small tear in one of the thermal

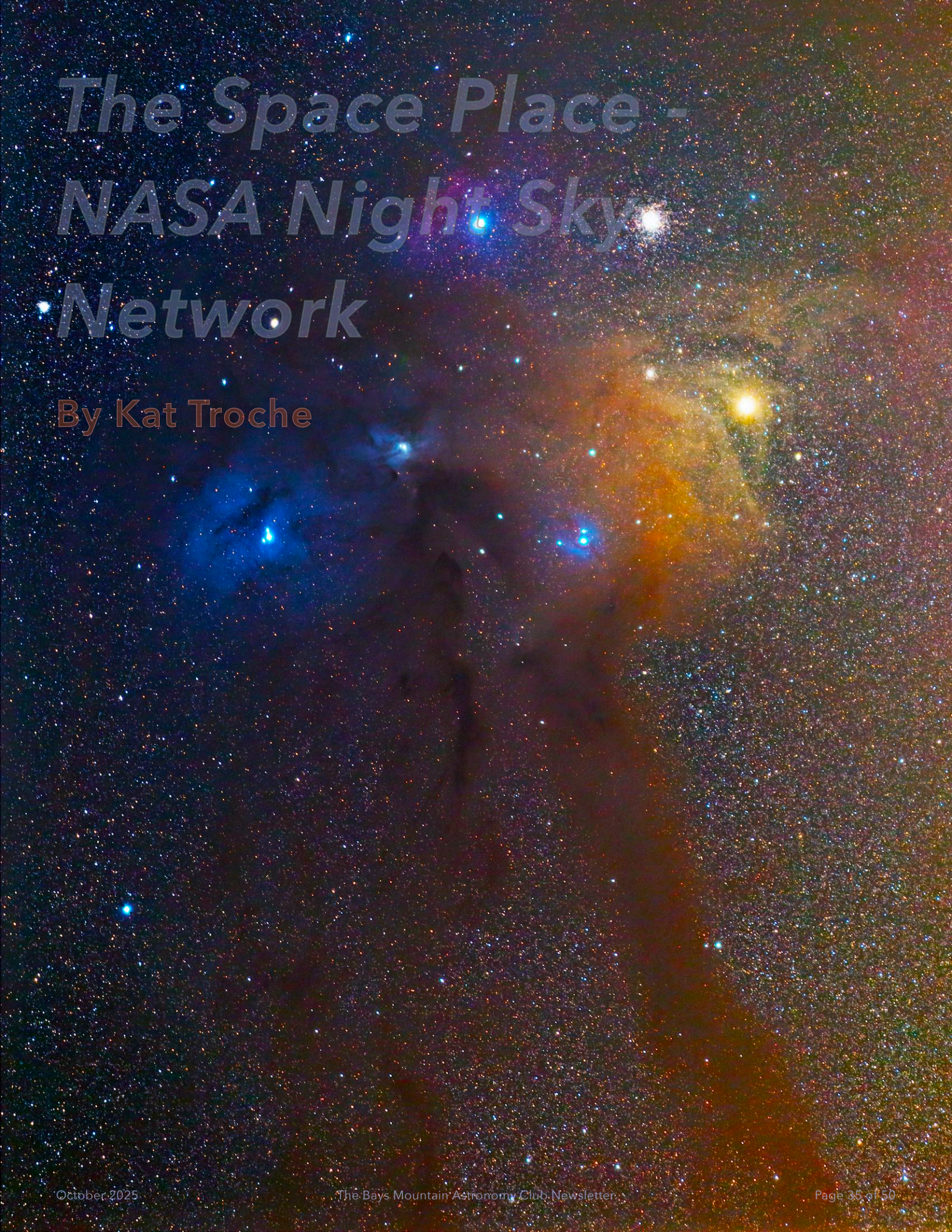
blankets covering the Shuttle was found. The Sew Sisters worked with NASA engineers to figure out a solution. First a mock-up was made and tested in a wind tunnel to see if the tear could be left unfixed, but they found that the drag of reentry would make it much worse. It had to be repaired. Then they needed to figure out how to fix the tear while wearing the bulky gloves used during a spacewalk. They found that the surgical staples kept in the on-board medical kit would do the trick. The repair was made, and the Shuttle returned safely. The Atlantis crew personally thanked all of the Sew Sisters for their help in solving the potentially life-threatening problem.

With the end of the Shuttle Program, Jean retired from NASA, but continues to be involved with the space program by volunteering at Kennedy Space Center. It was on a visit to KSC that the book's author met Jean and learned her story. From that chance encounter, this sweet book was born.

Sew Sister: The Untold Story of Jean Wright and NASA's Seamstresses by Elise Matich provides a glimpse into a part of the space program that is often overlooked. While the astronauts, engineers, and administrators of NASA are given much attention, and deservedly so, there are thousands of people who are never seen, but whose work is so vital to the success of all of the missions to space. Jean Wright and her Sew Sisters finally have a chance to be known through this enchanting children's book.

References:

Sew Sister: The Untold Story of Jean Wright and NASA's Seamstresses written and illustrated by Elise Matich; Tilbury House Publishers, 2023.



The Space Place - NASA Night Sky Network

By Kat Troche

Let's go, LIGO!



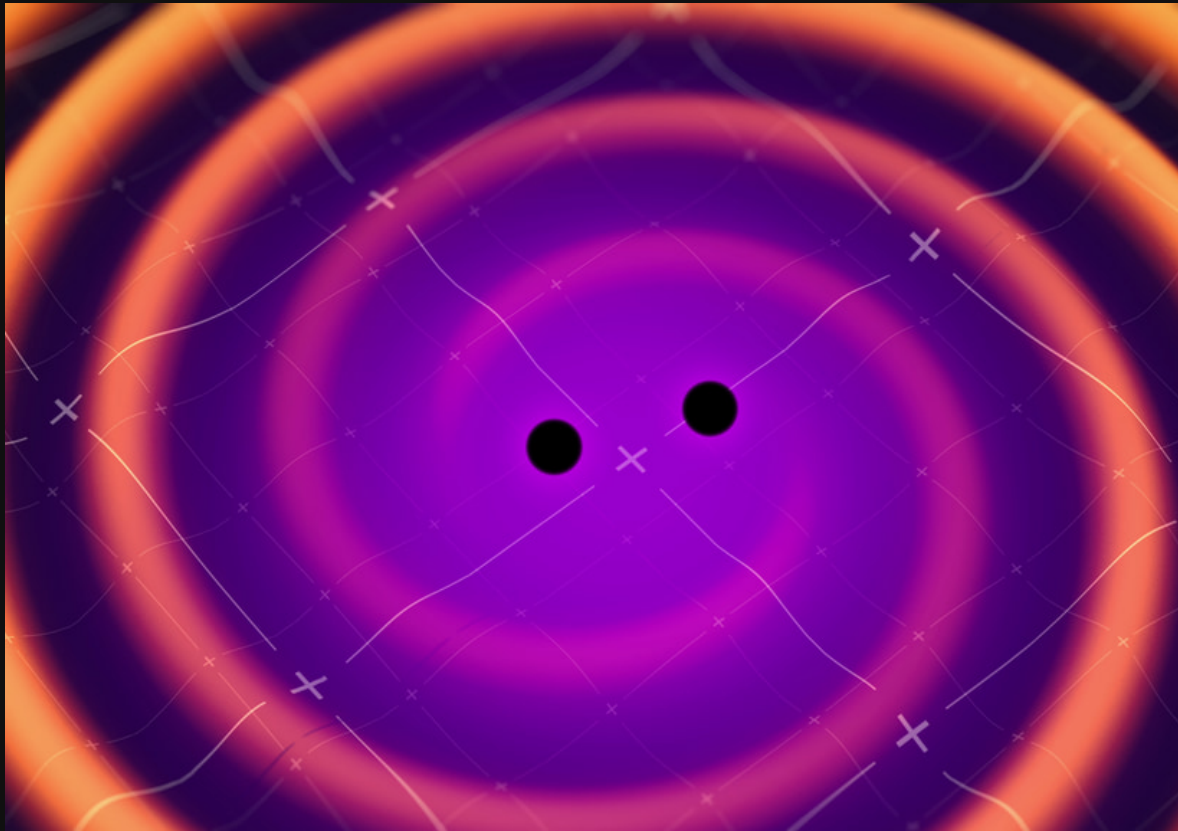
September 2025 marks ten years since the first direct detection of gravitational waves as predicted by Albert Einstein's 1916 theory of General Relativity.

These invisible ripples in space were first directly detected by the Laser Interferometer Gravitational-Wave Observatory (LIGO). Traveling at the speed of light (~186,000 miles per second), these waves stretch and squeeze the fabric of space itself, changing the distance between objects as they pass.

Waves In Space

Gravitational waves are created when massive objects accelerate in space, especially in violent events. LIGO detected the first gravitational waves when two black holes, orbiting one another, finally merged, creating ripples in space-time. But these waves are not exclusive to black holes. If a star were to go supernova, it could produce the same effect. Neutron stars can

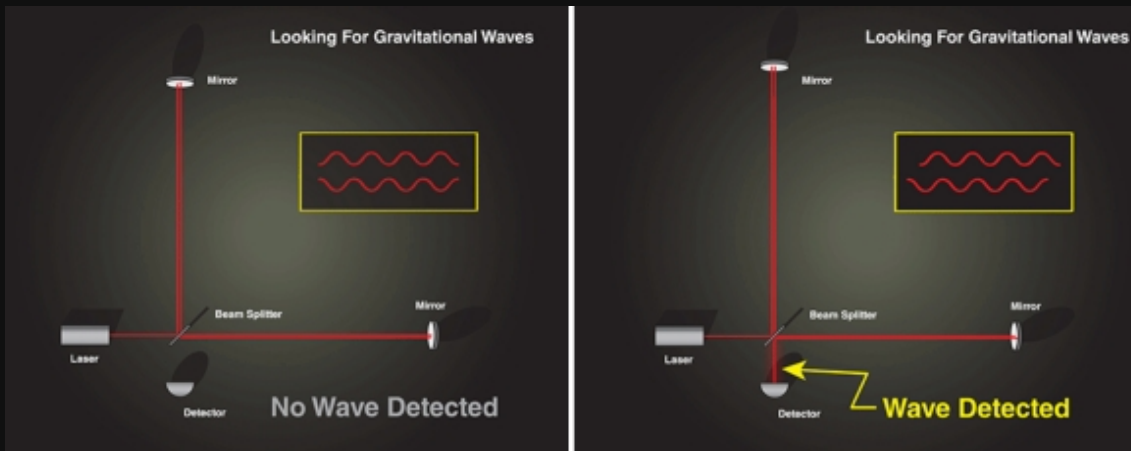
also create these waves for various reasons. While these waves are invisible to the human eye, this animation from NASA's Science Visualization Studio shows the merger of two black holes and the waves they create in the process.



Two black holes orbit around each other and generate space-time ripples called gravitational waves in this image. Credit: NASA's Goddard Space Flight Center Conceptual Image Lab

How It Works

A gravitational wave observatory, like LIGO, is built with two tunnels, each approximately 2.5 miles long, arranged in an "L" shape. At the end of each tunnel, a highly polished 40 kg mirror (about 16 inches across) is mounted; this will reflect the laser beam that is sent from the observatory. A laser beam is sent from the observatory room and split into two, with equal parts traveling down each tunnel, bouncing off the mirrors at the end. When the beams return, they are recombined. If the arm lengths are perfectly equal, the light waves cancel out in just the right way, producing darkness at the detector. But if a gravitational wave passes, it slightly stretches one arm while squeezing the other, so the returning beams no longer cancel perfectly, creating a flicker of light that reveals the wave's presence.



Still images of how LIGO (Laser Interferometer Gravitational-Wave Observatory) detects gravitational waves using a laser, mirrors, and a detector. You can find the animated version [here](#). Image Credit: NASA

The actual detection happens at the point of recombination, when even a minuscule stretching of one arm and squeezing of the other changes how long it takes the laser beams to return. This difference produces a measurable shift in the interference pattern. To be certain that the signal is real and not local noise, both LIGO observatories – one in Washington State (LIGO Hanford) and the other in Louisiana (LIGO Livingston) – must

record the same pattern within milliseconds. When they do, it's confirmation of a gravitational wave rippling through Earth. We don't feel these waves as they pass through our planet, but we now have a method of detecting them!

Get Involved

With the help of two additional gravitational-wave observatories, VIRGO and KAGRA, there have been 300 black hole mergers detected in the past decade; some of which are confirmed, while others await further study.

While the average person may not have a laser interferometer lying around in the backyard, you can help with two projects geared toward detecting gravitational waves and the black holes that contribute to them:

- **Black Hole Hunters:** Using data from the TESS satellite, you would study graphs of how the brightness of stars changes over time, looking for an effect called gravitational microlensing. This lensing effect can indicate that a massive object has passed in front of a star, such as a black hole.
- **Gravity Spy:** You can help LIGO scientists with their gravitational wave research by looking for glitches that may mimic gravitational waves. By sorting out the mimics, we can train algorithms on how to detect the real thing.

IMAGE CREDITS:

Gravitational Wave Animation: https://svs.gsfc.nasa.gov/20367/#media_group_314770

LIGO Instrument Example: <https://i.imgur.com/vs1Ekqt.jpg>

LIGO Instrument Example, Animated: <https://spaceplace.nasa.gov/gravitational-waves/en/gravitational-wave-detection.en.gif>

BONUS - Black Hole Merger (Simulated): <https://www.jpl.nasa.gov/edu/resources/teachable-moment/gravitational-waves-detected-for-the-first-time/>

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky](https://nightsky.org) to find local clubs, events, and more!

BMAC Calendar & More



Calendar:



MAC Meetings:

- Friday, October 3, 2025 - 7p - Robin Byrne - Topic: "Nancy Grace Roman: the Telescope and the Woman"
- Friday, December 5, 2025 - 7p - Topic TBA
- Friday, January 2, 2026 - 7p - Topic TBA
- Friday, February 6, 2026 - 7p - Topic TBA
- Friday, March 6, 2026 - 7p - Topic TBA
- Friday, April 3, 2026 - 7p - Topic: TBA
- Friday, May 1, 2025 - 7p - Topic: TBA
- Friday, June 5, 2025 - 7p - Topic: TBA



unWatch:

- Every clear Saturday & Sunday - 3p-3:30p - March-October - By the Dam
 - View the Sun safely with a white-light view if clear.; Free.
 - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.



tarWatch:

- Every Saturday in October and November - By the observatory
 - View the night sky with large telescopes at the observatories. If poor weather, an alternate live tour of the night sky will be held in the planetarium theater. Free.
 - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.



Special Events:

- **StarFest 2025 - November 7-9, 2025**

- Our 40th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique zip-up hoodie jacket and more!
- **Pre-registration by Oct. 19, 2025 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."**
- [Link for all the StarFest info including registration and hotel reservation links.](#)

- **BMAC Dinner - January 2026**

- This event is for members and their families. Look for an e-mail in January with all the information.

- **Annual Club Picnic - July 2026**

- Date and site location will be sent directly to full BMAC members. BMACers and their families are welcome to enjoy an evening of astronomy-themed games and activities along with a potluck dinner and observing.

Regular Contributors:



Greg Penner



Robin Byrne



Mackenzie Henley

Greg Penner is a semi-retired architect living in the Tri-Cities area since 2018. He has enjoyed astronomy since childhood when he received a “department store telescope” and viewed Saturn for the first time. He has been a member since 2018.

Robin Byrne has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

Mackenzie Henley is our new head editor of the Bays Mountain Astronomy Club newsletter. She is an undergraduate student at the University of Tennessee Knoxville.

Connection:

Bays Mountain Astronomy Club:

- 853 Bays Mountain Park Road; Kingsport, TN 37650
- (423) 229-9447 - [Park Site](#) - [Club Site](#)
- Newsletter edited by [Mackenzie Henley](#)

Dues:

- Dues are highly supplemented by the Bays Mountain Park Association and volunteerism by the club. As such, our dues are kept at an extremely low cost.
- \$16 / person / year
- \$6 / each additional family member
- Note: if you are a Park Member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. The easiest way is to pay via the CivicRec online portal. If you are a current member, please log in with your e-mail address and reset your password if you have not already done so. You can then update your membership. Here's the direct [link](#). If you want to add family members, then add them via the internal link. You can also pay at the gift shop, by mail or over the phone.

Chapter Background Image Credits:

- **Cover image of Southern Milky Way by Adam Thanz.**
 - *Sony A7ii with Zeiss Batis 2.8/18 lens, f/2.8, 8 sec., ISO 6,400, October 9, 2020.*
- **Table of Contents image of Comet NEOWISE (C/2020 F3) by Adam Thanz**
 - *Sony A7ii with Sony FE 2.8/90 Macro G OSS lens, f/2.8, 8 sec., ISO 4,000, October 15, 2020.*
- **Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.**
 - *Image captured October 23, 2016.*
- **BMAC Notes painting of the Moon with moon glow by Christa Cartwright.**
 - *Painting based on a photograph of the Moon Christa captured October 2020.*
- **Stellar Observations image of Crescent Nebula by David Reagan.**
 - *This image was taken with a 140mm refractor in his suburban backyard using an AstroPhysics 900 mount, 8.7 hours of 5 minute Ha and OIII subexposures, combined in AstroPixelProcessor as an HOO image and processed in Lightroom and Photoshop. Image captured in 2022.*
- **The Queen Speaks image of a solar halo by Robin Byrne.**
 - *iPhone 7, October 8, 2020.*
- **The Space Place - NASA Night Sky Network image of the Rho Ophiuchi cloud complex by Brandon Stroupe.**
 - *Canon 6D with Canon 2.8/70-200mm lens, f/2.8 @200mm, 20 x 120 sec. exposures, ISO 1,000, stacked in Deepsky Stacker, processed in Adobe Photoshop CC, Skywatcher Star Adventure mount, October 19, 2015.*
- **BMAC Calendar & More image of the Moon by Greg Penner.**
 - *iPhone shooting through a 9mm eyepiece and 12.5" Truss Tube Dobsonian @212x.*
- **All background images used with permission by their authors.**