



The Bays Mountain Astronomy Club Newsletter

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Cosmic Reflections

Greg Penner - BMAC Chair



reetings BMACer's!

September is finally upon us, so we can really start looking forward to the change of seasons and longer nights for observing! We have a great fall season ahead of us for our astronomy club activities. Registration is open for our biggest event of the year: STARFEST! If you haven't done so yet, go check out the [StarFest page](#) on the Bays Mountain website. The theme of this year's event is "Moonstruck." Each of our four keynote speakers will focus on the Moon or moons of our Solar System. There's a lot going on now in astronomy and space exploration regarding these natural satellites, and our speakers will be guiding us through this moonscape of wonder. Once again, the artwork for the t-shirt is amazing! StarFest is always a great experience with fantastic speakers, delicious food, stargazing, and great conversations all in the beautiful autumn setting at Bays Mountain: so register now!

The August meeting was a nice gathering where we enjoyed the current planetarium program and some Show & Tell.

At our September 6th meeting, we will welcome Dr. Gary Henson from ETSU for a talk titled "The Astronomical Origins of our Ancient Holidays." This should be a fascinating talk in the planetarium theater and a great way to lead into the upcoming "holiday season." After Dr. Henson's talk, if there is anyone that has a "Show and Tell" item or some news of interest, please share that with the club. Later in September, a field trip to an observatory in North Carolina has been set. BMAC members received an e-mail regarding details and a link to buy tickets. If you plan to go, you should purchase tickets ASAP as these events tend to sell out. Also, in late September/early October there may be a chance to see a nice comet. Refer to my "Stellar Observations" article later in this newsletter for the details.

Looking forward to a great September,

Clear Skies!

BMAC Notes



Bays Mountain StarFest 2024



he 39th StarFest at Bays Mountain Park is soon upon us. Expect beautiful fall colors, cooler weather and lots of astronomy fun for this astronomical

convention / star party. It is being held on November 1-3, 2024 in the heart of the Appalachians. Registration is currently open until October 13 2024, 11:59p. Registration is necessary to attend. Sorry, no walk-ins.

The theme of this year's event is "Moonstruck." Each of our four keynote speakers will focus on the Moon or moons of our Solar System. There's a lot going on now in astronomy and space exploration regarding these natural satellites and our speakers will be guiding us through this moonscape of wonder. We think you'll really enjoy this year's topic and speakers!



Keynote Speakers:

**Dr. Amy L. Fagan - Associate Professor of Geology,
Geosciences and Natural Resources Department Department
Head - Western Carolina University**

*Visiting a Piece of Home: Why it is important to go to the Moon
and how it can tell us about Earth's Early History*



Dr. Amy L. Fagan

- **Talk Abstract** - Humans have not set foot on the surface of the Moon since 1972, but in that time scientists have continued to perform exciting research on the samples returned to Earth by the crews. Many questions have been addressed, but each leads to new ones. We will walk through the formation and evolution of the Moon, and how we learned this from the sample collection. We will also explore whether or not the existing sample collection is sufficient to answer the remaining questions that we have so far (spoiler alert, it's not!).
- **Bio** - "Professor Fagan is a lunar petrologist and geochemist specializing in lunar igneous rocks (e.g., mare basalt and troctolites), impact products (e.g., impact melt breccias and regolith breccias), and identification of exogenous meteoritic material within lunar samples; she is an Apollo Principal Investigator, and also has experience working with lunar meteorites. She earned her B.S. in Geology from Washington and Lee University (2006) and her PhD from the University of Notre Dame (2013) before joining the faculty at Western Carolina University, where she now serves as the Department Head of the Geosciences and Natural Resources Department. Professor Fagan serves as the Emeritus Chair of the NASA-chartered Lunar Exploration Analysis Group (LEAG), composed of members from academia, government, and industry. She has also engaged in numerous support roles including JETT3; the Artemis III Science Definition Team; LEAG Specific Action Teams and other roles on the LEAG Executive Committee; and collaborative research."

**Dr. Erika Grundstrom - Director of Astronomy Labs -
Vanderbilt University**

Amazing Moons!



Dr. Erika Grundstrom

- **Talk Abstract** - Throughout much of human history, there was only one moon and humans didn't really realize it is a world of its own. Now we know of at least 600 moons (if we're counting dwarf planet and asteroid moons)! We'll look at some of the most fascinating worlds in the Solar System, especially ones we could consider "ocean worlds," and investigate how we know what we know. Maybe we'll touch on some famous fictional moons!
- **Bio** - Dr. Erika Grundstrom is Vanderbilt University's Director of Astronomy Labs and an experienced educator who kids may have had as a teacher in Vanderbilt's Program for Talented Youth or seen with an inflatable, portable planetarium around the Nashville area! As a kid, she lived on a farm close to the Canadian border where she thought the Northern Lights were normal (if totally awesome). But it was learning about constellations and the mythology with them that sparked a love of the stars and then "Star Trek: The Next Generation" that set her on a path to astrophysicist. When not astronomy-ing, she loves to partner dance with her hubby and hang with their two kids.

Dr. Sarah Milkovich - Planetary Geologist and Spacecraft Engineer

Ocean Moons: The Distant Worlds of Europa and Enceladus



Dr. Sarah Milkovich

- **Talk Abstract** - A number of moons orbit Jupiter and Saturn. Two of these tiny worlds have captured our attention: Europa and Enceladus. Covered in bright ice with oceans of water lurking underneath, these distant moons might even be able to support life. Learn how we discovered icy geyser-like plumes on Enceladus with the Cassini spacecraft, and our plans for a closer look at Europa with the spacecraft Europa Clipper - launching soon!
- **Bio** - Dr. Sarah Milkovich is a science storyteller, sharing her enthusiasm for robotic space exploration and the stories of the people behind the robots. Sarah spent decades exploring the Solar System with a variety of spacecraft, including Mars Phoenix Lander, Mars Reconnaissance Orbiter, Mars Curiosity Rover, the Mars 2020 Perseverance Rover, and the Cassini spacecraft at Saturn. She specialized in bringing together international teams of scientists and engineers to collect the best possible science within spacecraft engineering restraints. She holds a B.S. in planetary science from Caltech, and a M.S. and Ph.D. from Brown University in planetary geology with studies of ice on Mars, and volcanoes on Mercury. Sarah is a frequent public speaker at astronomy clubs and fan conventions.

**Dr. Caitlin Ahrens - Planetary Geologist - Center for Research
and Exploration in Space Science and Technology II at NASA
Goddard Space Flight Center**

*Unlocking the Moon: Exciting Opportunities in Lunar Exploration
and Sample Return Missions*



Dr. Caitlin Ahrens

- **Talk Abstract** - We will dive into the many exciting opportunities of returning to the Moon through human and robotic exploration with CLPS and Artemis missions. The Moon presents many interesting challenges, from radiation to dust to extremely cold temperatures, and human exploration lends its own level of complex issues. We will also investigate the motivations for sample return, especially volatile samples, from the lunar south pole, and how these samples can guide us to an eventual sustainable presence on the lunar surface.
- **Bio** - Dr. Caitlin Ahrens is a research scientist from the Center for Research and Exploration in Space Science and Technology II at NASA Goddard Space Flight Center, Greenbelt, Maryland. Dr. Ahrens received her B.S. in Physics/Astrophysics and Geology from West Virginia University in 2015, and a Ph.D. in Space and Planetary Science at the University of Arkansas in 2020. She is a member of the Diviner Science Team with the Lunar Reconnaissance Orbiter. In collaboration with Artemis, she serves as a technical support scientist for the Extravehicular and Human Activities Program to assist in risk assessments of astronaut, rover, and lander activity at the lunar surface. Her main area of research involves remote sensing of icy surfaces, volcanism, and volatile interactions, from the Moon to the outer Solar System at Pluto.

This year includes four distinctive keynote speakers, five great meals, a commemorative T-shirt with one-of-a-kind artwork, door prizes, the ever popular swap shop and telescope viewing. In addition to all the StarFest activities, there are public programs and activities available at the park, such as the wildlife exhibits, planetarium programs, barge rides and plenty of trails to explore. You can camp on the Park grounds with no extra fee or enjoy one of the many nearby hotels. We have arranged for a special rate at the closest and finest hotel, the MeadowView Marriott Resort.

This three-day long gathering is filled with great activities, but also makes sure there's quality free time for you to explore the Park and enjoy the camaraderie of your fellow StarFesters.

Attendance will be limited and registration must be received by the deadline, October 13, 2024, 11:59p. Registration includes everything. There are also three levels of student discounts available. The student discounts are quite generous to continue our long-term support of student involvement. I'm happy to say

that we've been averaging about 30% students for the past many years.

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

Adam Thanz - StarFest 2024 Chair



StarFest 2024 T-Shirt Design

Star Party @ the Gazebo at Natural Tunnel State Park



ere's a note about a star party that BMACers are invited to attend. Ray O'Connor is hosting this viewing at Natural Tunnel State Park on September 28, 2024. It will be at the Gazebo and start at sunset. Feel free to bring your observing equipment for a night of stargazing.

Contact Ray O'Connor for more information. 276-248-1712

Sky News from the Astronomical League

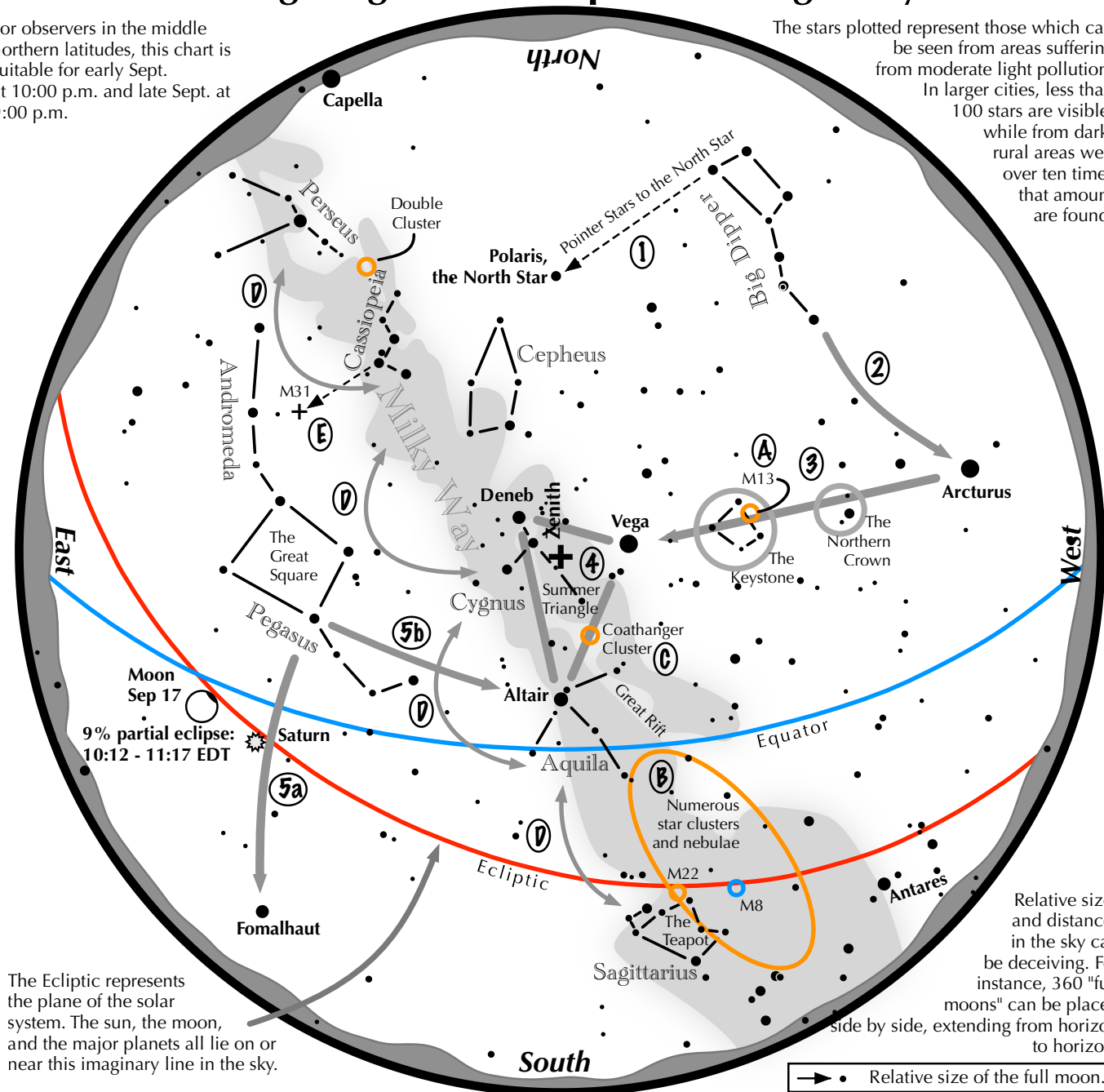


he Astronomical League has a plethora of educational content to help you learn and enjoy the night sky more. The following inserts are just a tiny bit of what they provide.

Navigating the mid September Night Sky

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

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



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

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

Binocular Highlights

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

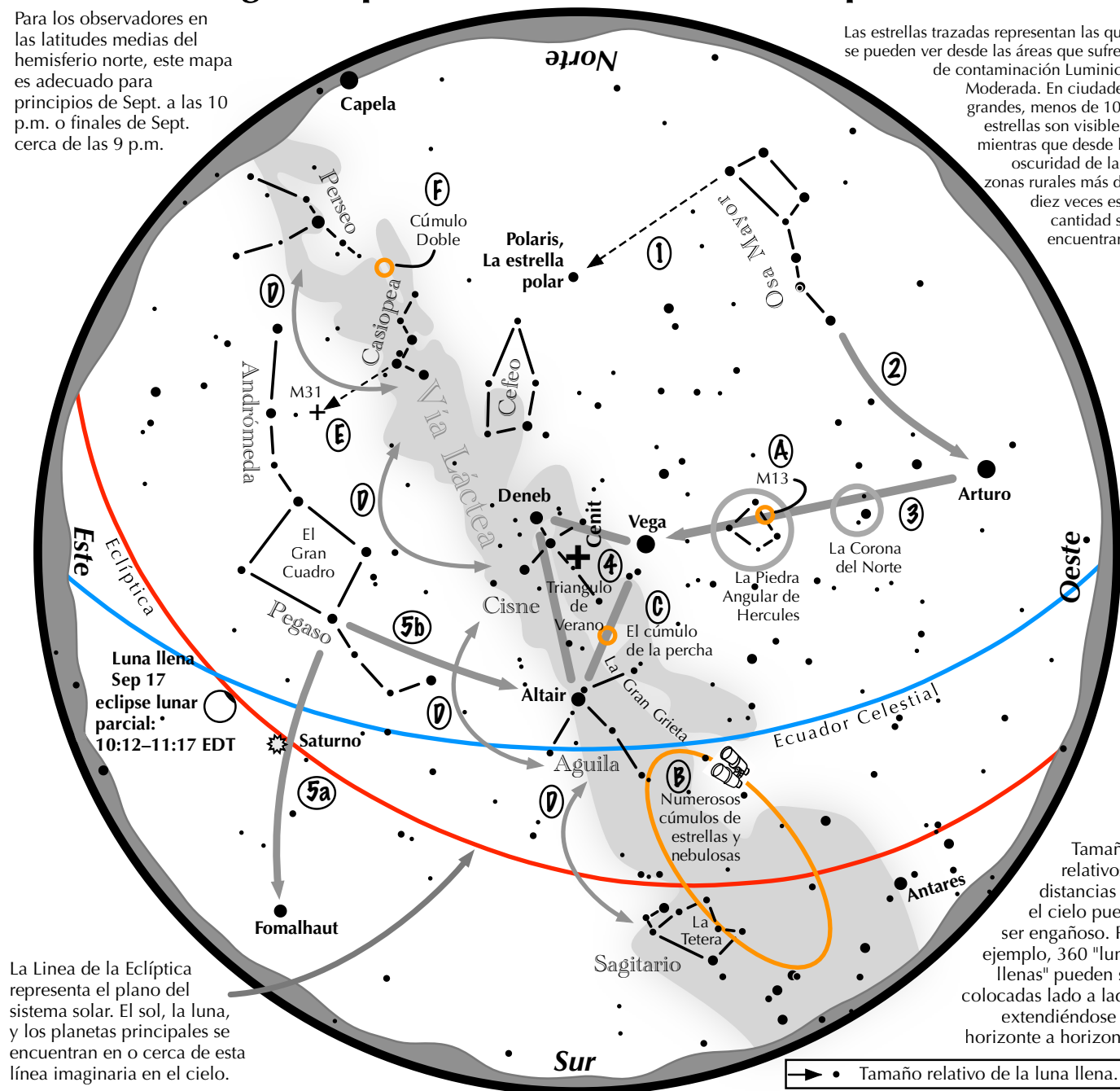
Astronomical League www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.



Navegando por el cielo nocturno de Septiembre

Para los observadores en las latitudes medias del hemisferio norte, este mapa es adecuado para principios de Sept. a las 10 p.m. o finales de Sept. cerca de las 9 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 septiembre.
- 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 Las dos estrellas más al oeste del Gran Cuadro, que se encuentra en el este, apuntan al sur hacia Fomalhaut. Las dos estrellas más al sur apuntan al oeste hacia Altair.

Puntos destacados con binoculares

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

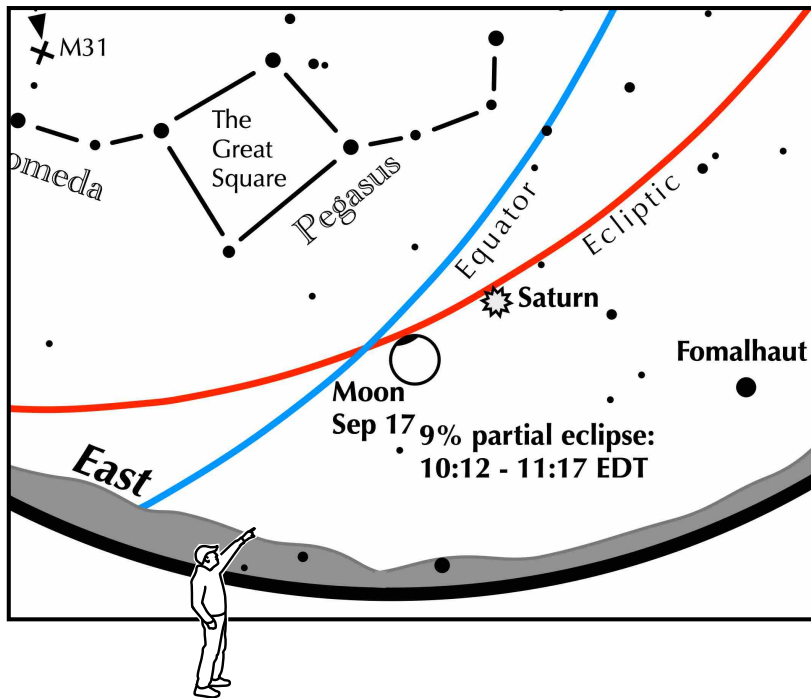
Traducción al español por Dr. Salvador Aguirre

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

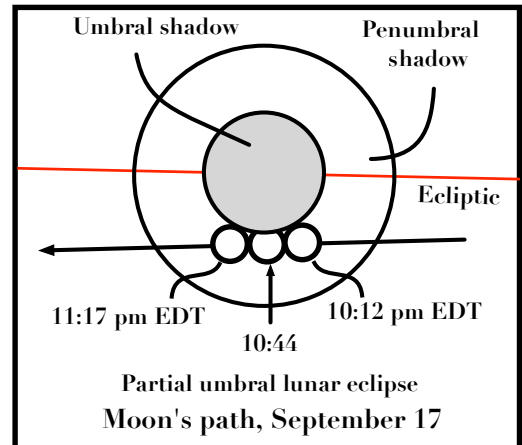
Liga Astronómica



A partial lunar eclipse that is a nibble, not a bite!



View to the southeast on September 17
from 10:12 through 11:17 pm EDT.
Mid eclipse lands at 10:44 pm



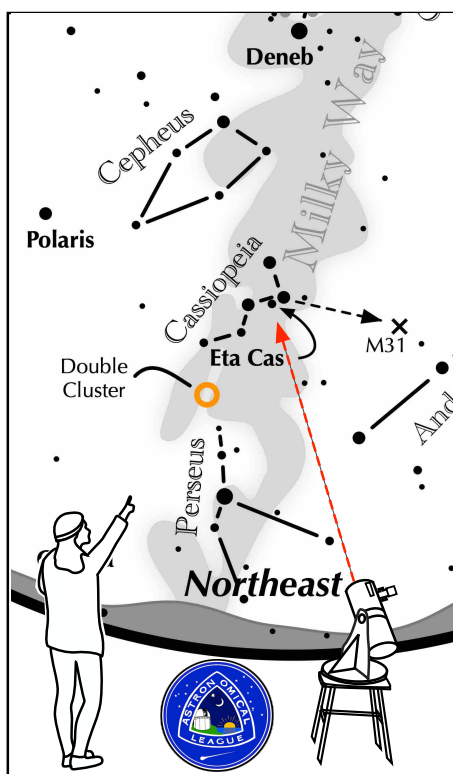
The Moon slides through a partial umbral eclipse

A very partial umbral lunar eclipse occurs on the night of September 17. Bring out the binoculars for a better look at Earth's shadow taking a nibble out of the moon. Only about 9% of the surface will be in umbral shadow. The event will be slight enough that the casual observer might not notice it.

Mid eclipse and the best view occurs at 10:44 pm EDT. West Coast observers will find it low above the southeastern horizon.



ASTRONOMICAL LEAGUE Double Star Activity



Other Suns: Eta Cassiopeiae

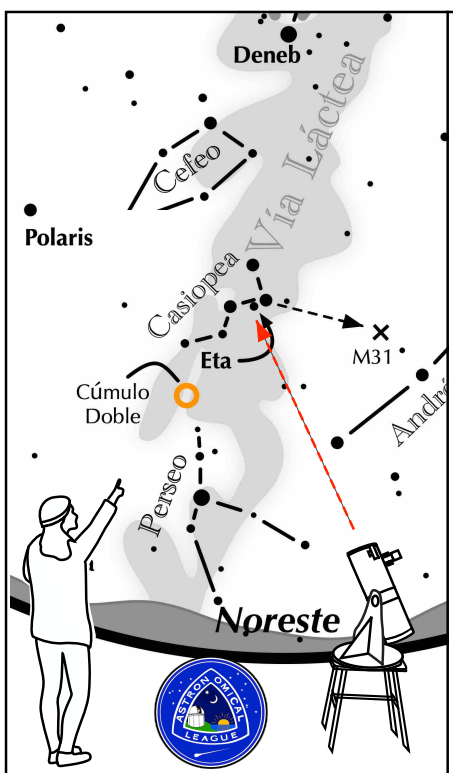
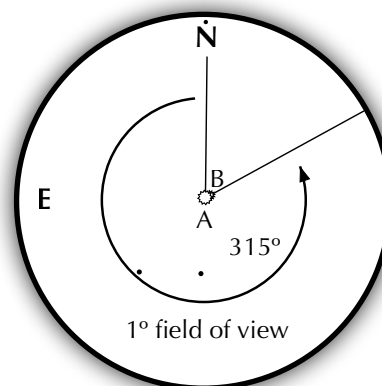
How to find Eta Cassiopeiae on a September evening

High in the northeast are the five moderately bright stars forming the "W" of Cassiopeia. The second star moving east along the W is Alpha Cassiopeiae. Eta is the dimmer star immediately to Alpha's northeast.

Suggested magnification: >30x
Suggested aperture: >2 inches

Beta Cassiopeiae

A-B separation: 13 sec
A magnitude: 3.5
B magnitude: 7.4
Position Angle: 319°
A & B colors:
yellow, purple?



Otros Soles: Eta Cassiopeiae

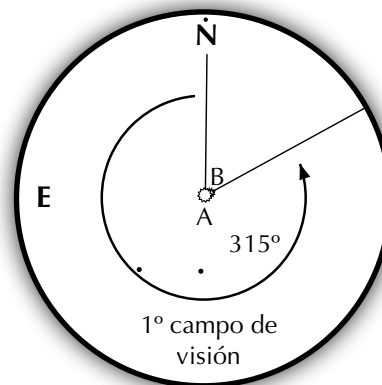
Cómo encontrar Eta Cas en una tarde de Septiembre

En lo alto del noreste se encuentran las cinco estrellas moderadamente brillantes que forman la "W" de Casiopea. La segunda estrella que se mueve hacia el este a lo largo del W es Alpha Casiopeiae. Eta es la estrella más tenue inmediatamente al noreste de Alpha.

Ampliación sugerida: >30x,
Apertura sugerida: >50 mm

Eta Cassiopeiae

A-B separación: 13 sec
A magnitud: 3.5
B magnitud: 7.4
PA: 319°
A & B color:
amarilla, púrpura?



Stellar Observations

Greg Penner



Comet Watch!



One of the most dramatic astronomical events is the appearance of a significant comet. The appearance of a bright comet can be sudden and unnerving to those not expecting the sight. Ancient cultures saw comets as harbingers of doom. Fortunately, for us in modern times, we understand that comets are big, "dirty snowballs" that come from the outer regions of the Solar System and produce spectacular tails as they round the Sun and head back out to deep space. We look forward to when we will be amazed by the next cometary show. In recent years we have seen Comet Leonard in December 2021 and Comet NEOWISE in July 2020. Leonard's visual magnitude was around 5 or 6 and made a beautiful photographic pairing with globular cluster M3. NEOWISE was bright enough to be naked-eye visible at around magnitude 1 to 2, making it the brightest northern hemisphere comet since the famous Hale-Bopp comet in 1997. So, will we be seeing another bright (possibly naked-eye) comet soon?



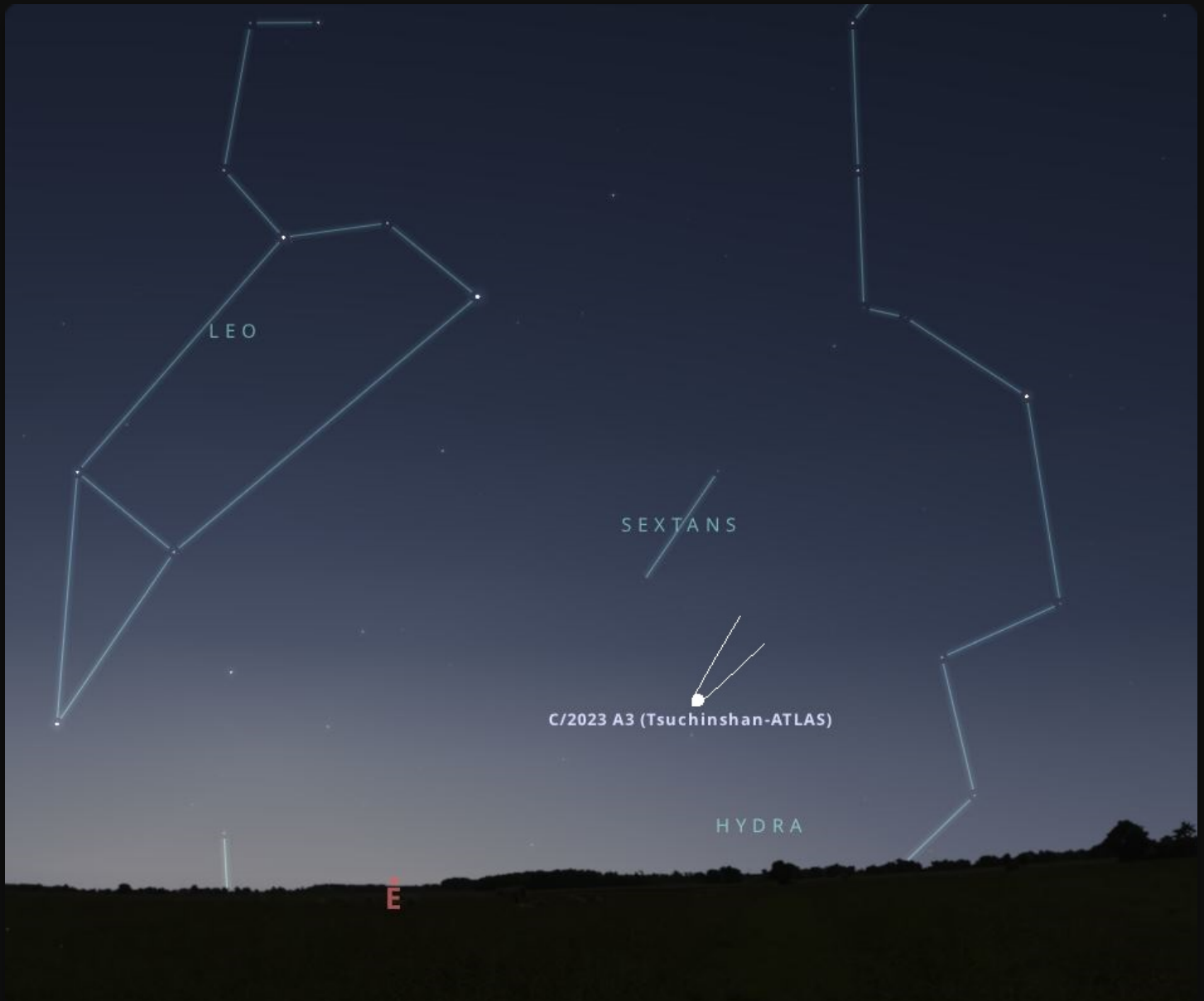
*Comet NEOWISE, July 2020. The curvy green lights are fireflies. - by
Greg Penner*



Comet Tsuchinsan, July 28, 2024 - by Gerald Rhemann

Comet Tsuchinshan-ATLAS (C/2023 A3) (pronounced Choo-cheen-SHAHN-ATLAS), as of mid-August, was inbound towards the inner Solar System about 1 astronomical unit (a.u.) away from the Sun speeding along at 144,000 km/hr. In early to mid-September, Comet T-A will be unobservable while it is in conjunction with the Sun. Starting around September 22nd, the comet will be just a few degrees above the eastern horizon in the mornings about 45 minutes before sunrise. By the 27th it will be the maximum altitude, about 5 degrees above the horizon, and then start descending again toward the Sun. During this morning apparition at the end of September, it could reach magnitude 2 to 3 with a nice dust tail visible photographically. Over the summer there had been some concern that the comet was starting to break up. Some observers noted that the comet was dimming, but further observations have challenged those conclusions, and the comet continued brightening. In early October the comet will be lost in the Sun's glare again, but then we should be prepared for Comet T-A to put on a great show! Comets are notoriously

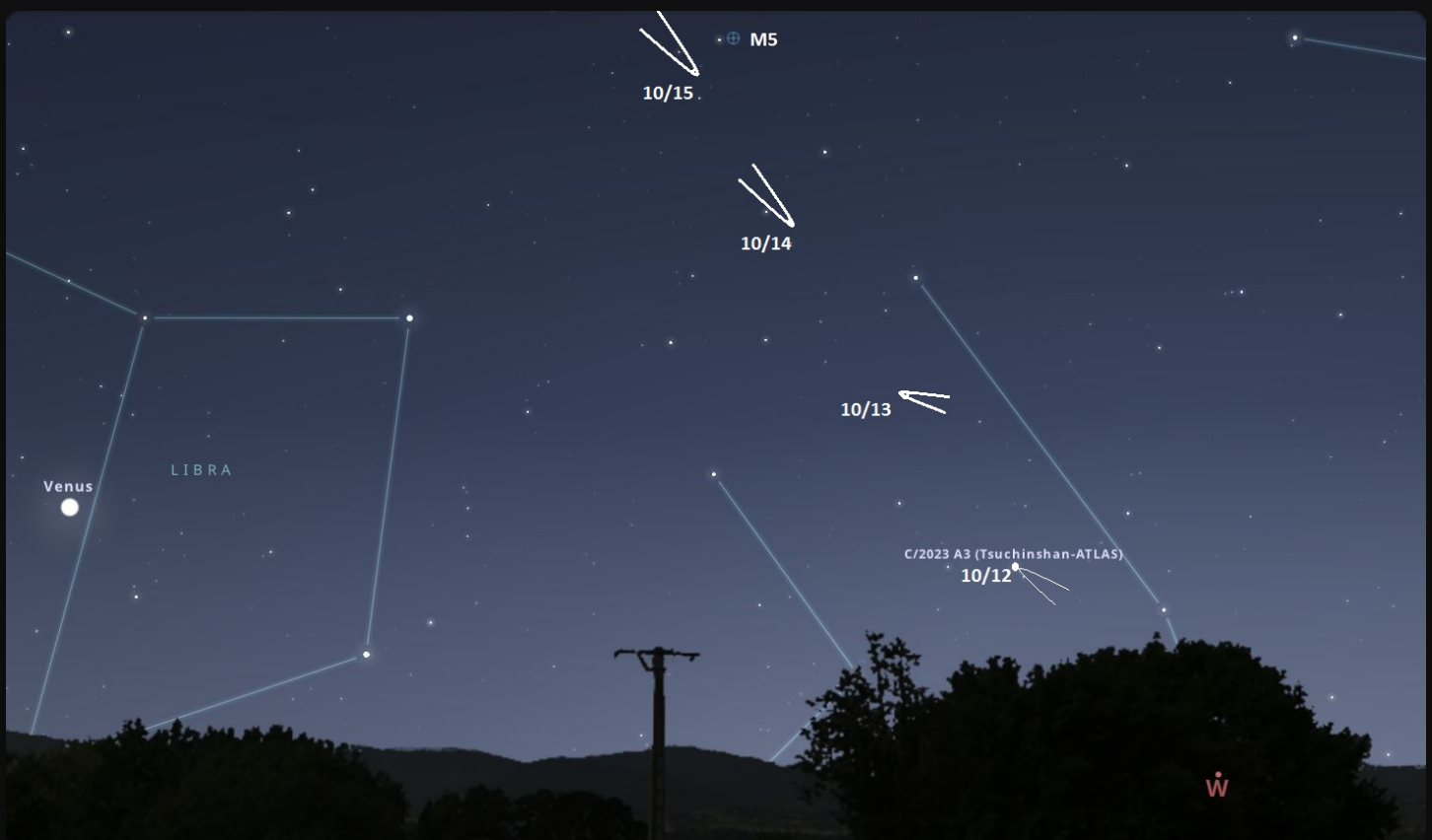
difficult to predict brightness, but why not be optimistic and make preparations now so you don't miss out?



Comet Tsuchinsan-ATLAS location on the morning of 9-27-24

French optical engineer and amateur photographer Nicolas Lefaudeux has a website in which he has created "Comet Tails Simulations." According to his simulations, as the comet descends in the early morning sky toward the Sun and disappears below the horizon, the tail will continue to grow and could be visible above the horizon. By October 9th, as the comet passes solar conjunction, the tail could be 30 degrees long. On that morning, the Sun and the comet will be 20 degrees below the horizon, so the tail could be visible up to 10 degrees above the horizon. As the comet swings around the Sun, it will become an evening object. By the evening of October 12th, the comet will emerge from the Sun's glare appearing very low on the horizon, possibly at magnitude 1, visible with the naked-eye with a tail pointing toward the Sun. By the evening of the 13th, Comet T-A will be 10 degrees above the horizon, and the tail should have a prominent curve as it will be in the process of re-orienting away from the Sun. According to Lefaudeux's website, "On October 14th: the Earth will cross the orbital plane of the comet, resulting in a strong and sharp

anti-tail. According to the simulations, the anti-tail of C/2023 A3 Tsuchinshan-ATLAS should be intrinsically brighter than the famous anti-tail of comet Arend-Roland. This is because the geometry of the encounter makes that a larger amount of dust particle is projecting in the anti-tail direction." On the evening of October 15th, the comet will pass less than $1 \pm$ degrees from globular cluster M5 for an excellent photographic pairing! The only downside during this time will be bright moonlight as the Moon will be waxing toward full.



Comet Tsuchinsan-ATLAS location on evenings from 10/12/24 - 10/15/24

The key task for anyone who would like to have a good view of Comet T-A is to find a viewing location with unobstructed views down to the horizon (eastern and western) away from bright city lights. So plan on using early to mid-September to scout locations and prepare for this possible bright cometary show!

References/Extra Resources:

[A great article about the history of comets](#)

[Nicolas Lefaudeux comet tails simulations](#)

The Queen Speaks

Robin Byrne



Happy Birthday Daniel Kirkwood



his month we celebrate the life of a man whose name is associated with parts of the Solar System, but which I associate with my alma mater.

Daniel Kirkwood was born September 27, 1814 on a farm in Hartford County, Maryland. Despite being raised on a farm, Kirkwood had no interest in pursuing farming as a career. In fact, he was much more interested in mathematics. So, in 1834, he enrolled at the York County Academy in York, Pennsylvania to study mathematics. Upon his graduation in 1838, Kirkwood was hired by the same Academy as a First Assistant and Mathematical Instructor.

In 1843, Kirkwood moved on to Lancaster High School, in Lancaster, Pennsylvania, to be the school's Principal. The following year, he married Sarah McNair. Kirkwood moved to Pottsville, Pennsylvania in 1848 to take the position of Principal for the Pottsville Academy.



Daniel Kirkwood. C. 1894.

Despite a career in public education, Kirkwood still found time to pursue his interest in mathematics, especially applying it to astronomy. In 1849, Kirkwood used the published values of the rotation rates of the known planets, and their distances from the Sun, to look for a pattern. He wanted to see if there was a connection between how long it takes a planet to spin on its axis and its distance from the Sun. The relationship he found stated that the number of rotations per orbit, when squared, was proportional to the distance from the Sun cubed. This became known as Kirkwood's Law and led to astronomers first taking note of Kirkwood. However, modern observations of planetary rotation rates show that this law doesn't actually apply.

In 1851, Kirkwood took the position of Professor of Mathematics at Delaware College. Four years later, he was named President of the same school. He apparently did not enjoy the responsibilities of being president, referring to his time in that post, Kirkwood said, "Concerning that, the less said

the better.” He did not like being the center of attention or being in the public eye, leaving the job after just one year.

Kirkwood left Delaware to become Professor of Mathematics at Indiana University, in Bloomington, Indiana. Kirkwood finally found a place where he felt he belonged, staying at Indiana until his retirement 30 years later.

At Indiana, Kirkwood applied his mathematical skills to the study of asteroids. At a time when only about 50 asteroids were known, Kirkwood proposed that the gravity from Jupiter would create gaps in the asteroid belt. He reasoned that asteroids that had orbits in resonance with Jupiter’s orbit (that is, orbits that would line up every so many times around the Sun), would be gravitationally affected by Jupiter, effectively removing them from the resonant orbits, thus creating gaps. As more asteroids were discovered (up to about 450), the proposed gaps were confirmed observationally. Those gaps are now known as Kirkwood Gaps.

In 1883, Kirkwood proposed that a similar phenomenon should occur in Saturn's rings for ring particles in resonant orbits with some of Saturn's moons. He suggested that this would explain the existence of the Cassini Division in the rings. Kirkwood was also one of the first people to associate meteor showers with comets. Kirkwood's string of contributions to astronomy made him the first Indiana University faculty member to achieve national recognition.

In 1886, Kirkwood retired from IU and moved to California, but he wasn't quite done with teaching. In 1891, at the age of 77, Kirkwood was hired as a Lecturer in Astronomy at Stanford University. He truly loved teaching throughout his career, so it's no surprise that he never wanted to permanently leave the classroom or the camaraderie with his students.

In addition to teaching, Kirkwood was also a prolific writer. He published 126 articles, plus three books, covering topics related to meteors, comets, and asteroids.

On June 11, 1895, at the age of 81, Daniel Kirkwood passed away in Riverside, California. Although he died in California, he was buried in Bloomington, Indiana, the place he considered his true home.

Daniel Kirkwood's name lives on in many ways. On the far side of the Moon lies crater Kirkwood. In the asteroid belt is asteroid 1578 Kirkwood. And in Bloomington, Indiana you will find many homages to Kirkwood: On the IU campus are both Kirkwood Hall and Kirkwood Observatory, and the main street leading to campus is Kirkwood Avenue.

As a graduate of the Indiana University Astrophysics program, the name Kirkwood is very much a part of my fond memories of IU. Kirkwood Observatory was the first observatory I ever made observations from. My physics classes were taught in Kirkwood Hall. And Kirkwood Avenue was the destination for restaurants and entertainment in town. But even if you aren't fortunate enough to be an IU graduate, you can still think kindly of Daniel Kirkwood. Whether observing an asteroid, watching a meteor

shower, or noting gaps in Saturn's rings, take a moment to remember the man who helped us understand these objects, and so much more - Daniel Kirkwood.

References:

Department of Astronomy, Indiana University - [Daniel Kirkwood History](#)

Wikipedia - [Daniel Kirkwood](#)

[Daniel Kirkwood](#) by Joseph Swain, Publications of the Astronomical Society of the Pacific, Vol.13, No. 80, p.140



The Space Place - NASA Night Sky Network

Kat Troche

Marvelous Moons



September brings the gas giants Jupiter and Saturn back into view, along with their satellites. And while we organize celebrations to observe our own Moon this month, be sure to grab a telescope or binoculars to see other moons within our Solar System! We recommend observing these moons (and planets!) when they are at their highest in the night sky, to get the best possible unobstructed views.

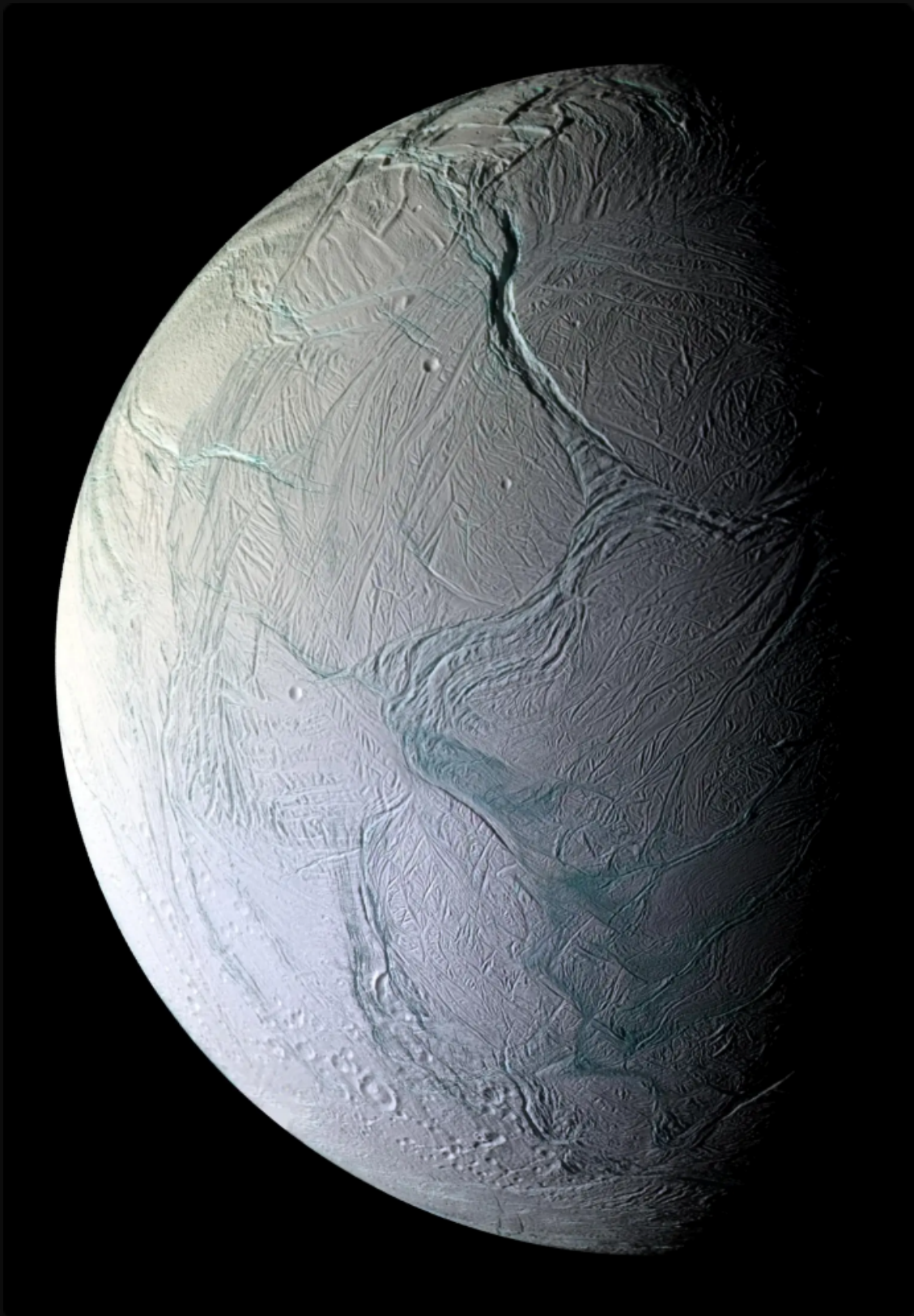
The More the Merrier

As of September 2024, the ringed planet Saturn has 146 identified moons in its orbit. These celestial bodies range in size; the smallest being a few hundred feet across, to Titan, the second largest moon in our Solar System.



The Saturnian system along with various moons around the planet Saturn: Iapetus, Titan, Enceladus, Rhea, Tethys, and Dione. Credit: Stellarium Web

Even at nearly 900 million miles away, Titan can be easily spotted next to Saturn with a 4-inch telescope, under urban and suburban skies, due to its sheer size. With an atmosphere of mostly nitrogen with traces of hydrogen and methane, Titan was briefly explored in 2005 with the Huygens probe as part of the Cassini-Huygens mission, providing more information about the surface of Titan. NASA's mission Dragonfly is set to explore the surface of Titan in the 2030s.



This mosaic of Saturn's moon Enceladus was created with images captured by NASA's Cassini spacecraft on Oct. 9, 2008, after the spacecraft came within about 16 miles (25 kilometers) of the surface of Enceladus. Credit: NASA/JPL/Space Science Institute

Saturn's moon Enceladus was also explored by the Cassini mission, revealing plumes of ice that erupt from below the surface, adding to the brilliance of Saturn's rings. Much like our own Moon, Enceladus remains tidally locked with Saturn, presenting the same side towards its host planet at all times.

The Galilean Gang

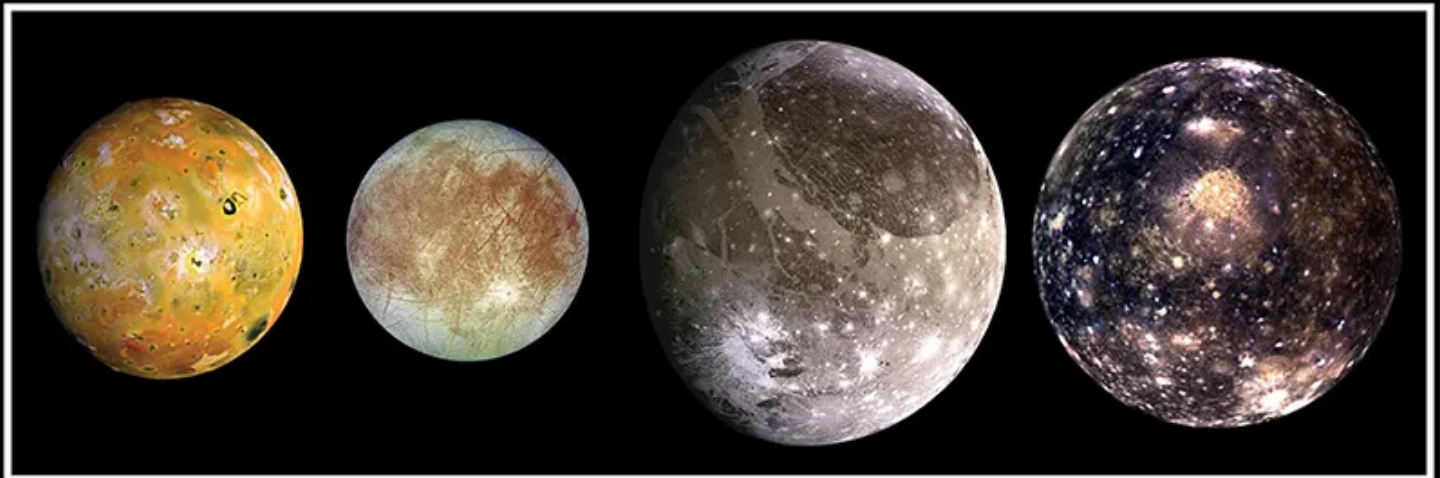
The King of the Planets might not have the most moons, but four of Jupiter's 95 moons are definitely the easiest to see with a small pair of binoculars or a small telescope because they form a clear line. The Galilean Moons - Ganymede, Callisto, Io and Europa - were first discovered in 1610 and they continue to amaze stargazers across the globe. [Ed: They are the only moons of Jupiter that formed with the planet. The others are captured asteroids.]



The Jovian system: Europa, Io, Ganymede, and Callisto. Credit: Stellarium Web

- **Ganymede**: Largest moon in our Solar System and larger than the planet Mercury. Ganymede has its own magnetic field and a possible salt water ocean beneath the surface.
- **Callisto**: This heavily cratered moon is the third largest in our Solar System. Although Callisto is the furthest away of the Galilean moons from Jupiter, it only takes 17 days to complete an orbit around Jupiter.
- **Io**: The closest moon to Jupiter and third largest in this system. Io is an extremely active world due to the push and pull of Jupiter's gravity. The volcanic activity of this rocky world is so intense that it can be seen from some of the largest telescopes here on Earth.

- Europa: Jupiter's smallest moon also happens to be the strongest candidate for a liquid ocean beneath the surface. NASA's Europa Clipper is set to launch October 2024 and will determine if this moon has conditions suitable to support life. Want to learn more? Rewatch the July 2023 Night Sky Network webinar about Europa Clipper [here](#).



Io

Europa

Ganymede

Callisto

Be sure to celebrate International Observe the Moon Night here on Earth September 14, 2024, leading up to the super full Moon on September 17th! You can learn more about supermoons in our mid-month article on the Night Sky Network page!

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 to find local clubs, events, and more!

BMAC Calendar & More



Calendar:



MAC Meetings:

- Friday, September 6, 2024 - 7p - Dr. Gary Henson, Professor of Physics & Astronomy & Director of the Powell Observatory & ETSU Planetarium will present. The presentation will be: "The Astronomical Origins of our Ancient Holidays." A presentation on the historical perspective of the connection between seasonal changes, cultural and religious beliefs, and the Earth's orbital motion around the Sun. Although traditions around the equinoxes and solstices are more well known, many holidays have evolved from the significance of the "Cross-Quarter" days occurring between them.
- Friday, October 4, 2024 - 7p - Trina L. Ray, Europa Clipper Deputy Science Manager and REASON Investigation Scientist, will present. Topic TBA.
- Friday, December 6, 2024 - 7p - Topic TBA.
- Friday, February 7, 2025 - 7p - Topic TBA.
- Friday, March 7, 2025 - 7p - Topic TBA.
- Friday, April 4, 2025 - 7p - Topic TBA.
- Friday, May 2, 2025 - 7p - Topic TBA.
- Friday, June 6, 2025 - 7p - Topic TBA.
- Friday, August 1, 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:

- October 5 & 12, 2024 - 7:30p
- October 19, 26 & November 2, 2024 - 7p
- November 9, 16, 23 & 30, 2024 - 6p
- 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 2024 - November 1-3, 2024**

- Our 39th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique T-shirt and more!
- **Pre-registration by Oct. 13, 2024 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 2025**

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

- **Astronomy Day - ?, 2025 - 12p-3p; 8:30p-9:30p**

- Come help share the fun of astronomy with the public. There will be tables with different themed topics plus solar and night viewing.

- **Annual Club Picnic - July 2025**

- 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



Adam Thanz

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).

Adam Thanz has been the BMAC Newsletter Editor for all but a small number of issues since 1992. He is the Planetarium Director at Bays Mountain Park and an astronomy adjunct instructor at NSCC since 2000.

Connection:

Bays Mountain Astronomy Club:

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

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, August 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, July 15, 2020.*
- **Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.**
 - *Image captured July 23, 2016.*
- **BMAC Notes painting of the Moon with moon glow by Christa Cartwright.**
 - *Painting based on a photograph of the Moon Christa captured July 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, June 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, September 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.**