L.A.S.
Lima Astronomical Society

STAR GAZER

Night Sky Network
Astronomy clubs bringing the wonders of the universe to the public

Member of the Astronomical League and the NASA Night Sky Network

September 2023

Lima Astronomical Society • PO Box 201 • Lima, OH 45802
Schoonover Observatory • 670 N. Jefferson St. • Lima, OH 45801

CLUB NEWS AND EVENTS

MONTHLY MEETINGS

Board Meeting: September 1 @ 7:00 p.m.
Members Meeting: September 1 @ 8:00 p.m.
Held at Schoonover Observatory

UNDER THE DOME

August was a very busy month for the club with several events occurring. We think they all went pretty great!

Perseid Meteor Shower

This year's Perseid observing event was fantastic! Turnout for the event was the best we had seen, and the club was joined by staff from the Johnny Appleseed Metropolitan Parks District and the Armstrong Air & Space Museum for a night of exceptionally dark and clear skies. Meteor activity was moderate with a few good fireballs seen. Views through the telescopes were absolutely stunning. Every deep sky object popped right out in the eyepiece in superb detail. As a bonus, a train of brilliantly-lit Starlink satellites, launched just two days prior, traveled almost directly overhead

Allen County Fair

The club was able to staff a booth at the fair every day this year. Our main goals were to increase awareness and safe-observing of the upcoming solar eclipses in October 2023 and April 2024, and to raise funds for the proposed dark sky observatory at Kendrick Woods through donations and the sale of club-branded eclipse glasses. Hundreds of visitors interacted with the club, many for the first time. We saw many familiar faces and had some great conversations and interactions. The club got some media attention as well through news and radio.

Thank you to Michael Ritchie and David Humphreys for donating their entire week to help set up and staff the fair booth. Special thanks to the Hardin County Astronomy Club for assisting!

Summer Viewing Program

The observatory continued to be open for observing during the Friday Allen County Fair days. Several guests who visited the club at the fair also visited the observatory the same evening.

September is the last month for weekly observing! It will be a good month to see Saturn, which has just recently been rising early enough in the evening.

Observer's Handbook 2024

The Astronomical League now has the 2024 edition of the Observer's Handbook on sale. This books is *the* resource for annual astronomical events. You can order yours today at the Astronomical League store.

UPCOMING EVENTS

September 23 - Astronomy Day #2

Schoonover Observatory will be open starting at 12:00pm (noon) with astronomy videos and talks in the meeting room all day and evening. Observing with the main telescope will be weather-dependent. This is a great day to expand your knowledge of all things astronomy-related and get to know other members.

September 24 - STEAM on the Quad

The club will be on the quad at Ohio State University Lima from 1:00pm–4:00pm. This is a collaborative event from multiple organizations to drive youth interest in science-related fields.

October 14 - Partial Solar Eclipse

Schoonover Observatory will be open starting at 10:00am to observe the partial solar eclipse. The eclipse occurs from 11:03am–4:55pm, and will peak at 1:59pm. This is a rain or shine event, as the eclipse will be livestreamed if there area clouds.

October 21 - International Observe the Moon night

Held at Kendrick Woods with JAMPD staff beginning at 6:00pm. The club will have programs on the Moon and astronomy, and telescopes on the field. This event may be cancelled due to incelement weather

LOOKING BEYOND THE STARS

BRIAN KRUSE - NIGHT SKY NETWORK

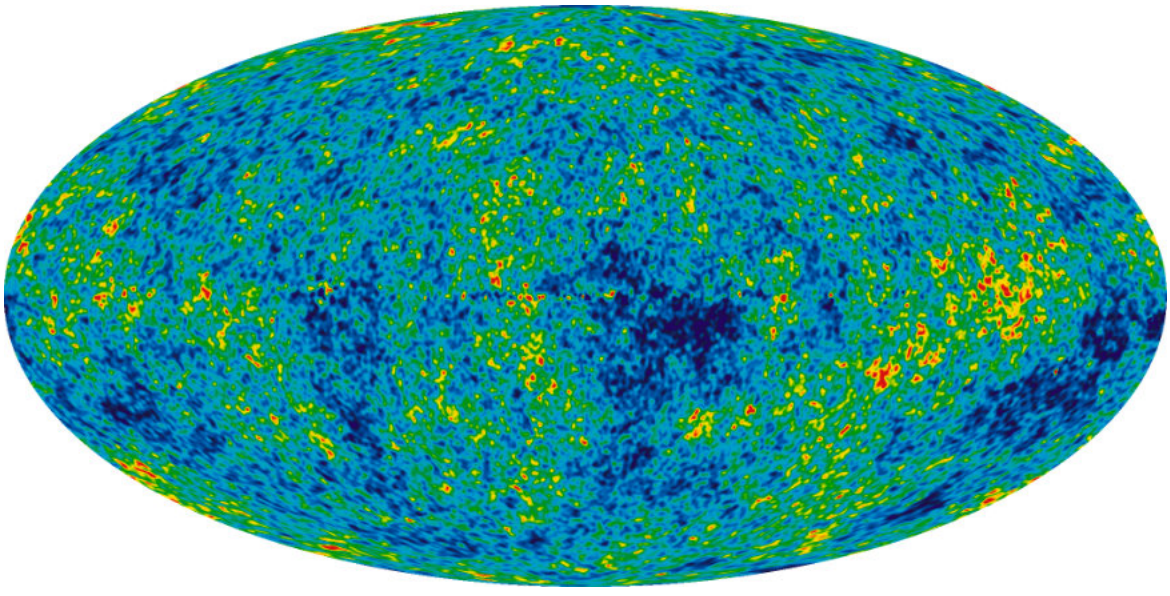
Looking up in awe at the night sky, the stars and planets pop out as bright points against a dark background. All of the stars that we see are nearby, within our own Milky Way Galaxy. And while the amount of stars visible from a dark sky location seems immense, the actual number is measurable only in the thousands. But what lies between the stars and why can't we see it? Both the Hubble telescope and the James Webb Space Telescope (Webb) have revealed that what appears as a dark background, even in our backyard telescopes, is populated with as many galaxies as there are stars in the Milky Way.

So, why is the night sky dark and not blazing with the light of all those distant galaxies? Much like looking into a dense forest where every line of sight has a tree, every direction we look in the sky has billions of stars with no vacant spots. Many philosophers and astronomers have considered this paradox. However, it has taken the name of Heinrich Wilhelm Olbers, an early 19th century German astronomer. Basically, Olbers Paradox asks why the night sky is dark if the Universe is infinitely old and static – there should be stars everywhere. The observable phenomenon of a dark sky leads us directly into the debate about the very nature of the Universe – is it eternal and static, or is it dynamic and evolving?

It was not until the 1960s with the discovery of the Cosmic Microwave Background that the debate was finally settled, though various lines of evidence for an evolving universe had built up over the previous half century. The equations of Einstein's General Theory of Relativity suggested a dynamic universe, not eternal and unchanging as previously thought. Edwin Hubble used the cosmic distance ladder discovered by Henrietta Swan Leavitt to show that distant galaxies are moving away from us – and the greater the distance, the faster they're moving away. Along with other evidence, this lead to the recognition of an evolving Universe.

The paradox has since been resolved, now that we understand that the Universe has a finite age and size, with the speed of light having a definite value. Here's what's happening – due to the expansion of the Universe, the light from the oldest, most distant galaxies is shifted towards the longer wavelengths of the electromagnetic spectrum. So the farther an object is from us, the redder it appears. The Webb telescope is designed to detect light from distant objects in infrared light, beyond the visible spectrum. Other telescopes detect light at still longer wavelengths, where it is stretched into the radio and microwave portions of the spectrum. The farther back we look, the more things are shifted out of the visible, past the infrared, and all the way into the microwave wavelengths. If our eyes could see microwaves, we would behold a sky blazing with the light of the hot, young Universe – the Cosmic Microwave Background.

The next time you look up at the stars at night, turn your attention to the darkness between the stars, and ponder how you are seeing the result of a dynamic, evolving Universe.

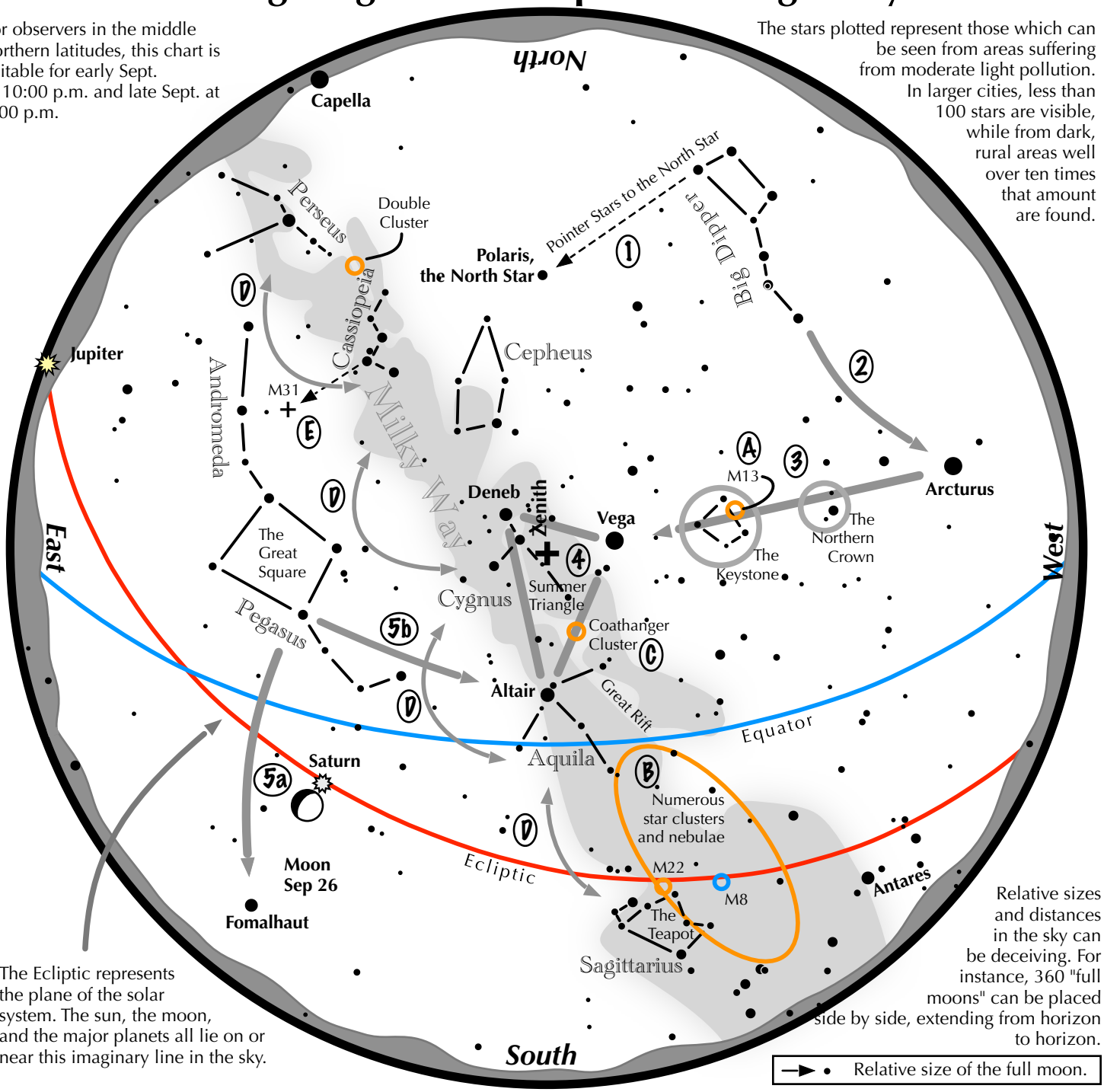


The oldest light in the universe, called the cosmic microwave background, as observed by the Planck space telescope is shown in the oval sky map. An artist's concept of Planck is next to the map. The cosmic microwave background was imprinted on the sky when the universe was just 380,000 years old. It shows tiny temperature fluctuations that correspond to regions of slightly different densities, representing the seeds of all future structure: the stars and galaxies of today. (Image credit: ESA and the Planck Collaboration - D. Ducros)

Navigating the mid September Night Sky

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

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



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

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

Relative size of the full moon.

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

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

Binocular Highlights

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

Observing Lists

Top ten deep-sky objects for September	
IC 1396	NGC 6946
M2	NGC 6960
M15	NGC 6992
M30	NGC 7000
NGC 6888	NGC 7009

Top ten deep-sky binocular objects for September	
IC 1396	M30
LDN 906	M39
M2	NGC 6939
M15	NGC 6871
M29	NGC 7000

Challenge deep-sky object for September
Abell 78
Abell 78 is a planetary nebula located in Cygnus. It has a fainter halo consisting mostly hydrogen, and an inner elliptical ring that is mostly made of helium. Apparent Magnitude: 17.9 Surface Brightness: 15.0

The Planets in September

Mercury: Too close to the Sun to be observed early in the month, achieving inferior conjunction on the 6th. Reappears in the morning sky around mid-month and begins its **best morning apparition of the year for Northern Hemisphere observers**. Reaches greatest western elongation of just 18° on the 22nd, just one day before it achieves perihelion. This has the combined effect of placing Mercury against a brighter background sky closer to the Sun in Earth's sky, but intrinsically brighter at mag. –0.3 at elongation. It brightens further to mag. –1.0 by month end when still 15° from the Sun.

Venus: Now receding from Earth and becoming ever more prominently placed in the morning sky. Venus's elongation increases from 28° on the 1st to 44° on the 30th, even as its equatorial diameter diminishes from 49" to 32". Undergoes an exceptionally wide conjunction 11° south of the Moon on the 11th. Achieves its greatest illuminated extent on the 19th, when it shines at mag. –4.8.

Mars: Now 2.5au from Earth, Mars is ever more challenging to find in early evening twilight. Its last hurrah for 2023 is an occultation by the thin crescent Moon on the 16th, with the event telescopically visible in daylight from much of North America. It will take the Moon some 8 seconds to cover Mars's tiny 4" disk.

Jupiter: Reaches its first stationary point on the 4th just as the Moon passes to its north. By that point, Jupiter has achieved +15° declination, its most northerly placement on the sky since 2015. Its four-month retrograde period–the optimum observing window–ensues.

Saturn: Now rising before sunset, it is relatively well placed for observation in the evening hours. Its southerly location remains a bane for northerly observers, having resided below –10° declination for a solid decade. Has an appointment with the waxing gibbous Moon on the 28th.

Uranus: Rising in the late evening hours, its retrograde motion gradually picks up the pace in southeastern Aries.

Neptune: Achieves opposition on the 19th, 4.0 light hours (28.9au) from Earth, mag. +7.8 with a 2.3" disk. Neptune will be in the sky all night long throughout the month, in extreme southwestern Pisces.

Astronomy History This Month

- Jean-Dominique Maraldi discovered the globular cluster M15 on September 7, 1746.
- On September 11, 1746, Jean-Dominique Maraldi discovered the globular cluster M2.
- Nicolas-Louis de Lacaille discovered NGC 104 (47 Tucanae), the second largest and brightest globular cluster, on September 14th, 1751.
- William Herschel discovered the barred spiral galaxy NGC 7753 on September 12, 1784.
- William Herschel discovered the Saturnian satellite Mimas on September 17, 1789.
- Comet C/1793 S2 (Messier) was discovered by Charles Messier on September 27th, 1793.
- Karl Harding discovered asteroid 3 Juno on September 1, 1804.
- Neptune was discovered by Johann Gottfried Galle on September 23, 1846, using Urbain Le Verrier's calculations of its position.
- On September 19, 1848, William Bond discovered Saturn's fourteenth-magnitude satellite Hyperion, the first irregular moon to be discovered.
- On September 13, 1850, John Russell Hind discovered the asteroid 12 Victoria.
- E. E. Barnard discovered Jupiter's fifth satellite, fourteenth-magnitude Amalthea, using the 36-inch refractor at the Lick Observatory, on September 9, 1892.

September 2023 Astronomy Events Calendar

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
					1 **LAS Meeting @ 8pm**	**2**
3 Venus stationary	**4** **Jupiter 3° S of Moon** Jupiter stationary	**5** Uranus 3° S of Moon **Moon 1.2 ° S of Pleiades (M45**	**6** Mercury in inferior conjunction **Last quarter Moon**	**7**	**8**	**9**
10 **Pollux 1.5° N of Moon**	**11**	**12** Moon at apogee	**13**	**14**	**15** Mercury stationary **New Moon**	**16** **Mars 0.7° S of Moon, occultation**
17 Moon at descending node	**18**	**19** Mercury at ascending node **Venus greatest illuminated extent** **Neptune at opposition**	**20**	**21**	**22** **Mercury greatest elongation W (18°)** **First quarter Moon**	**23** Mercury at perihelion **Fall equinox**
24	**25**	**26**	**27** Saturn 3° N of Moon	**28** Moon at perigee	**29** **Last day for LAS Summer Viewing Program** **Full Moon**	**30** Moon at ascending node

ASTRONOMY CALENDAR TERMINOLOGY

Aphelion – The point in the orbit of a planet, asteroid, or comet at which it is furthest from the Sun.

Apogee – The point in the orbit of the Moon, planet, or satellite at which it is furthest from the Earth.

Ascending Node – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from S to N.

Conjunction – When the Moon or a planet appears especially close to another planet or bright star.

Descending Node – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from N to S.

Elongation – The angular distance the Moon or a planet is from the Sun. Mercury and Venus are best seen when at "greatest" elongation, and will appear at their highest position above the horizon before sunrise or sunset.

Heliocentric Latitude – The longitude of a heavenly body, as seen from the Sun's center (the Sun is at the center in the heliocentric model of the solar system). Essentially, if you could stand in the center of the Sun and draw a plane straight out in front of you (this would be 0.0°), heliocentric latitude is the number of degrees above or below that plane where the planet appears.

Inferior Conjunction – When a planet (Mercury or Venus) passes between the Earth and the Sun.

Occultation – When the Moon or a planet passes directly in front of a more distant planet or star. (*Occult, as a verb, means to obscure the view of an object*).

Opposition – When a planet or asteroid is directly *opposite* the Sun in the sky. Just like the Full Moon, a planet will appear brighter and fully lit during this time.

Perigee – the point in the orbit of the Moon, planet, or satellite at which it is nearest to the Earth.

Perihelion – the point in the orbit of a planet, asteroid, or comet at which it is closest to the Sun.

Superior Conjunction – When a planet (Mercury or Venus) passes behind the Sun, out of our view.

Transit – When a smaller object passes in front of a larger object. Such as when Mercury or Venus pass in front of the Sun, silhouetting them against the disc; or when one of Jupiter's Galilean moons pass in front of the planet.

Zodiacal Light – Sunlight that is reflected off celestial dust that is concentrated in the plane of the Solar System. It appears as a faint glow in the sky extending from the horizon in late winter/early spring, and requires the darkest skies to be observed. In the darkest sky conditions, zodiacal light can cast very faint shadows.

Examples

Mars 1.1° S of Moon, occultation

On this night, Mars would appear in the sky very close to the Moon – only 1.1 degrees away from it. At a point during this night the Moon would pass in front of Mars, hiding it from view.

Double shadow transit on Jupiter

On this night, two of Jupiter's Galilean moons will cast shadows on the surface of Jupiter simultaneously, appearing as two dark discs moving across the face of the planet. If you were standing on the surface of Jupiter as one of these shadows passed over, you would witness a solar eclipse.

Mercury greatest elongation E

On this night, Mercury will be at a point in its orbit where it appears highest in the sky. From our point of view, this is the furthest apart Mercury and the Sun will appear from each other. E or W indicate which side of the Sun the planet appears on in its orbital cycle, and can also tell you when to look for Mercury. The planet can be found in the evening sky during the greatest elongation E, and in the morning sky in the greatest elongation W.