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

April 2022

Lima Astronomical Society • PO Box 201 • Lima, OH 45802

Schoonover Observatory • 670 N. Jefferson St. • Lima, OH 45801

SOCIETY NEWS AND EVENTS

Upcoming Events

MONTHLY MEETINGS

Board Meeting – April 1 @ 7:00pm
Members Meeting – April 1 @ 8:00pm
Held at Schoonover Observatory

Program / Observing

Earl Lhamon, retired professor and an original member of the Society, will present a history of the Lima Astronomical Society and Schoonover Observatory.

The primary telescope in the dome will be open for observing (weather-dependent).

STEAM NIGHT
APRIL 13, 4:00PM – 6:00PM

The Society will be at the Lima South Science and Technology Magnet School to participate in STEAM night. Members will have telescopes, various displays, handouts, and pictures. The Society will also be donating a telescope to the school.

HISTORY OF THE LAS & SCHOONOVER OBSERVATORY
APRIL 25, STARTING AT 7:00PM

Members will be at the Armstrong Air and Space Museum in Wapakoneta to speak on the history of the Society and Schoonover Observatory. Members will also have a display table set up with various astronomy info and handouts, as well as information about membership in the Society.

Under the Dome

The organization of Schoonover Observatory continues. Wire shelving units have been purchased and will soon be installed in the Library and Optical Shop rooms. This will greatly help with identifying the assets the Society has at the Observatory, as well as moving items out that do not need need to be stored at the Observatory.

Additionally, this organizational initiative is also an effort to make the observatory meeting room more efficient and educational. Members are invited to share ideas and provide input.

The Lima Police Department has updated their process for checking out keys for Schoonover Observatory. Members on the key list will now need to present an ID when checking out keys.

Updated estimates have been requested for materials and construction of the proposed dark sky observatory at Kendrick Wooods. The project is a collaboration with the Johnny Appleseed Metropolitan Parks District (JAMPD). The vision for this project is to construct an observatory with professional-grade optics and equipment, in a location less-affected by light pollution, that will allow members and visitors the best views the night sky in Northwest Ohio has to offer, as well as the potential to contribute to the scientific community with observations performed.

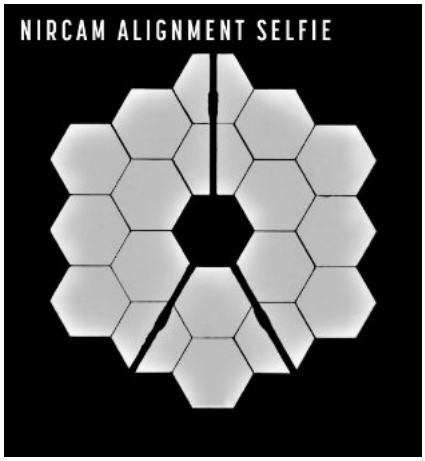
This edition of the *Star Gazer* was compiled by Joshua Crawford.
Please forward comments, suggestions, or to unsubscribe/subscribe to this newsletter to crajos@gmail.com.

WEBB OPTICS WORKING SUCCESSFULLY

NASA.gov

Following the completion of critical mirror alignment steps, NASA's James Webb Space Telescope team expects that Webb's optical performance will be able to meet or exceed the science goals the observatory was built to achieve.

On March 11, the Webb team completed the stage of alignment known as "fine phasing." At this key stage in the commissioning of Webb's Optical Telescope Element, every optical parameter that has been checked and tested is performing at, or above, expectations. The team also found no critical issues and no measurable contamination or blockages to Webb's optical path. The observatory is able to successfully gather light from distant objects and deliver it to its instruments without issue.



Although there are months to go before Webb ultimately delivers its new view of the cosmos, achieving this milestone means the team is confident that Webb's first-of-its-kind optical system is working as well as possible.

"More than 20 years ago, the Webb team set out to build the most powerful telescope that anyone has ever put in space and came up with an audacious optical design to meet demanding science goals," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate in Washington. "Today we can say that design is going to deliver."

While some of the largest ground-based telescopes on Earth use segmented primary mirrors, Webb is the first telescope in space to use such a design. The 21-foot, 4-inch (6.5-meter) primary mirror – much too big to fit inside a rocket fairing – is made up of 18 hexagonal, beryllium mirror segments. It had to be folded up for launch and then unfolded in space before each mirror was adjusted – to within nanometers – to form a single mirror surface.

"In addition to enabling the incredible science that Webb will achieve, the teams that designed, built, tested, launched, and now operate this observatory have pioneered a new way to build space telescopes," said Lee Feinberg, Webb optical telescope element manager at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

With the fine phasing stage of the telescope's alignment complete, the team has now fully aligned Webb's primary imager, the Near-Infrared Camera, to the observatory's mirrors.

"We have fully aligned and focused the telescope on a star, and the performance is beating specifications. We are excited about what this means for science," said Ritva Keski-Kuha, deputy optical telescope element manager for Webb at NASA Goddard. "We now know we have built the right telescope."

Over the next six weeks, the team will proceed through the remaining alignment steps before final science instrument preparations. The team will further align the telescope to include the Near-Infrared Spectrograph, Mid-Infrared Instrument, and Near InfraRed Imager and Slitless Spectrograph. In this phase of the process, an algorithm will evaluate the performance of each instrument and then calculate the final corrections needed to achieve a well-aligned telescope across all science instruments. Following this, Webb's final alignment step will begin, and the team will adjust any small, residual positioning errors in the mirror segments.

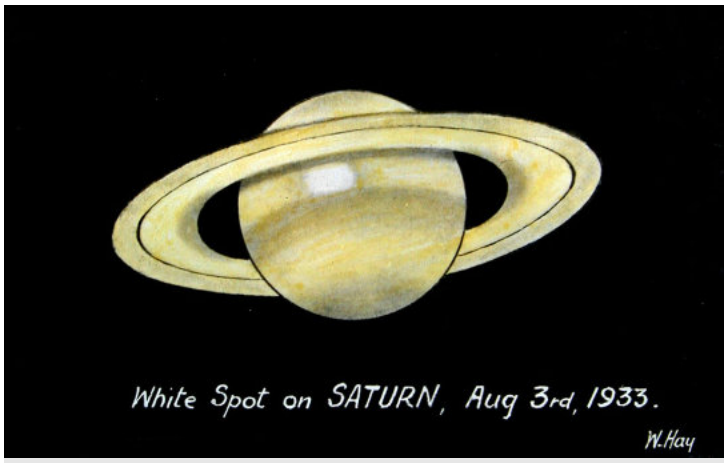
The team is on track to conclude all aspects of Optical Telescope Element alignment by early May, if not sooner, before moving on to approximately two months of science instrument preparations. Webb's first full-resolution imagery and science data will be released in the summer.

Webb is the world's premier space science observatory and once fully operational, will help solve mysteries in our solar system, look beyond to distant worlds around other stars, and probe the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its partners at ESA (European Space Agency) and the Canadian Space Agency.

WILL SATURN SPROUT SPOTS THIS OBSERVING SEASON?

[By Bob King @ SkyAndTelescope.org]

As Saturn returns to the morning sky, will this otherwise serene-looking planet experience another bout of severe weather? Keep your eyes peeled for white spots!



Will Hay, a beloved British comedian and entertainer, was also an ardent amateur astronomer. Hay independently discovered a white spot outbreak on Saturn with his 6-inch Cooke refractor from London on August 3, 1933.

Bright planets have deserted dusk this season and instead flocked like robins to the dawn sky. Venus and Mars have been steady companions for weeks, with Saturn just now entering the scene. I got my first look at the ring king on March 3rd paired with Mercury 45 minutes before sunup. Through my scope, Saturn was a quivering blob. But I held out until the planet rose high enough for the rings to steady and sharpen, marking (for me) the official start of the 2022 apparition.

Every planetary apparition is a chance to make a start fresh and set new observing goals. With Mars, this might be the year to spot both polar caps or identify a dark albedo feature you've never seen before. While Saturn's rings are undeniably captivating, let me suggest diverting some of your attention this apparition to its globe in anticipation of the next Great White Spot outbreak.

Saturn looks pretty bland when compared to its bigger brother, Jupiter. Being more massive, Jupiter compresses its atmosphere into a layer about 75 kilometers thick, so ammonia-ice clouds form closer to the top of its airy envelope, where they're fair game for visual observers. Due to Saturn's lower gravity, its atmosphere is thicker — clouds form at a deeper level beneath a layer of photochemical haze, making them more difficult to see. Enhanced images clearly show numerous dark belts, bright zones, and occasional spots resembling Jovian features — but they're so muted, Saturn's globe appears barren in contrast.

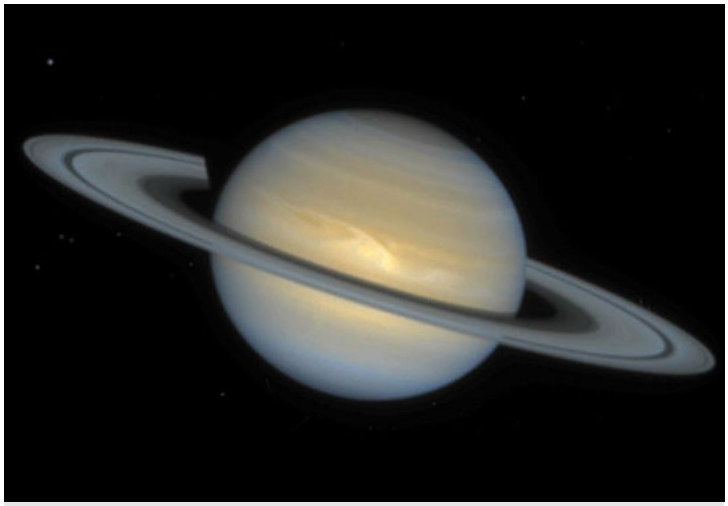
Like many amateurs my view of Saturn resembles Will Hay's sketch (above) — a bland, pale yellow globe encircled by a grayish-brown equatorial belt, a brighter equatorial zone, and topped by a gray hood. On rare occasions of excellent seeing I've glimpsed the north and south components of the North Equatorial Belt and suspected one or two additional bands and zones.

But every 20 to 30 years, Saturn awakens from its visual dormancy and unleashes a powerful storm that lofts water and other molecules high into the atmosphere where they freeze out to form a large, white cloud. These Great White Spots have appeared at somewhat regular intervals since the first recorded observation by American astronomer Asaph Hall on December 7, 1876. Hall, best known as the discoverer of Martian moon Deimos and Phobos, observed a very bright, round spot 2–3″ in diameter in Saturn's Equatorial Zone that remained visible for nearly a month.

Additional major eruptions occurred in 1903, 1933, 1960, 1990, and 2010, with a number of smaller spots recorded photographically (on the ground and from space) in recent years including a moderate-size storm in 1994. British entertainer and passionate amateur Will Hay made one of the most celebrated sightings in 1933. He noticed a large, bright elliptical spot in the planet's Equatorial Zone through his 6-inch refractor on the night of August 3rd. He immediately rang up his friend and fellow amateur W. H. Steavenson, who confirmed the observation. Hay used successive transits of the spot to measure Saturn's equatorial rotation period at approximately 10 hours 17 minutes. The modern value is closer to 10 hours 14 minutes.

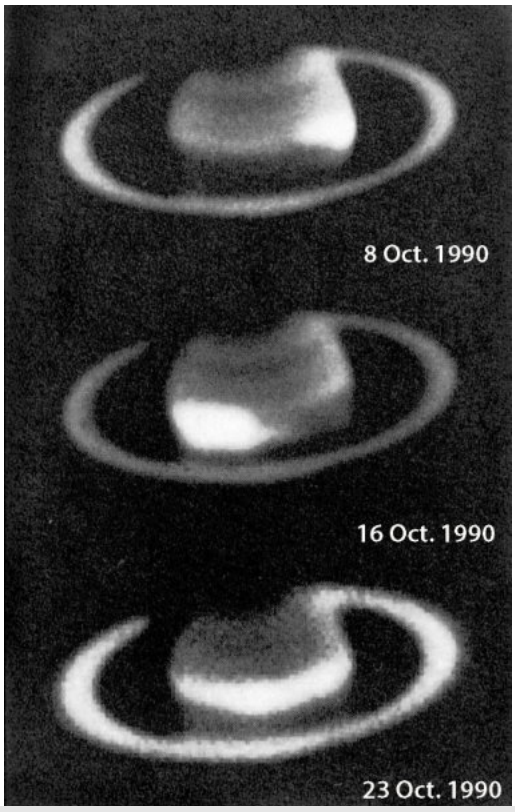
Great White Spot appearances have alternated between the equatorial region and mid-northern latitudes and may be connected to seasonal changes Saturn experiences during its 29.5-year orbital period . . . or not. The recent 1994 and 2010 eruptions break that pattern, making it all that more important to keep a close eye on the planet during this and other off-year apparitions.

The Great White Spot of 1990 was widely observed by amateurs, including myself. On October 12th of that year, using an 8-inch f/6 Dob, "the white spot was the brightest feature on Saturn, as bright or perhaps brighter than the outer B-ring," according to my observing notes. I remember being glued to the eyepiece as the core of the storm crossed the planet's central meridian, making it "the first time I'd ever watched anything on Saturn (its globe) move!" We often take Jupiter's east-to-west parade of meteorological curiosities for granted. Saturn requires the patience of Yoda, but the reward is great.



A moderately large white spot blossomed in Saturn's equatorial region in October 1994, here captured by the Hubble Space Telescope on December 1st when it had grown as wide as Earth's diameter.

Amateurs have been instrumental in discovering and alerting professionals to the appearance these huge storms. Starting in 1933, they were the first to spot and report all major outbreaks. That includes the monster storm of 2010, discovered by amateurs Sadegh Ghomizadeh and Teruaki Kumamori on December 8th and 9th in Saturn's North Tropical Zone (NTrZ). By January 5, 2011, it had spread across more than 100° of longitude and resembled a thick plume of smoke billowing from a steam locomotive.

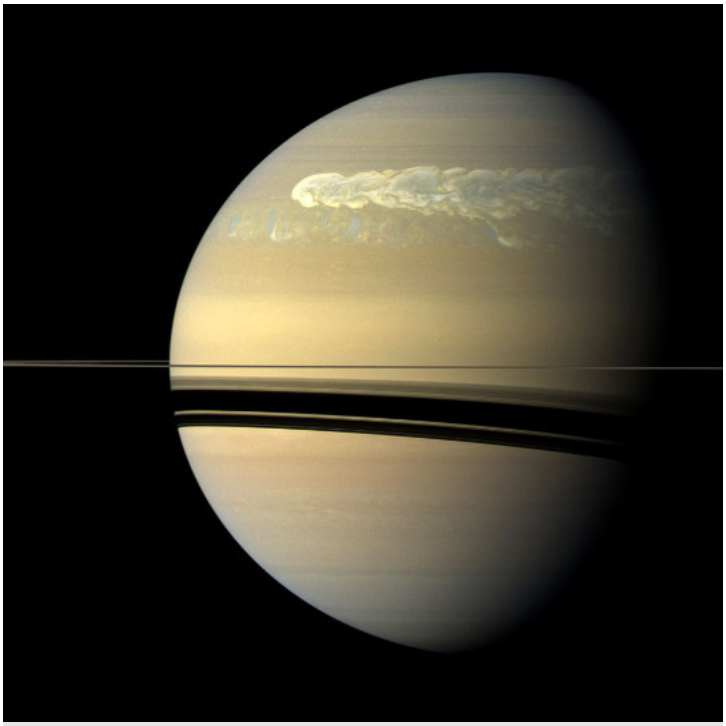


This series of three exposures from ESO's La Silla Observatory tracks the expansion of the 1990 Great White Spot in Saturn's northern hemisphere over a period of two weeks in October. First reported on September 25th, it grew to about 20,000 kilometers by October 2nd. After October 16th, it rapidly expanded to reach all the way around the planet's Equatorial Zone.

Good thing it appeared 10 years early. As it happened, NASA's Cassini probe had a front-row seat at the planet and sent back spectacular, close-up images of roiling clouds and the storm "chasing its tail" around the globe. With its radio and plasma wave science instrument the probe detected 10 lightning strikes per second at the height of the storm that were 10,000 times more powerful than those on Earth.

What's at the bottom of these atmospheric hiccups? Saturn's air column is comprised of layers, with the outer atmosphere resting on top of denser air made of hydrogen, helium and water molecules. The outer layer acts like a lid that prevents the warmer air underneath from rising, cooling and condensing into turbulent storm clouds. Over time, that layer radiates its heat into space until it finally becomes cold and dense enough to sink, allowing the warm, water-rich air sequestered below to punch through to the top and blow up into a titanic thunderstorm.

The heavier water molecules eventually rain back down, the storm calms and quiescence returns until the balance shifts again. There's no knowing if and when the next Great White Spot might appear, but if you subscribe to the ~30-year periodicity hypothesis, it should have occurred in 2020 or will again in 2040. No matter when it happens I'll put my money on amateurs like you spotting it first.



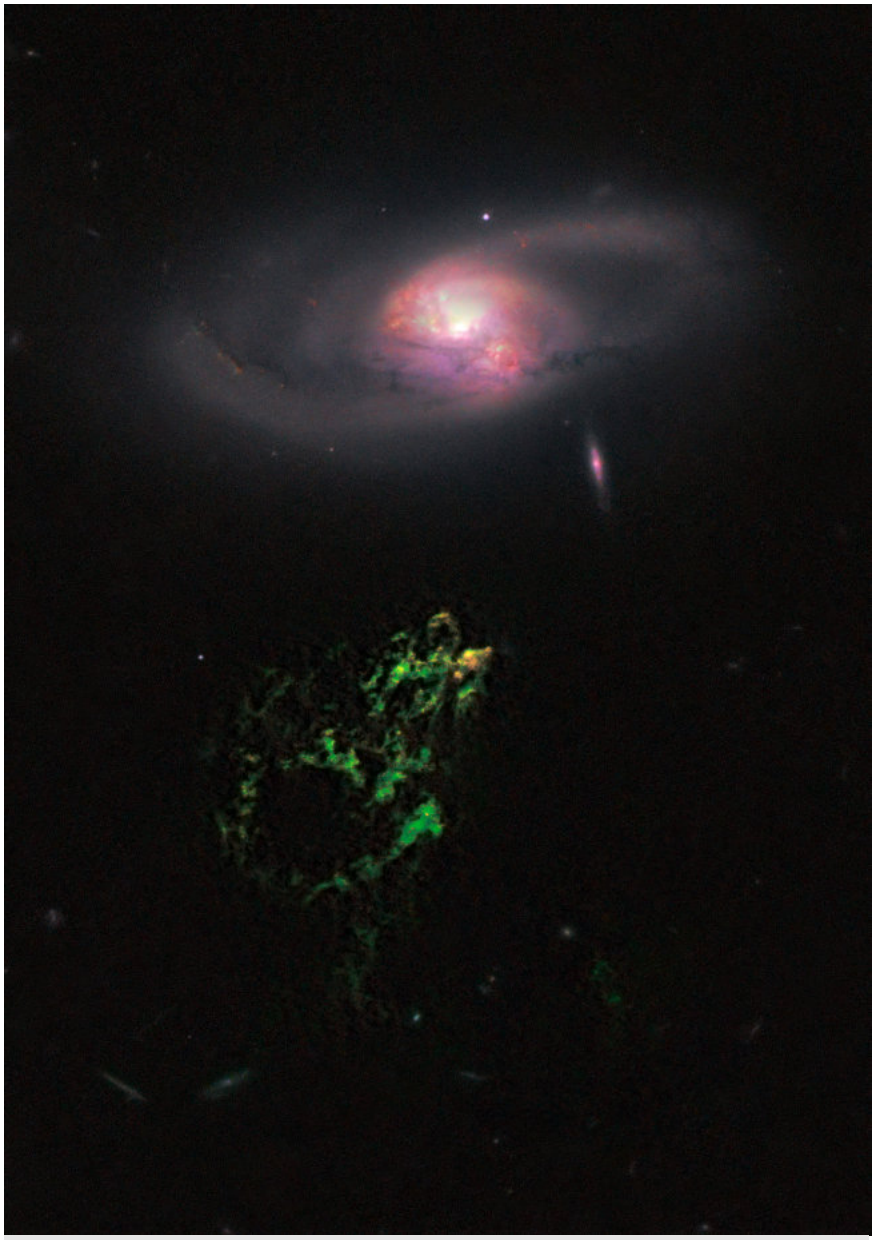
The huge storm of 2010–2011 overtakes itself in this photo made on February 25, 2011, by the Cassini probe. The bright storm head appears at top, with the fainter tail below. Falling rain and hail deeper down within the water-clouds generated powerful lightning. North is up.

ADVANCED CATSPOTTING: LYNX AND LEO MINOR

NIGHT SKY NETWORK

Many constellations are bright, big, and fairly easy to spot. Others can be surprisingly small and faint, but with practice even these challenging star patterns become easier to discern. A couple of fun fainter constellations can be found in between the brighter stars of Ursa Major, Leo, and Gemini: Lynx and Leo Minor, two wild cats hunting among the menagerie of animal-themed northern star patterns!

Lynx, named for the species of wild cat, is seen as a faint zigzag pattern found between Ursa Major, Gemini, and Auriga. Grab a telescope and try to spot the remote starry orb of globular cluster NGC 2419. As it is so distant compared to other globular clusters - 300,000 light years from both our solar system and the center of the Milky Way - it was thought that this cluster may be the remnants of a dwarf galaxy consumed by our own. Additional studies have muddied the waters concerning its possible origins, revealing two distinct populations of stars residing in NGC 2419, which is unusual for normally-homogenous globular clusters and marks it as a fascinating object for further research.



Hanny's Voorwerp and the neighboring galaxy IC 2497, as imaged by Hubble. Credits: NASA, ESA, W. Keel (University of Alabama), and the Galaxy Zoo Team

Source: https://hubblesite.org/contents/news-releases/2011/news-2011-01.html

Leo Minor is a faint and diminutive set of stars. Its "triangle" is most noticeable, tucked in between Leo and Ursa Major. Leo Minor is the cub of Leo the Lion, similar to Ursa Minor being the cub to the Great Bear of Ursa Major. While home to some interesting galaxies that can be observed from large amateur scopes under dark skies, perhaps the most intriguing object found within Leo Minor's borders is Hanny's Voorwerp. This unusual deep-space object is thought to be a possible "light echo" of a quasar in neighboring galaxy IC 2497 that has recently "switched off." It was found by Hanny van Arkel, a Dutch schoolteacher, via her participation in the Galaxy Zoo citizen science project. Since then a few more intriguing objects similar to Hanny's discovery have been found, called "Voorwerpjes."

Lynx and Leo Minor are relatively "new" constellations, as they were both created by the legendarily sharp-eyed European astronomer Johannes Hevelius in the late 1600s. A few other constellations originated by Hevelius are still in official use: Canes Venatici, Lacerta, Scutum, Sextans, and Vulpecula. What if your eyes aren't quite as sharp as Johannes Hevelius – or if your weather and light pollution make searching for fainter stars more difficult than enjoyable? See if you can spot the next Voorwerp by participating in one of the many citizen science programs offered by NASA at science.nasa.gov/citizenscience! And of course, you can find the latest updates and observations of even more dim and distant objects at nasa.gov.

Map of the sky around Lynx and Leo Minor. Notice the prevalence of animal-themed constellations in this area, making it a sort of celestial menagerie. If you are having difficulty locating the fainter stars of Leo Minor and Lynx, don't fret; they are indeed a challenge. Hevelius even named the constellation as reference to the quality of eyesight one needs in order to discern these faint stars, since supposedly one would need eyes as sharp as a Lynx to see it! Darker skies will indeed make your search easier; light pollution, even a relatively bright Moon, will overwhelm the faint stars for both of these celestial wildcats. While you will be able to see NGC 2419 with a backyard telescope, Hanny's Voorwerp is far too faint, but its location is still marked. A few fainter constellation labels and diagrams in this region have been omitted for clarity.

OBSERVING LISTS

Top ten deep-sky objects for April	
M65	M105
M66	M108
M95	NGC 3115
M96	NGC 3242
M97	NGC 3628

Top ten binocular objects for April	
M65	M105
M66	M108
M95	M109
M96	NGC 3115
M97	NGC 3242

Challenge deep-sky object for April
Leo I (Dwarf Galaxy)
Leo I is a dwarf spheroidal galaxy in the constellation Leo. It is a member of the Local Group of galaxies and is thought to be one of the most distant satellites of the Milky Way galaxy. Apparent Magnitude: 11.2 Dimensions: 9′.8 × 7′.4

THIS MONTH IN ASTRONOMY

- Charles Messier discovered the open cluster M50 in Monoceros on April 5, 1772.
- Charles Messier discovered the spiral galaxy M58 in Virgo on April 15, 1772.
- Johann Koehler discovered the elliptical galaxies M59 and M60 in Virgo on April 11, 1779.
- Caroline Herschel discovered C/1790 H1 (Herschel) on April 18, 1790.
- The first photograph of the Sun was taken on April 2, 1845.
- The first radar signal was bounced off of the Sun on April 7, 1959.
- The Hubble Space Telescope was placed in orbit on April 25, 1990.
- The Compton Gamma Ray Observatory achieved orbit on April 7, 1991.

The Lion Nebula captured in September 2021 by LAS member Mark Casazza.

April 2022 Astronomy Events Calendar

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
					1 **LAS Meeting @ 8pm** **New Moon** Algol at minimum	**2** Mercury in superior conjunction
3 **Uranus 0.6° N of Moon, occultation†**	**4** Algol at minimum **Mars 0.3° S of Saturn**	**5**	**6** **Ceres 0.2° N of Moon, occultation‡**	**7** Algol at minimum Moon at apogee	**8**	**9** Mercury at ascending node **First Quarter Moon**
10 Venus at descending node Algol at minimum	**11**	**12** Pallas in conjunction with the Sun **Jupiter 0.1° N of Neptune**	**13** **STEAM NIGHT @ Lima S. Science and Tech. Magnet School** Mercury at perihelion Algol at minimum	**14**	**15**	**16** Algol at minimum **Full Moon**
17	**18** Mercury 0.2° N of Uranus	**19** Algol at minimum Moon at perigee	**20**	**21** Algol at minimum	**22** Lyrid meteors peak	**23** **Last Quarter Moon**
24 Mercury at greatest heliocentric lat. N Algol at minimum Saturn 5° N of Moon	**25** **LAS @ Armstrong Air & Space Museum** Mars 4° N of Moon	**26**	**27** Algol at minimum Jupiter 4° N of Moon Venus 4° N of Moon **Venus 0.01° S of Neptune**	**28**	**29** **Mercury greatest elongation E (21°)** **Mercury 1.4° S of Pleiades (M45)**	**30** Algol at minimum **Venus 0.2° S of Jupiter** **New Moon** **Partial Solar Eclipse**

†S and E S. America, Ascension Island, St. Helena, edge of W Central Africa. ‡ Madagascar, parts of E Africa, S and E India, most of SE Asia, SE China, Papua New Guinea most of Micronesia