STRATFORD ASTRONOMY GROUP

MAY 2ND, 2023

AGENDA

- Meet and Greet
- Club NEWS and Activities
- Club Q & A
- Equipment Lessons
- Software and Imaging Information
- Latest Astronomy NEWS
- What's UP this Month
- Show and Tell
- Astronomy Lessons
- Cosmology Lessons
- Conclusion

MEET AND GREET

Welcome

New Visitors

Regrets

PREVIOUS MEETING REVIEW

Meeting attended by 17:

Nick Assiouras
Michael Burns
Colleen Devine
Rob Greer
Patrick Hayes
Tom Hislop
Wolfgang Keller
Rick Lyons
Michael Maranger
David Orr
Tim Pauli
Peter Tenits
Richard Skevington
Rena Sperack
Ken Roberts
Bill Thompson
Reg White

CLUB NEWS AND ACTIVITIES

Group Funds

Total = $1336.45

- If you would like to contribute to the group, then please e-transfer Tim at:

timannemariepauli@gmail.com

or by cheques:

Tim Pauli

96 Front Street

Stratford, ON

N5A4H2

CLUB NEWS AND ACTIVITIES

EQUIPMENT:

STRATFORD ASTRONOMY CLUB EQUIPMENT

CLUB EQUIPMENT LOCATION:

Paul Bartlett is now storing all the group's equipment. If you wish to borrow an item, then please contact him at:

1948paul.bartlett@gmail.com

519-274-2010

UPCOMING MEETINGS

NEXT MEETING DATES

Bookings

Status: Approved

Total hours: 20

Status	Date	Start	End	Facility and spaces
Approved	Tue, Sep 06, 2022	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Oct 04, 2022	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Nov 01, 2022	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Dec 06, 2022	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Jan 10, 2023	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Feb 07, 2023	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Mar 07, 2023	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Apr 04, 2023	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, May 02, 2023	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*
Approved	Tue, Jun 06, 2023	7:00pm	9:00pm	St. Michael CSS *in Classroom 2 - Room 104*

CLUB NEWS AND ACTIVITIES

- New Web site: (https://stratfordastronomy.com/)
  Tim Pauli - Owner/Administrator
  Ken Roberts - technical contact
  Tom Kimber - Administrator/Editor
  Doug Fyfe - Administrator
  Michael Burns- Administrator
  Tom will build it on WordPress.

CLUB Q & A

- Tim and next Museum presentation
  - June 23 8:30 p.m. is the date of the event at the museum. Please bring along a scope if possible and arrive between 7:30 -8:00 p.m.
  - A Rain date of June 30th at 8:30 has been set
- Tim and Canadensys
  - The tour of their facility will be on June 02, 2023 at 1:15 p.m. Maximum number is 20 persons.
  - We should meet at 1 pm outside and enter if possible as a group.
  - Location: 753 Ontario Street, Stratford N5A 7Y2

LATEST ASTRONOMY NEWS

APRIL-MAY

APRIL 6TH: WEBB ADDS ANOTHER RINGED WORLD WITH NEW IMAGE OF URANUS

•This zoomed-in image of Uranus, captured by the James Webb Space Telescope (JWST) Webb's Near-Infrared Camera (NIRCam) on 6 February 2023, reveals stunning views of the planet's rings. The planet displays a blue hue in this representative-color image, made by combining data from two filters (F140M, F300M) at 1.4 and 3.0 microns, shown here as blue and orange, respectively. On the right side of the planet is an area of brightening at the pole facing the Sun, known as a polar cap. This polar cap is unique to Uranus because it is the only planet in the Solar System that is tilted on its side, which causes its extreme seasons. A new aspect of the polar cap revealed by Webb is a subtle brightening near the Uranian north pole. At the edge of the polar cap lies a bright cloud and a few fainter extended features can be seen just beyond the cap's edge; a second very bright cloud is seen at the planet's left limb. Such clouds are typical for Uranus at infrared wavelengths, and are likely connected to storm activity.

APRIL 10TH: HISTORIC NEBULA SEEN LIKE NEVER BEFORE WITH IMAGING X-RAY POLARIMETRY EXPLORER

NASA's Imaging X-ray Polarimetry Explorer (IXPE), which launched on December 9, 2021. Now, more than 50 years after the sounding rocket experiment, scientists have used IXPE to create a detailed, nuanced map of the Crab Nebula's magnetic field, revealing more of its inner workings than ever before. The new results, accepted for publication in the journal *Nature Astronomy* (preprint available), help resolve longstanding mysteries about the well-studied Crab Nebula and open new questions for future study.

APRIL 13: TAKING A SHARPER LOOK AT THE M87 BLACK HOLE

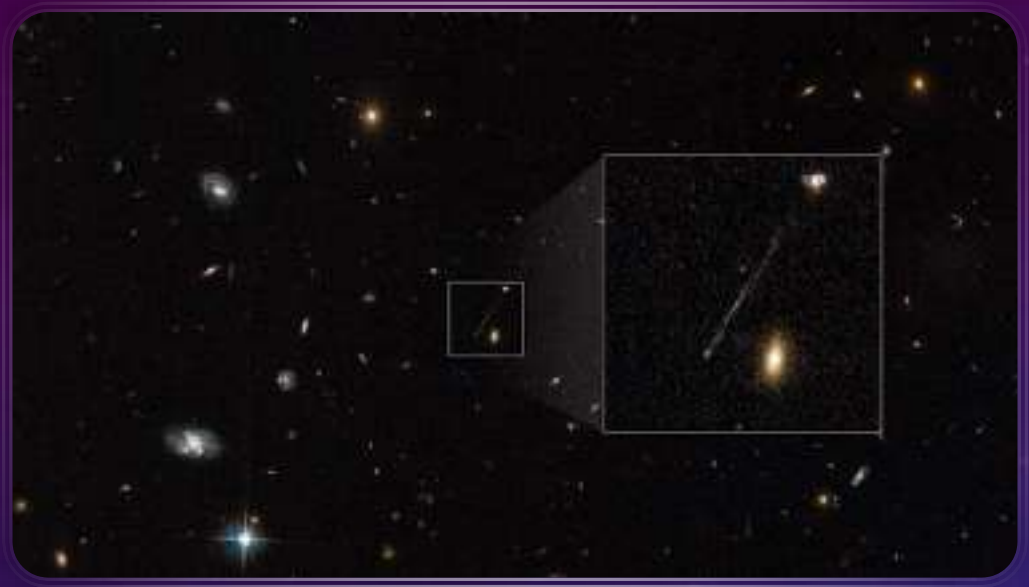
In The iconic image of the supermassive black hole at the center of M87—has gotten its first official makeover with the help of machine learning. The new image further exposes a central region that is larger and darker, surrounded by the bright accreting gas shaped like a "skinny donut." The team used the data obtained by the Event Horizon Telescope (EHT) collaboration in 2017 and achieved, for the first time, the full resolution of the array.

"With our new machine learning technique, PRIMO, we were able to achieve the maximum resolution of the current array," says lead author Lia Medeiros of the Institute for Advanced Study. "Since we cannot study black holes up-close, the detail of an image plays a critical role in our ability to understand its behavior. The width of the ring in the image is now smaller by about a factor of two, which will be a powerful constraint for our theoretical models and tests of gravity."

PRIMO, which stands for principal-component interferometric modeling, was developed by EHT members.

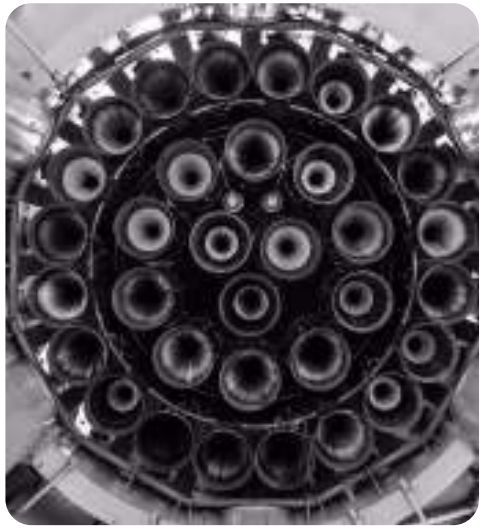
APRIL 13TH: GIANT GALAXY SEEN IN 3D

•Though we live in a vast three-dimensional universe, celestial objects seen through a telescope look flat because everything is so far away. Now for the first time, astronomers have measured the three-dimensional shape of one of the biggest and closest elliptical galaxies to us, M87. This galaxy turns out to be "triaxial," or potato-shaped. This stereo vision was made possible by combining the power of NASA's Hubble Space Telescope and the ground-based W. M. Keck Observatory on Maunakea, Hawaii.



APRIL 20TH: HUBBLE SPOTS RUNAWAY BLACK HOLE LEAVING BEHIND A TRAIL OF NEW STARS

- Astronomers think they've discovered a black hole some 20 million times the mass of the Sun speeding away from the core of a distant galaxy. And as the supermassive black hole barrels through intergalactic space, it's compressing the scant gas and dust available out there, leaving behind a thin line of newly formed stars that's some 200,000 light-years long.

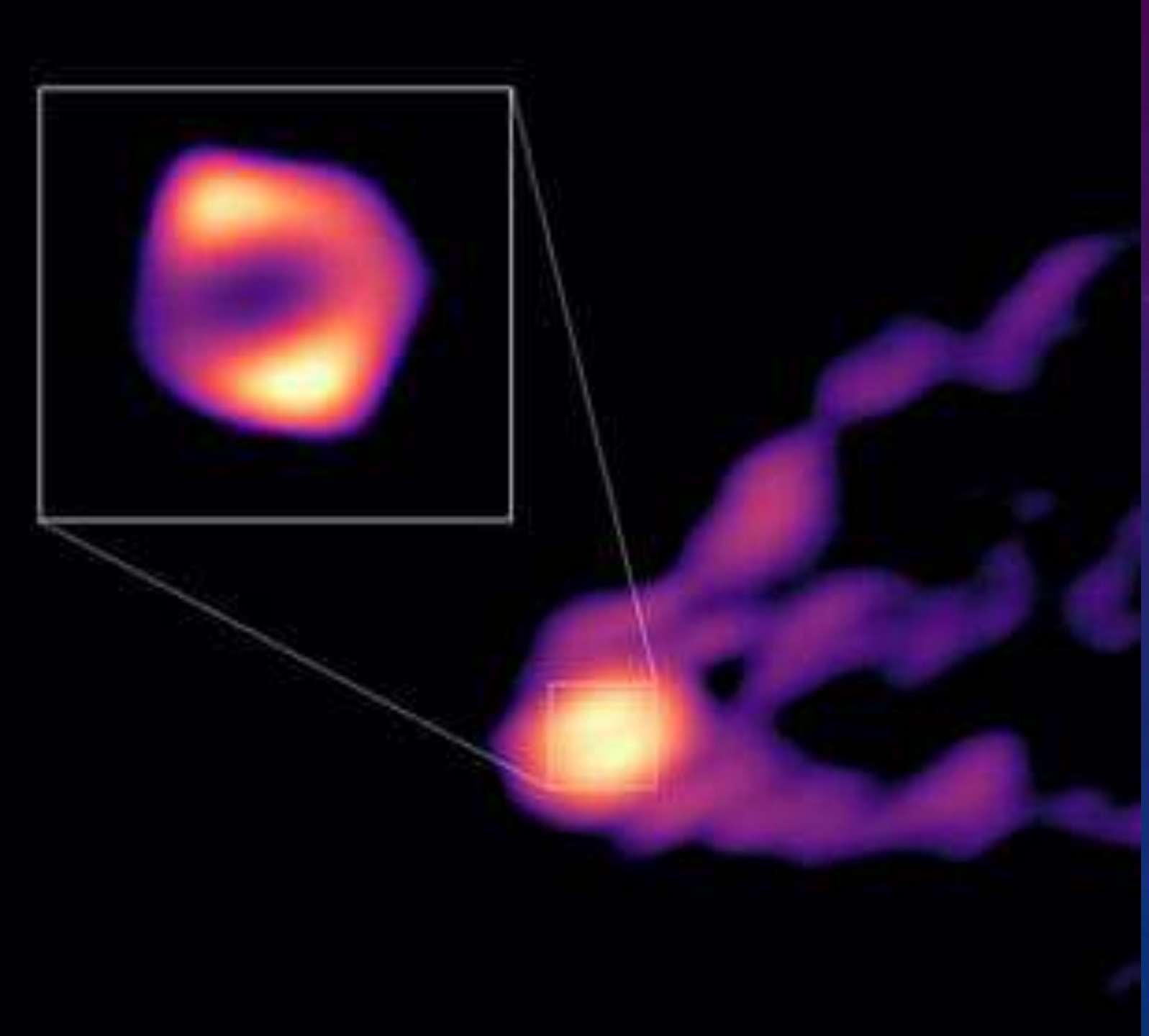


APRIL 20TH: SPACEX'S STARSHIP FLIES HIGH, THEN TERMINATED ABOUT 4 MINUTES INTO FLIGHT

- About two or so minutes into the ascent, the rocket began to spin and then tumble. Based on the company's webcast, the rocket made it to a maximum altitude of about 24 miles (39 kilometers) and velocity of 1,330 miles (2,150 kilometers) per hour.
- Eventually the rocket's flight termination system activated to destroy the rocket about four minutes after launch.
- Note: This was a successful rocket launch test

APRIL 25TH: ISPACE'S JAPANESE MOON LANDER CRASHED

•Days before Japan's Hakuto-R lunar lander apparently crashed into the moon's surface on Tuesday (April 25), it snapped a truly gorgeous picture of our planet. The image, which is reminiscent of Apollo 8's iconic "Earthrise"(opens in new tab) photo, shows our planet sitting on top of the lunar horizon like a perfect blue marble. The moon's shadow can be seen passing over Australia, which was experiencing a total solar eclipse at the time (April 20).



APRIL 26TH:ASTRONOMERS CAPTURE FIRST IMAGE OF JET BEING LAUNCHED FROM EDGE OF BLACK HOLE

- Study concerns Messier 87 galaxy, 55m light years away from Earth, and a black hole 6.5bn times more massive than the sun The latest observations were made in 2018 with telescopes from the Global Millimetre VLBI Array (GMVA), the Atacama Large Millimeter/submillimeter Array (ALMA) and the Greenland Telescope (GLT). Event Horizon Telescope observations of M87 in 2017, at a wavelength of 1.3 mm, revealed a ring-like structure, which was interpreted as gravitationally lensed emission around a central black hole. Here we report images of M87 obtained in 2018, at a wavelength of 3.5 mm, showing that the compact radio core is spatially resolved.

WHAT'S UP

STRATFORD ASTRONOMY GROUP

WHAT'S UP FOR MARCH

This is a month of "Almost for us"

<< April | May 2023 | June >>

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1  Waxing gibbous Visible: 82% ↑ Age: 10.63 days	2  Waxing gibbous Visible: 88% ↑ Age: 11.57 days	3  Waxing gibbous Visible: 95% ↑ Age: 12.53 days	4  Full moon Visible: 99% ↑ Age: 13.51 days	5  **Full moon Visible: 100% Age: 14.53 days**	6  Full moon Visible: 100% ↓ Age: 15.57 days	7  Waning gibbous Visible: 97% ↓ Age: 16.62 days
8  Waning gibbous Visible: 91% ↓ Age: 17.70 days	9  Waning gibbous Visible: 83% ↓ Age: 18.78 days	10  Waning gibbous Visible: 74% ↓ Age: 19.86 days	11  Last quarter Visible: 63% ↓ Age: 20.95 days	12  **Last quarter Visible: 52% ↓ Age: 22.03 days**	13  Last quarter Visible: 40% ↓ Age: 23.10 days	14  Waning crescent Visible: 30% ↓ Age: 24.16 days
15  Waning crescent Visible: 20% ↓ Age: 25.24 days	16  Waning crescent Visible: 12% ↓ Age: 26.30 days	17  Waning crescent Visible: 6% ↓ Age: 27.34 days	18  New Visible: 2% ↓ Age: 28.37 days	19 **New Visible: 1% ↓ Age: 29.38 days**	20  New Visible: 1% ↑ Age: 0.84 days	21  Waxing crescent Visible: 4% ↑ Age: 1.80 days
22  Waxing crescent Visible: 9% ↑ Age: 2.74 days	23  Waxing crescent Visible: 15% ↑ Age: 3.67 days	24  Waxing crescent Visible: 22% ↑ Age: 4.58 days	25  Waxing crescent Visible: 31% ↑ Age: 5.47 days	26  First quarter Visible: 40% ↑ Age: 6.36 days	27  **First quarter Visible: 49% ↑ Age: 7.26 days**	28  First quarter Visible: 59% ↑ Age: 8.16 days
29  Waxing gibbous Visible: 68% ↑ Age: 9.07 days	30  Waxing gibbous Visible: 77% ↑ Age: 10.01 days	31  Waxing gibbous Visible: 85% ↑ Age: 10.97 days	1 	2 	3 	4 

HEY, THERE BE A MOON OVERHEAD

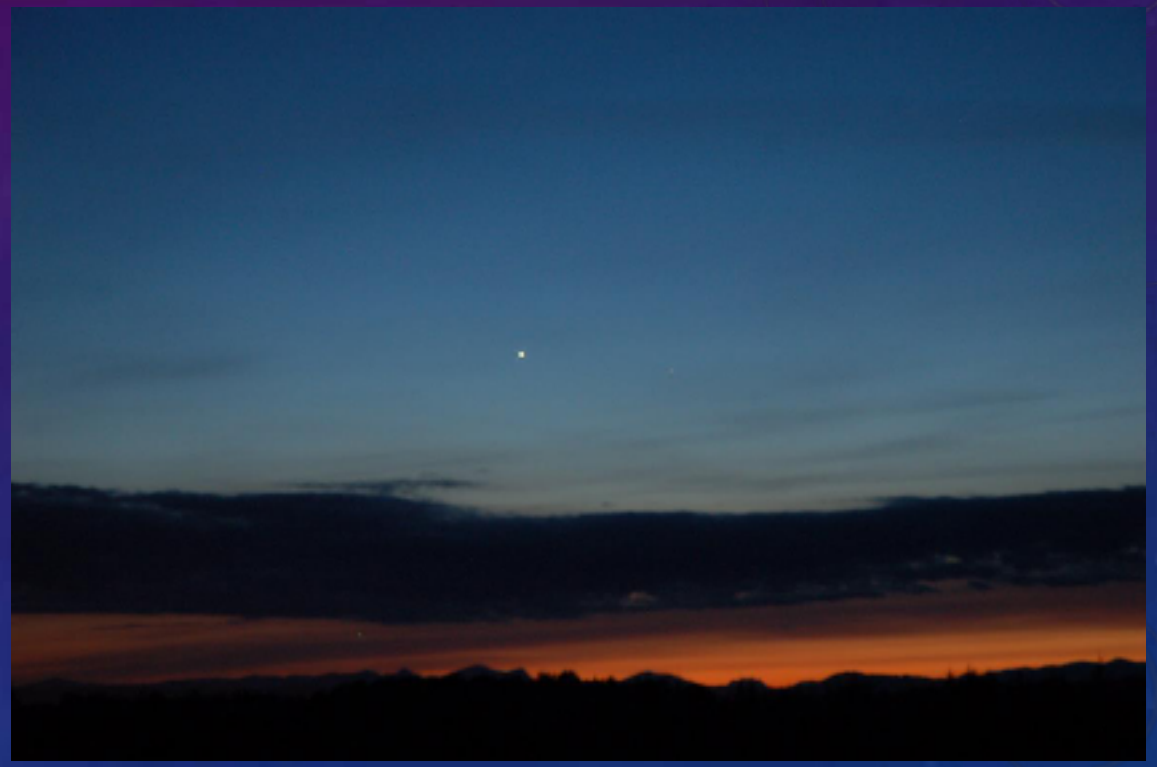
MOON PHASES FOR THE MONTH OF MAY

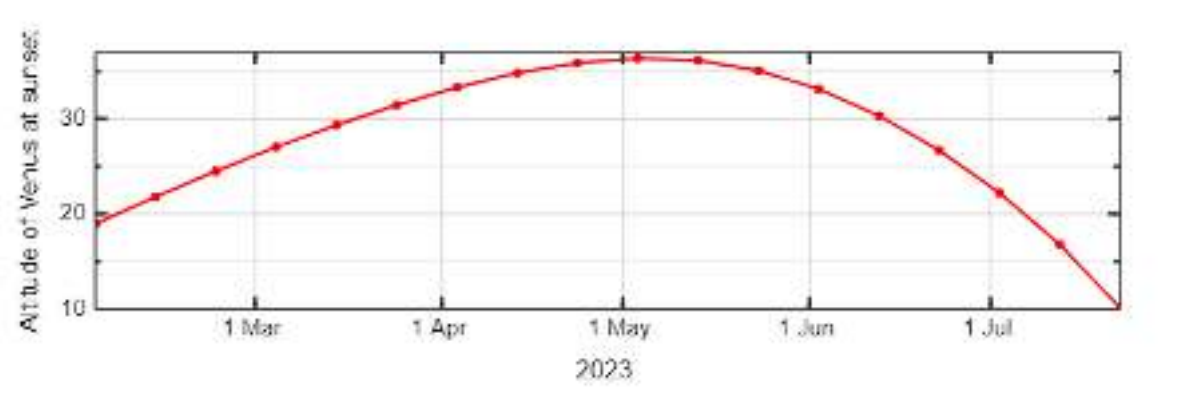
MAY 2023

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Mercury at inferior solar conjunction	**2**	**3** Venus at highest altitude in evening sky	**4**	**5** Penumbral lunar eclipse Full Moon	**6** η-Aquariid meteor shower 2023 Lunar occultation of Delta Scorpii
7 The Moon at aphelion	**8** Comet C/2020 V2 (ZTF) passes perihelion	**9** η-Lyrid meteor shower 2023 Comet C/2020 K1 (PANSTARRS) passes perihelion Uranus at solar conjunction	**10**	**11** The Moon at perigee	**12** Moon at Last Quarter Messier 5 is well placed	**13** Conjunction of the Moon and Saturn Close approach of the Moon and Saturn
14 Mercury at aphelion	**15**	**16**	**17** Close approach of the Moon and Jupiter Lunar occultation of Jupiter Conjunction of the Moon and Jupiter The Moon at perihelion Conjunction of the Moon and Mercury	**18**	**19** New Moon	**20**
21	**22**	**23** Conjunction of the Moon and Venus Close approach of the Moon and Venus	**24** Conjunction of the Moon and Mars Close approach of the Moon and Mars	**25** The Moon at apogee	**26**	**27** Moon at First Quarter
28 Messier 4 is well placed	**29** Mercury at greatest elongation west	**30** Mars at aphelion	**31**			

MAY 3 – VENUS AT HIGHEST ALTITUDE IN EVENING SKY

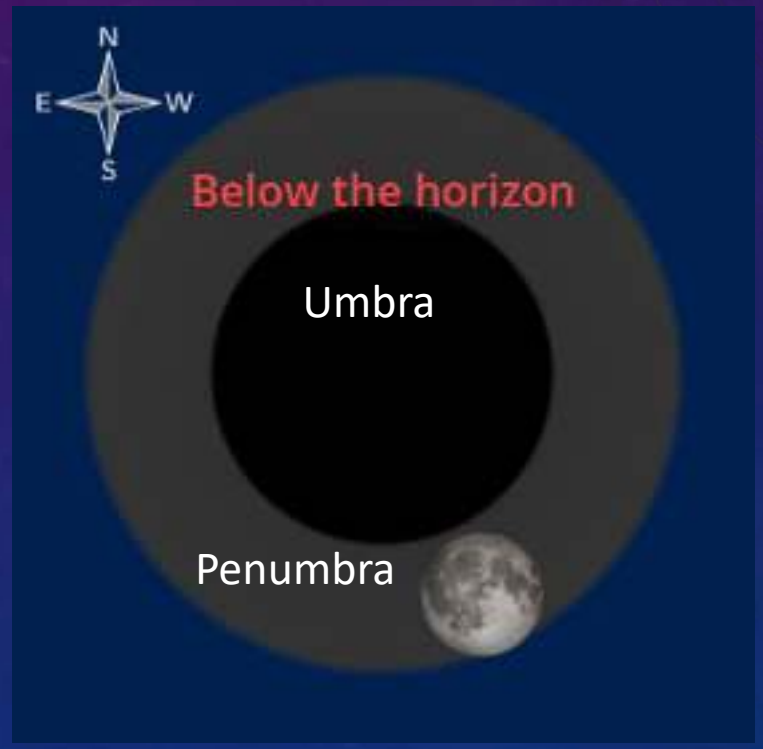
- As seen from Stratford , Venus will reach its highest point in the sky in its 2023 evening apparition. It will be shining brightly at magnitude: -4.3 (yep, that is a minus).
- From Stratford, this apparition will be reasonably placed and prominent, reaching a peak altitude of 36° above the horizon at sunset on 3 May 2023.





MAY 5 – PENUMBRAL LUNAR ECLIPSE

- **If you are visiting Asia, Russia, Africa then you are in for a treat. The Moon will pass through the Earth's shadow between 11:15 and 15:32 EDT, creating a penumbral lunar eclipse. The eclipse will be visible any location where the Moon is above the horizon at the time, including from Antarctica, Asia, Russia, Africa and Oceania.**
- **It will not be visible from Stratford since the Moon will be beneath the horizon at the time (Bummer).**
- **Maximum eclipse will occur at 13:24 (all times given in Stratford time).**



MAY 13 – CONJUNCTION OF THE MOON AND SATURN

- **The Moon and Saturn will share the same right ascension, with the Moon passing 3°17' to the south of Saturn. The Moon will be 23 days old.**
- **At around the same time, the two objects will also make a close approach, technically called an appulse.**
- **From Stratford however, the pair will be visible from soon after it rises, at 03:10, until soon before it sets at 13:54.**
- **The Moon will be at mag -11.7, and Saturn at mag 0.8, both in the constellation Aquarius.**
- **The pair will be too widely separated to fit within the field of view of a telescope but will be visible to the naked eye or through a pair of binoculars.**

3pm

8pm

MAY 17 – JUPITER'S TURN

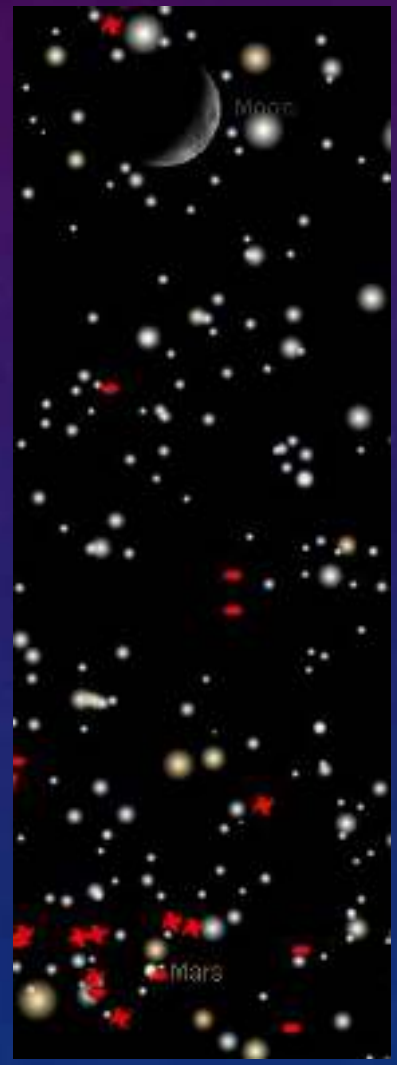
- The Moon and Jupiter will make a close approach, passing within a mere 43.1 arcminutes of each other. From some parts of the world, the Moon will pass in front of Jupiter, creating a lunar occultation. The Moon will be 27 days old.
- From Stratford however, the pair will be visible from soon after it rises, at 04:52, until soon before it sets at 18:19. Always take extreme caution when trying to make daytime observations of the Moon while the Sun is above the horizon.
- The Moon will be at mag -9.4 in Aries; and Jupiter will be at mag -2.1 in Pisces.
- They will be a little too widely separated to fit comfortably within the field of view of a telescope but will be visible to the naked eye or through a pair of binoculars.

MAY 23 – DON'T FORGET VENUS

- **The Moon and Venus will share the same right ascension, with the Moon passing 2°12' to the north of Venus. The Moon will be 4 days old.**
- **At around the same time, the two objects will also make a close approach, technically called an appulse.**
- **From Stratford however, the pair will be visible from soon after it rises, at 08:43, until soon before it sets at 00:22. Always take extreme caution when trying to make daytime observations of the Moon while the Sun is above the horizon.**
- **The Moon will be at mag -10.4, and Venus at mag -4.2, both in the constellation Gemini.**

MAY 24 – WHAT ABOUT MARS

- The Moon and Mars will share the same right ascension, with the Moon passing 3°45' to the north of Mars. The Moon will be 5 days old.
- At around the same time, the two objects will also make a close approach, technically called an appulse.
- From Stratford however, the pair will be visible from soon after it rises, at 10:03, until soon before it sets at 01:03.
- The Moon will be at mag -11.0, and Mars at mag 1.5, both in the constellation Cancer.
- The pair will be too widely separated to fit within the field of view of a telescope but will be visible to the naked eye or through a pair of binoculars.



MAY 29 – MERCURY AT GREATEST ELONGATION WEST

- Mercury will reach its greatest separation from the Sun in its May–Jun 2023 morning apparition. It will be shining brightly at mag 0.4.
- From Stratford , this apparition will not be one of the most prominent and very difficult to observe, reaching a peak altitude of 10° above the horizon at sunrise on 5 Jun 2023.

ASTRONOMY LESSONS

THE SUN

COOL SUN FACTS

- Distance : 1 Astronomical Unit (about 149,600,000 km)
- Mass: 1.9885×10^{30} kg or about 332,950 Earths
- Radius: 696,342 km (about 109 Earth Radii)
- Mass: 1.9885×10^{30} kg (about 99.86% of the mass of the whole Solar System)
- Age: 4.6 billion years

- Composition:
  - 73.46% hydrogen
  - 24.85% helium
  - 0.77% oxygen
  - 0.29% carbon
  - 0.16% iron
  - 0.12% neon
  - 0.09% nitrogen
  - 0.07% silicon
  - 0.05% magnesium
  - 0.04% sulphur

MORE COOL SUN FACTS

If the Sun disappeared, we would not notice it for 8 minutes and 19 seconds

Note: The Earth would still orbit around the once Sun for 8 minutes and 19 seconds

MORE COOL SUN FACTS

The Sun rotates at different rates along its Body.

At its equator, the Sun spins about once every 25 Days.

At its Poles, the Sun spins about once every 35 Days.

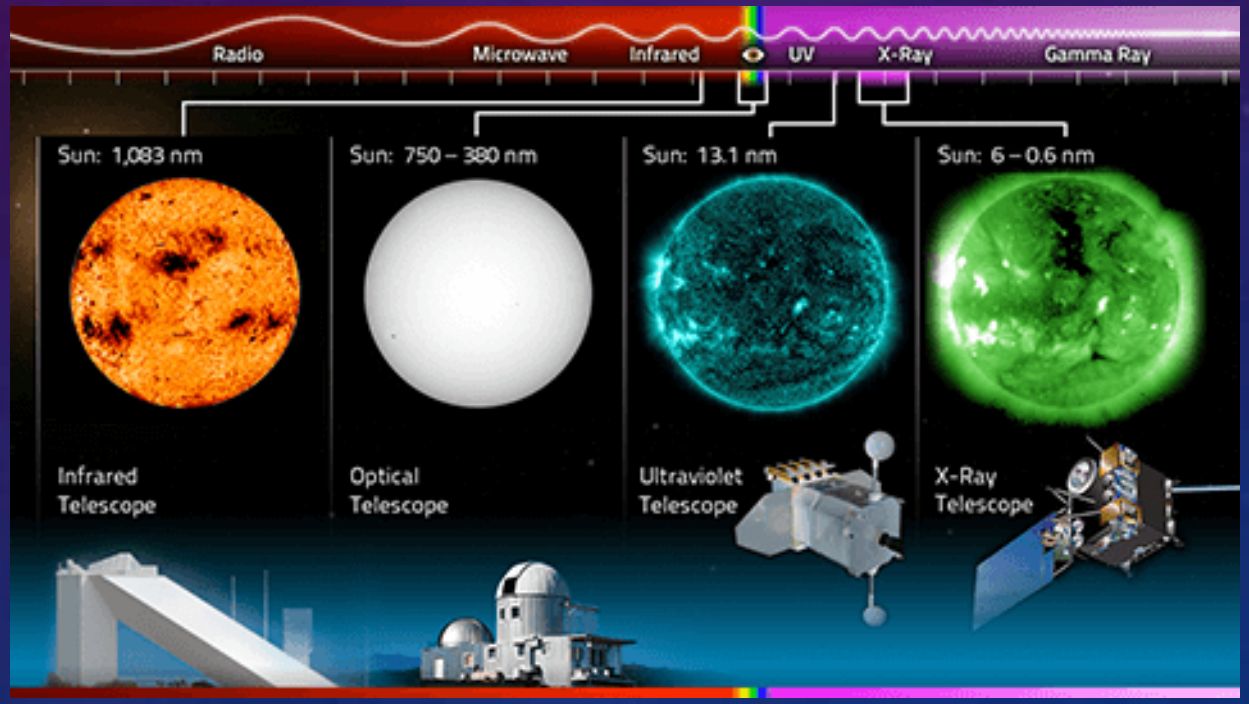
MORE COOL SUN FACTS

If The Sun orbits around the Milky Way at about 828,000 km/hr

It will take the Sun (and the rest of our Solar System) about 230,000,000 years to orbit the Milky Way.

MORE COOL SUN FACTS

If The Sun is actually White (not Yellow, even though it is classified as a Yellow Dwarf).



MORE COOL SUN FACTS

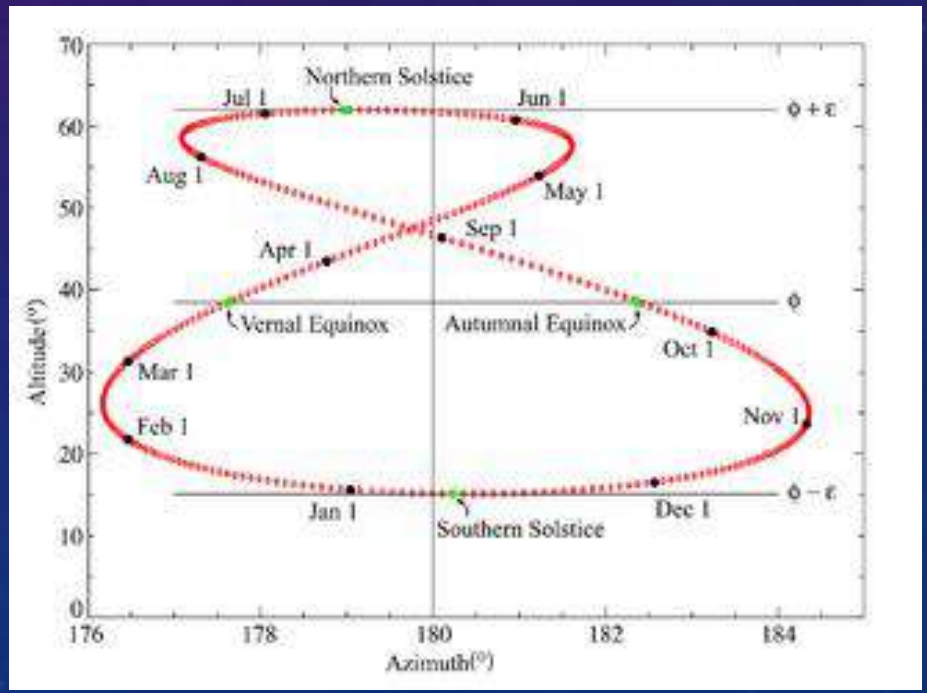
The Sun is almost a perfect sphere. Considering the sheer size of the Sun, there is only a 10 km difference in its polar and equatorial diameters—this makes it the closest thing to a perfect sphere observed in nature.

MORE COOL SUN FACTS

The Sun will eventually be about the size of Earth. Once the Sun has completed its red giant phase, it will collapse. Its huge mass will be retained, but it will have a volume similar to that of Earth. When that happens, it will be known as a White Dwarf.

MORE COOL SUN FACTS

If you took a picture of the Sun at the same time every Day. You image would look like infinity sign (Analemma)

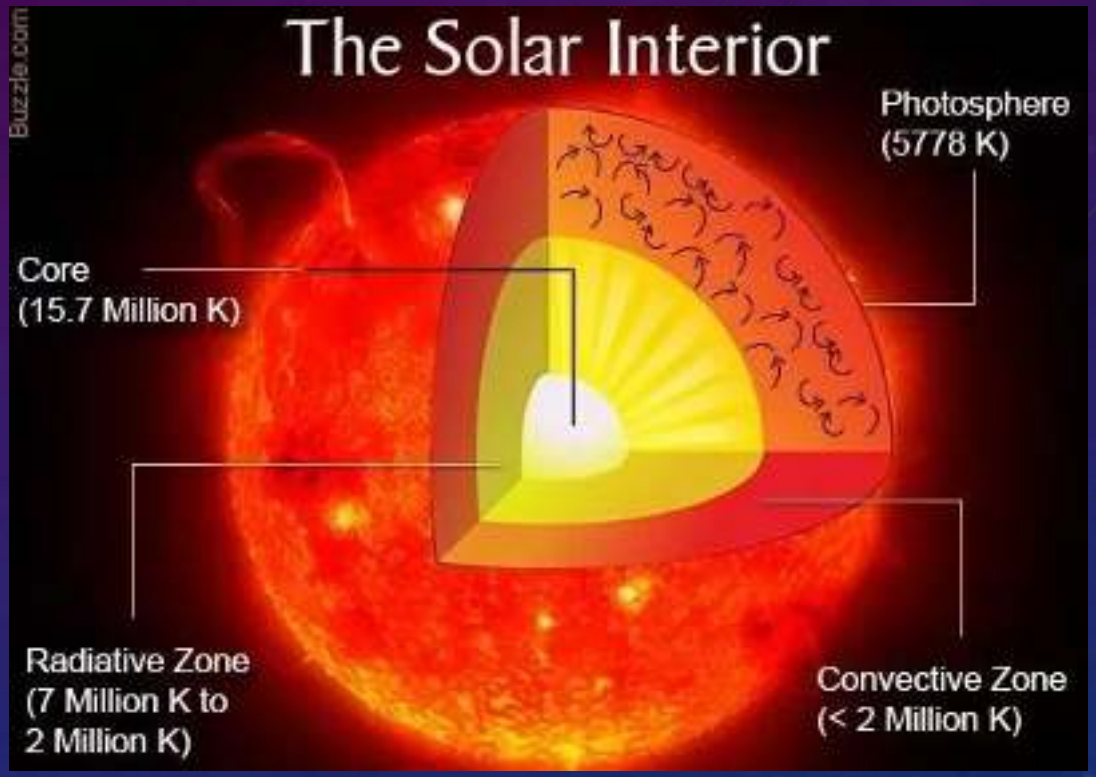


MORE COOL SUN FACTS

The Temperature of the surface of the Sun is only about 5500 degrees Celsius.

The Temperature of the Core of the Sun is about 15 million degrees Celsius.

The temperature of the corona (what you see in a solar eclipse) is about 2 million degrees Celsius.



MORE COOL SUN FACTS

The Sun and Moon (on average) have the same angular size in the sky.

Just slightly over 0.5 of a degree.

This is why we can get total solar eclipses (Monday, April 8, 2024)

MORE COOL SUN FACTS

In the Northern Hemisphere , the Sun always moves to the right.

Equatorial residents note the Sun always goes straight up then after being overs there heads it goes strain down.

In the Southern Hemisphere, the Sun always moves leftward

MORE COOL SUN FACTS

Due to atmospheric refraction, most locations receive an extra 7 minutes of day light. Even during the Equinoxes.

MORE COOL SUN FACTS

If The Sun moves its own width in about 2 minutes, about the speed of the minute hand on a clock. (except at the horizons where it takes 3 minutes).

This speed does not change even from Summer to Winter

SHOW AND TELL

EQUIPMENT LESSONS

SOFTWARE AND IMAGING LESSONS