STRATFORD ASTRONOMY GROUP

NOVEMBER 7TH, 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 16:

Michael Burns
Doug Fyfe
Alex Huddlesdon
Derek Huddlesdon
Paul Bartlett
Tom Hislop
John Burtenshaw
Bill Thompson
Patrick Hayes
Wolfgang Keller
Tim Pauli
Richard Rosenthall
Tom Kimber
David Orr
Rena Orr
Tom Hislop

CLUB NEWS AND ACTIVITIES

Group Funds

Total = $1257.25

- 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

New Equipment Donation: Tim

UPCOMING MEETINGS

NEXT MEETING DATES

Date	Start	End	Facility and Spaces
~~September 12, 2023~~	~~7.00 PM~~	~~9:00 PM~~	~~St. Michael's CSS, Room 104~~
~~October 3, 2023~~	~~7.00 PM~~	~~9:00 PM~~	~~St. Michael's CSS, Room 104~~
~~November 7, 2023~~	~~7.00 PM~~	~~9:00 PM~~	~~St. Michael's CSS, Room 104~~
December 12, 2023	7.00 PM	9:00 PM	St. Michael's CSS, Room 104
January 9, 2024	7.00 PM	9:00 PM	St. Michael's CSS, Room 104
February 6, 2024	7.00 PM	9:00 PM	St. Michael's CSS, Room 104
March 5, 2024	7.00 PM	9:00 PM	St. Michael's CSS, Room 104
April 2, 2024	7.00 PM	9:00 PM	St. Michael's CSS, Room 104
May 7, 2024	7.00 PM	9:00 PM	St. Michael's CSS, Room 104
June 4, 2024	7.00 PM	9:00 PM	St. Michael's CSS, 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

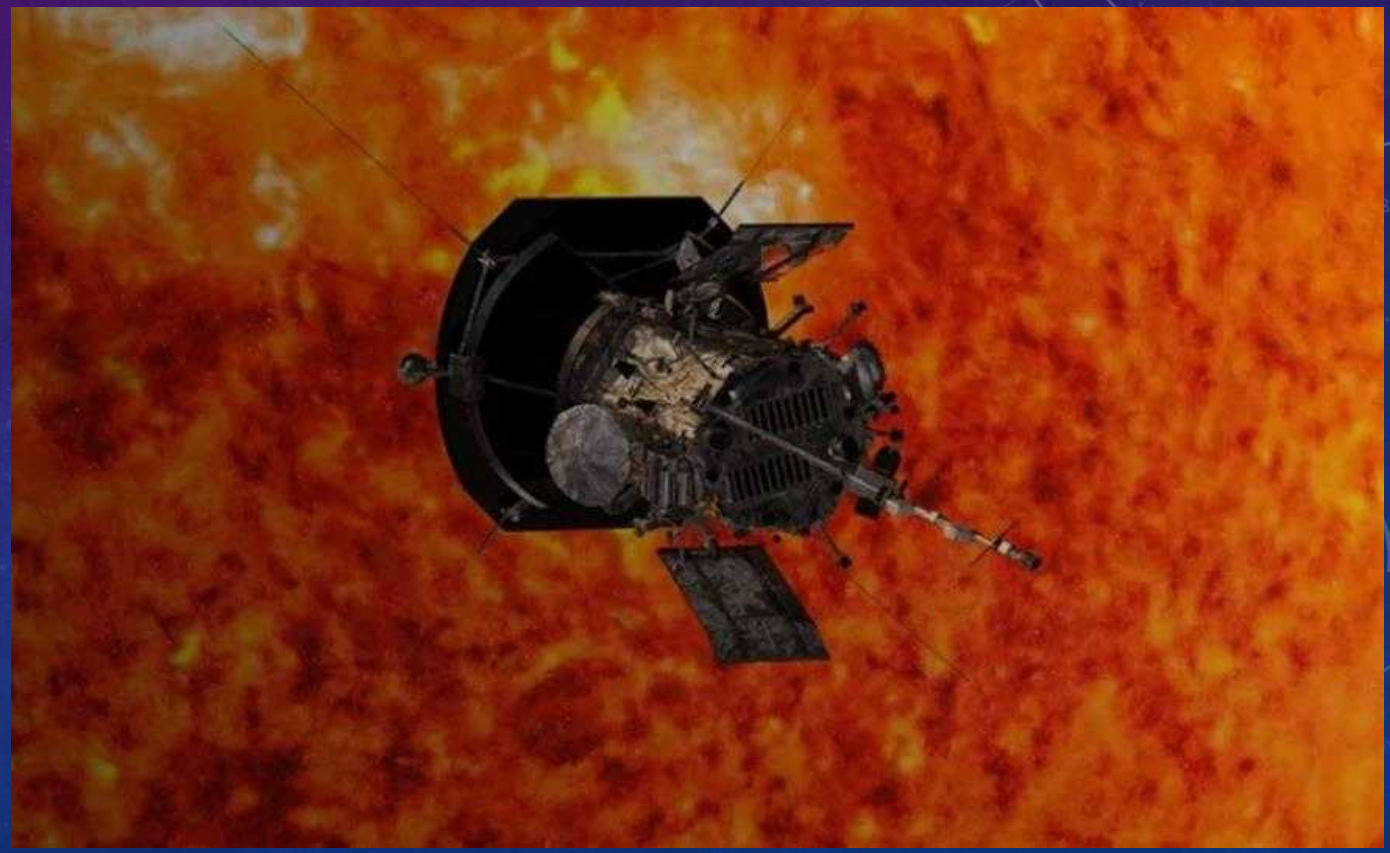
LATEST ASTRONOMY NEWS

OCTOBER

OCT 6TH: PARKER MAKES ITS CLOSEST AND FASTEST SOLAR FLYBY

The Parker Solar Probe is the little engine that just keeps going and going by the sun. On September 27th, it made its 17th close approach and skimmed just 7.26 million kilometers (4.51 million miles) above the sun's "surface" layer (called the photosphere).
That's just the latest achievement by the probe, which also became the first-ever spacecraft to fly through a coronal mass ejection—and live to tell the story. That CME pass-through occurred on September 5, 2022, during its 13th approach to the sun.
•The spacecraft's most recent accomplishment was set up by a gravity-assist flyby of Venus in late August. During the closest approach, the Parker Solar Probe was moving at 635,266 kilometers per hour (394,735 miles per hour). Both the close approach and the CME encounter are just two of many highlights of a mission that's planned to continue its studies of the sun and solar environment through mid-2025. Parker will fly more than seven times closer to the Sun than any spacecraft.

•Over seven years, the spacecraft will complete 24 orbits around the Sun.
•At its closest approach, the spacecraft will come within about 3.9 million miles (6.2 million kilometers) of the Sun.



OCT 11TH: AMAZON'S CHALLENGE TO MUSK'S STARLINK TO HAVE FIRST LAUNCH

Amazon is set to launch two satellites on Friday, in its first test mission as part of its plan to deliver the internet from space and compete with Elon Musk's Starlink service.

The launch window for the Atlas V rocket from the United Launch Alliance (ULA) hub at Kennedy Space Center in Florida is scheduled to open for two hours at 2:00 pm local time (1800 GMT).

Once up and running, the company founded by Jeff Bezos says its Project Kuiper will provide "fast, affordable broadband to unserved and underserved communities around the world," with a constellation of more than 3,200 satellites in low Earth orbit (LEO).

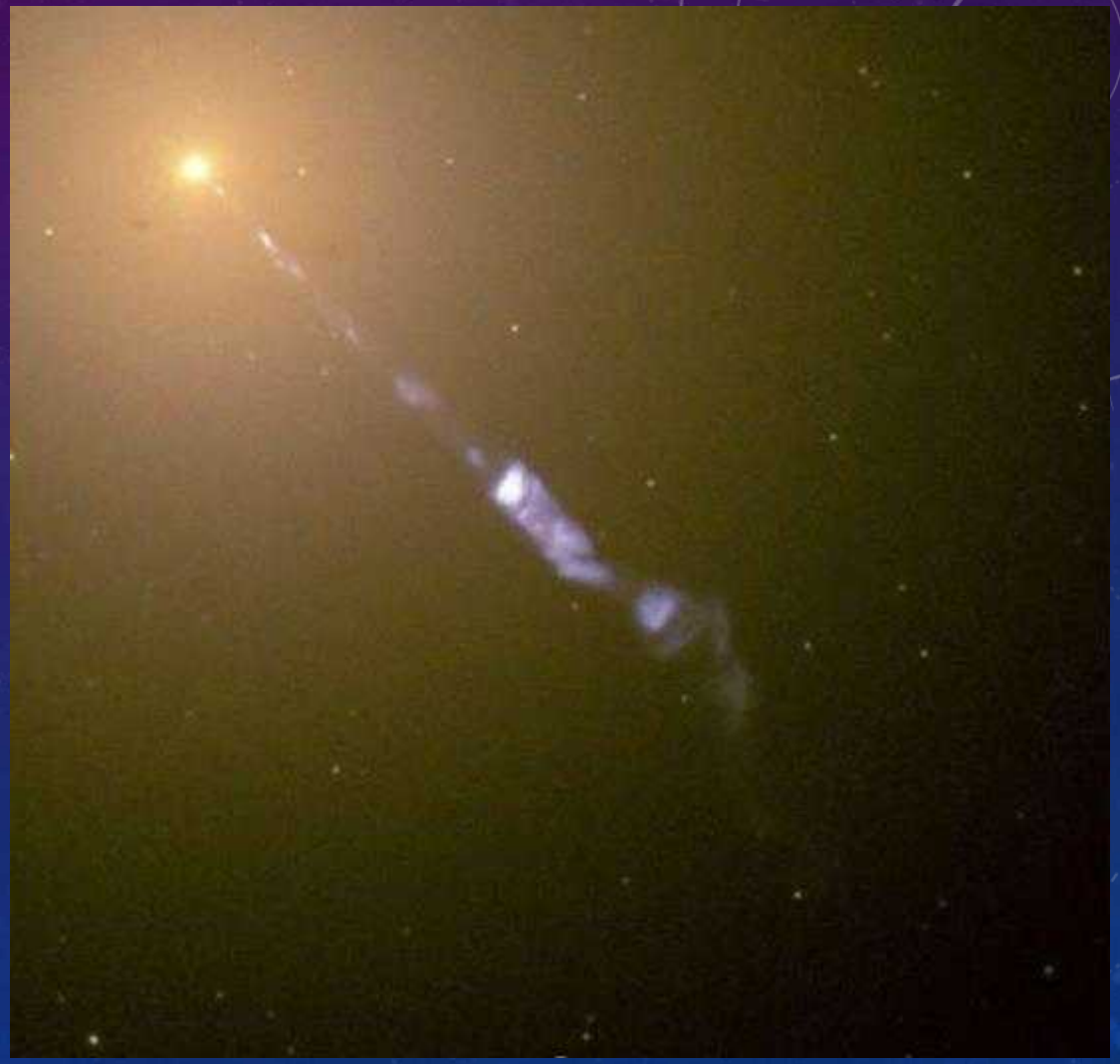
OCT 9TH: ASTRONOMERS DISCOVER M87'S JET IS TRIGGERING NOVAE

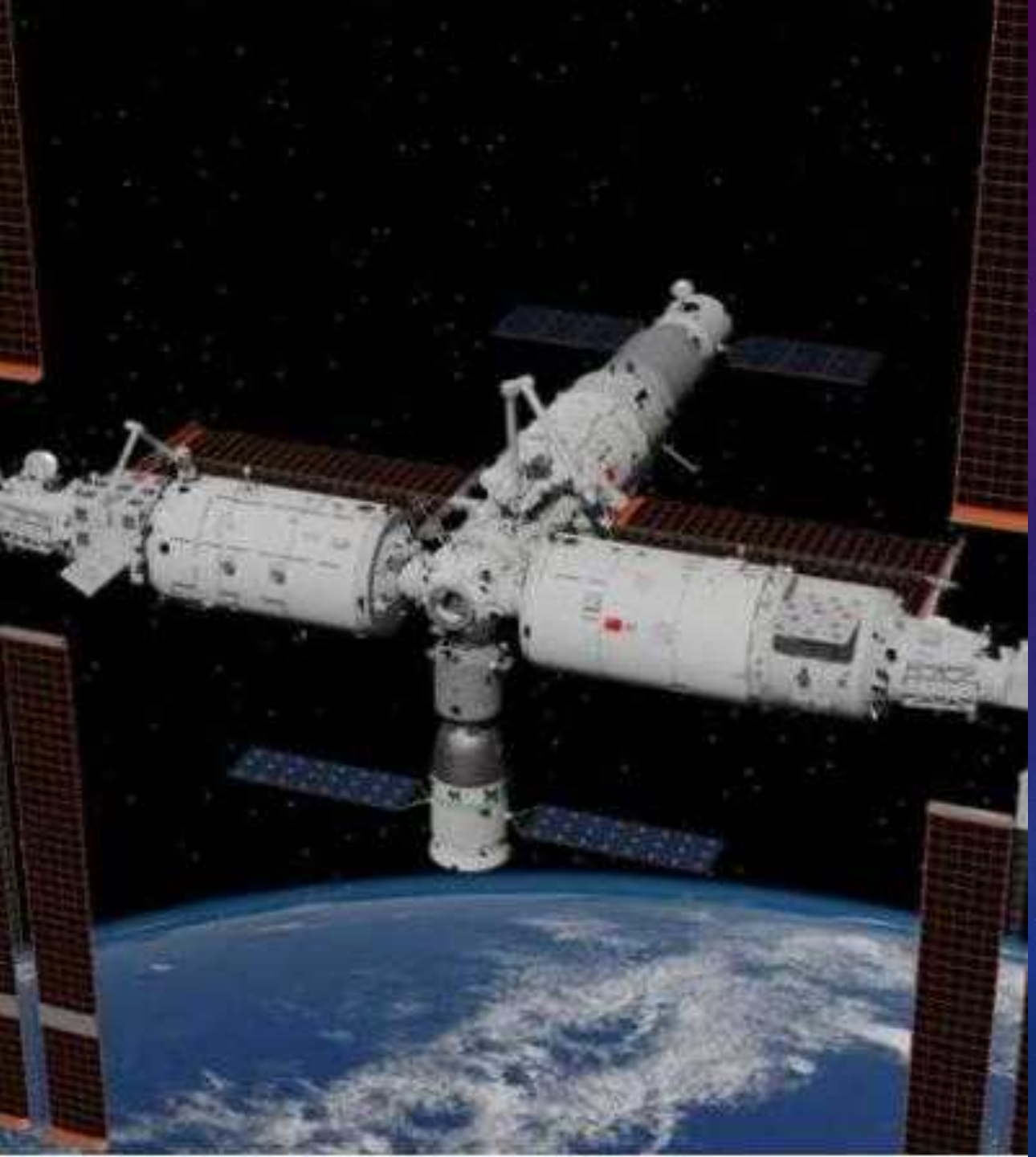
Everyone loves a good mystery, and astronomers have just uncovered a new one in a nearby supermassive galaxy called M87. Like most galaxies, M87 regularly plays host to a smattering of stellar explosions called novae, each the result of a star stealing material from a neighbor.

M87 also features a massive jet of plasma blasting out into deep space from the galactic core. These phenomena: the jet and the novae, are unrelated astronomical occurrences, or so scientists believed.
But astronomers recently discovered that the novae in M87 seem to be uncharacteristically aligned along the jet, instead of scattered randomly throughout the galaxy. Is the jet somehow triggering nova explosions?

It might be, but the mystery is: how?

A team of astronomers confirmed the presence of 135 novae within M87, and they appear to occur with unexpected frequency in the path of the jet. "The likelihood that this distribution occurred by chance is of order 0.3%,"



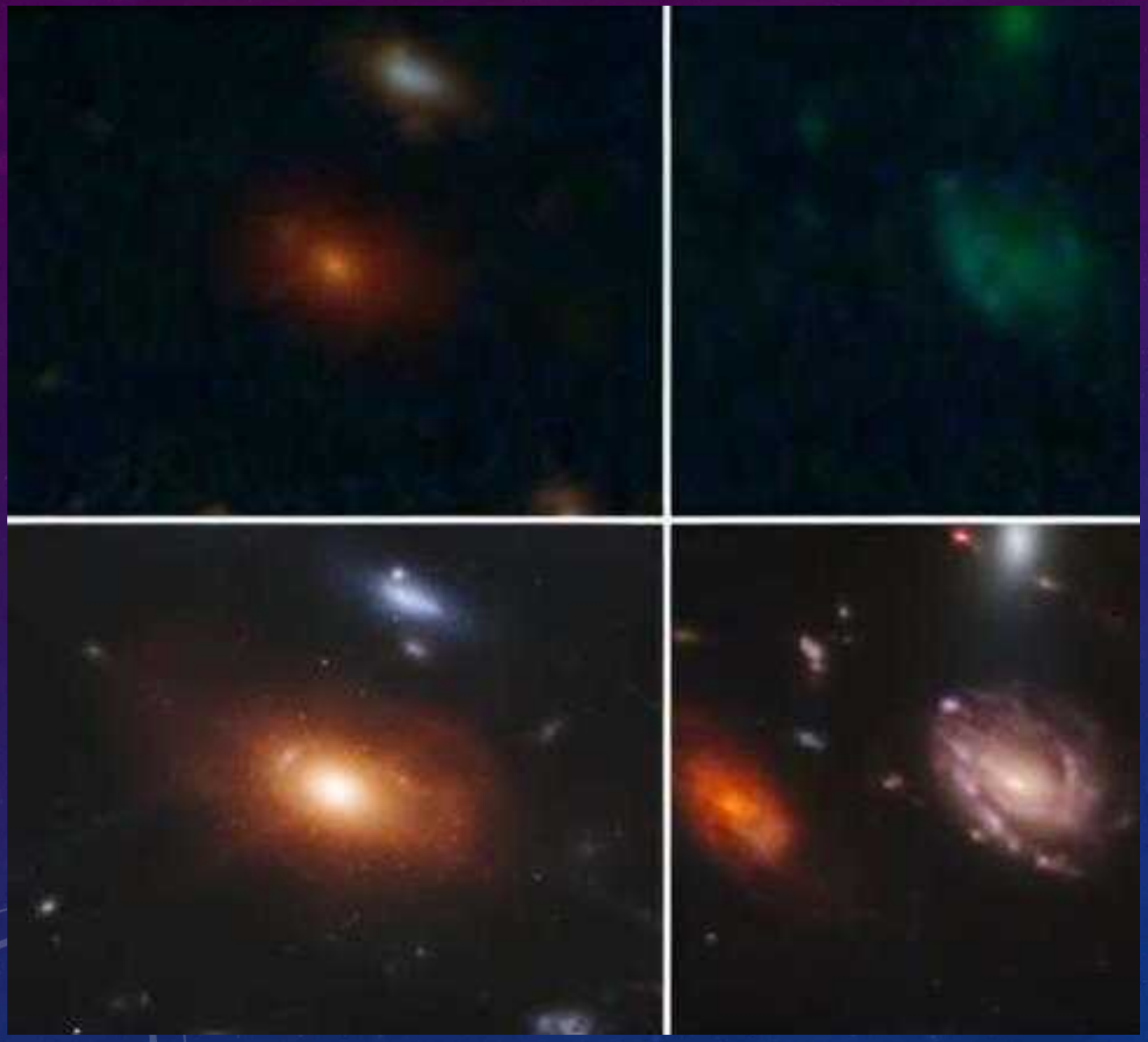


OCTOBER 12TH: CHINA IS PLANNING TO DOUBLE THE SIZE OF ITS SPACE STATION

- The International Space Station (ISS) will be retired in 2030 after more than 32 years of continuous service. Naturally, there are questions regarding what will replace this station, which has served as a bastion for vital research and inter-agency cooperation in space. In the past, China has indicated that their Tiangong ("heavenly palace") space station will be a successor and rival to the ISS, offering astronauts from other nations an alternative platform to conduct research in Low Earth Orbit (LEO). As part of this plan, China recently announced plans to double the size of Tiangong in the coming years.

- This announcement was shared last Wednesday, October 4th, during the 74th International Astronautical Congress (IAC 2023) in Baku, Azerbaijan. According to the China Academy of Space Technology (CAST), three new modules will be added to Tiangong, which currently consists of the Tianhe Core Cabin Module (CMM) and two Laboratory Cabin Modules (LCM)—Wenhian ("Quest for the Heavens") and Mengtian ("Dreaming of the Heavens"). This expansion will be accompanied by extending the station's operational lifetime.

- According to the statement made by CAST, Tiangong will be in service for more than 15 years, 10 more years than previously announced. This means that China intends to keep Tiangong operational until 2037 or later, several years after the ISS is decommissioned and deorbited. As of the penning of this article, the station has been fully operational since late 2022 (a total of 894 days) and has been occupied for the past 764 days. The station has hosted 15 taikonauts (a maximum of three at a time) at orbital altitudes of 340 to 450 km.



OCT 13TH: MORE JWST OBSERVATIONS ARE FINDING FEWER EARLY MASSIVE GALAXIES

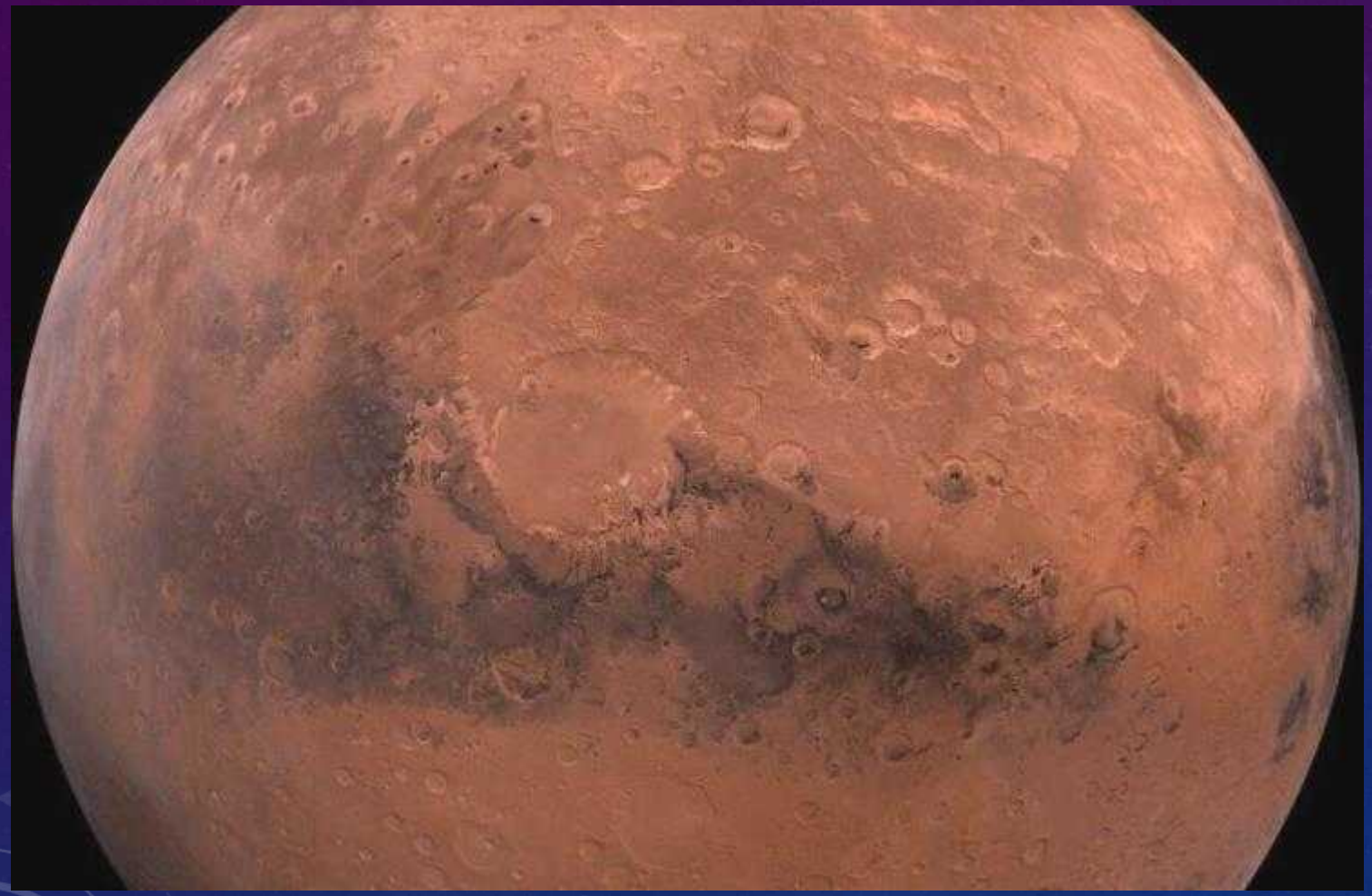
•Astronomers There's a common pattern in science. We develop some new process or tool that allows us to gather all kinds of data we've never had before, the data threatens to overturn all we've assumed about some long-established theory, and then the dust settles. Unfortunately, the early stage of this process generates a lot of sensationalism in the press. Early results from the JWST are a good example of this.

•The James Webb Space Telescope is the most powerful infrared telescope we've ever built. It is sensitive enough to capture detailed images of some of the earliest galaxies. Those that formed soon after the so-called dark ages of the early universe.

•Before JWST we only had galactic observations from a slightly later period, when the galaxies were fully established. Based on those observations and our understanding of the Big Bang, we had a good idea of how quickly galaxies evolve. Or so we thought, because initial observations from JWST seemed to overturn that.

•The galaxies JWST found were large, bright, and already had structure to them. So, the headlines ranged from claims that the Big Bang and possibly even general relativity had been disproven. But now the dust is starting to settle, and it turns out those revolutionary results weren't quite as unusual as some implied, as a new study shows.

•The team used data from the CAnadian NIRISS Unbiased Cluster Survey (CANUCS), which uses JWST images of galaxy clusters looking for small distant galaxies that are gravitationally lensed to make them appear brighter.



OCT 17TH: INTERNATIONAL TEAM REVEALS SOURCE OF LARGEST EVER MARSQUAKE RECORDED

A global team of scientists have announced the results of an unprecedented collaboration to search for the source of the largest ever seismic event recorded on Mars. The study, led by the University of Oxford, rules out a meteorite impact, suggesting instead that the quake was the result of enormous tectonic forces within Mars' crust. The quake, which had a magnitude of 4.7 and caused vibrations to reverberate through the planet for at least six hours, was recorded by NASA's InSight lander on May 4, 2022. Because its seismic signal was similar to previous quakes known to be caused by meteoroid impacts, the team believed that this event (dubbed "S1222a") might have been caused by an impact as well, and launched an international search for a fresh crater.

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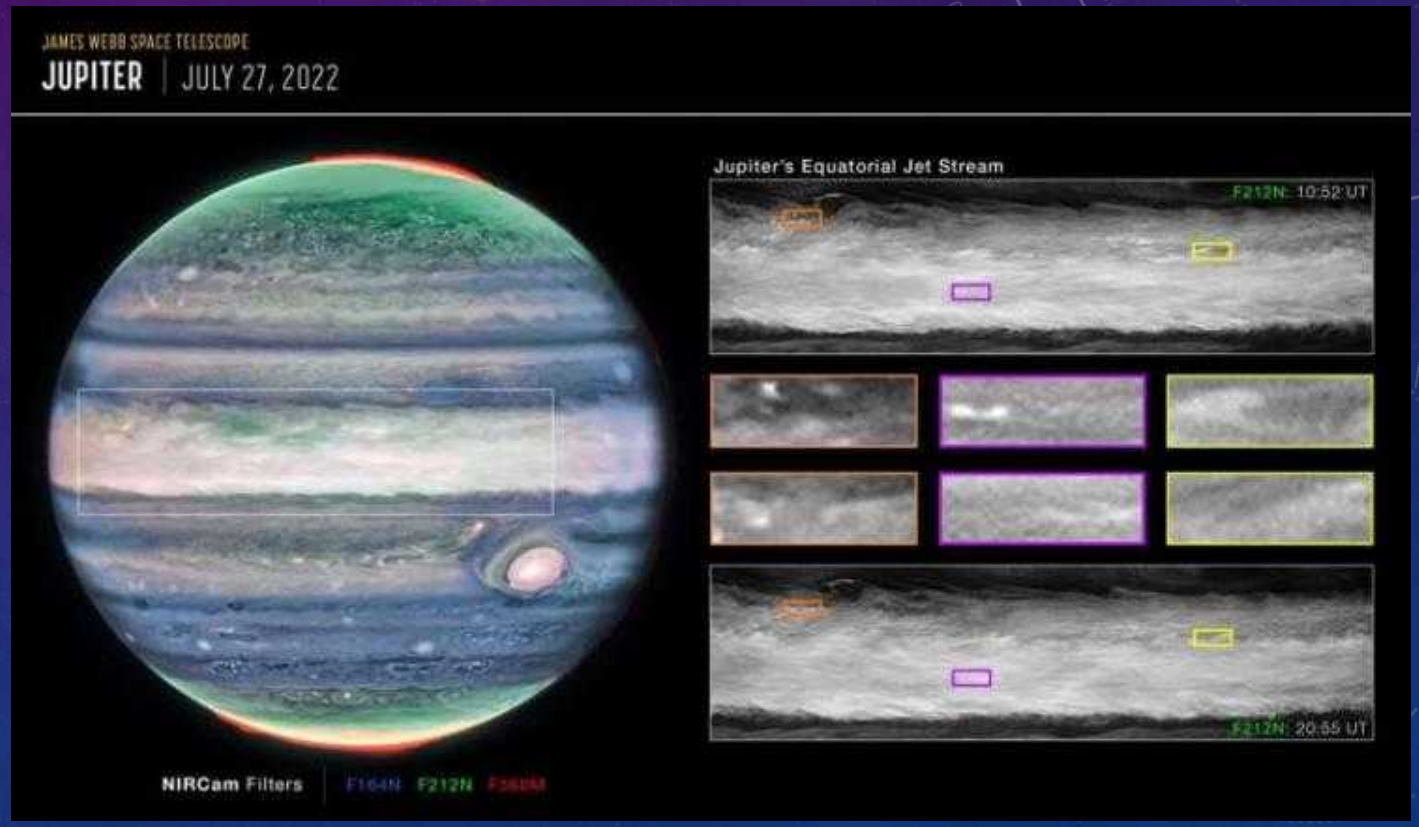
OCT 19TH: WEBB DISCOVERS NEW FEATURE IN JUPITER'S ATMOSPHERE

Jupiter has some of the most conspicuous atmospheric features in our solar system. The planet's Great Red Spot, large enough to envelop Earth, is nearly as well known as some of the various rivers and mountains on the planet we call home.

However, much like Earth, Jupiter is ever-changing, and there's much about the planet we have yet to learn. NASA's James Webb Space Telescope is unlocking some of those mysteries, revealing new features of Jupiter we've never seen before, including a high-speed jet speeding over the planet's equator.

While the jet stream is not as visually apparent or stunning as some of Jupiter's other features, it's giving researchers incredible insight into how the layers of the planet's atmosphere interact with each other, and how Webb will aid in these investigations in the future.

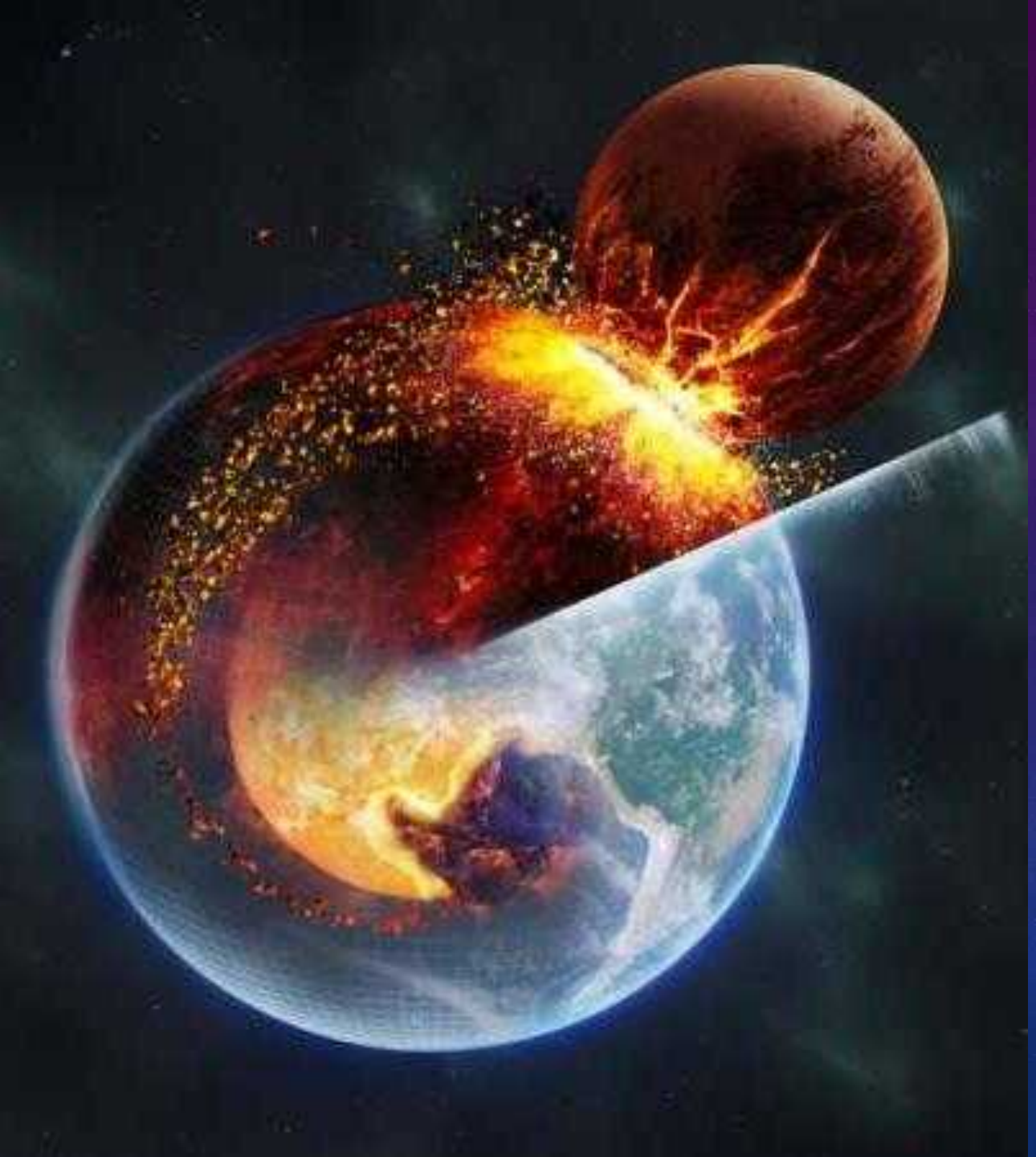


OCT 23RD: THE MOON IS 40 MILLION YEARS OLDER THAN THOUGHT, LUNAR CRYSTALS STUDY SUGGESTS

•More than 4 billion years ago, when the solar system was still young and the Earth was still growing, a giant object the size of Mars crashed into the Earth. The biggest piece that broke off of the early Earth formed our moon. But precisely when this happened has remained a mystery.

•In a new study in the journal Geochemical Perspectives Letters, researchers used crystals brought back from the moon by Apollo astronauts in 1972 to help pinpoint the time of the moon's formation. Their discovery pushes back the age of the moon by 40 million years, to at least 4.46 billion years old.

•"These crystals are the oldest known solids that formed after the giant impact. And because we know how old these crystals are, they serve as an anchor for the lunar chronology," says Philipp Heck, the Field Museum's Robert A. Pritzker Curator for Meteoritics and Polar Studies and the Senior Director of the Negaunee Interactive Research Center, a professor at the University of Chicago, and the study's senior author.



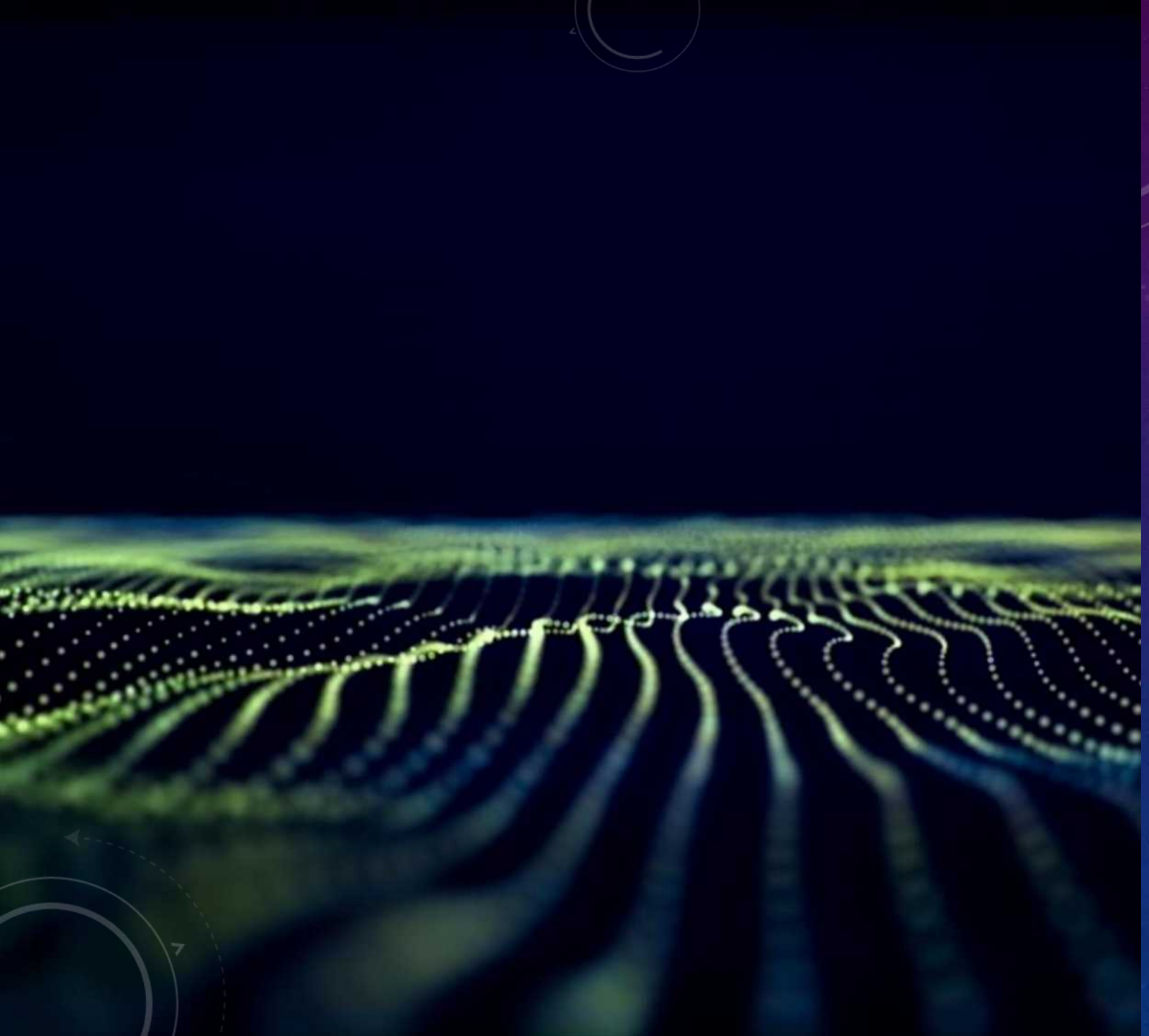
NOV 1ST: A CHUNK OF THE 'PROTOPLANET' THAT MADE THE MOON MAY BE STUCK NEAR EARTH'S CORE

- The newborn Earth was struck by a Mars-size rock that helped create the moon, and the impact may have left behind continent-size remnants of the rock near Earth's core, a new study finds.

- Scientists think Earth formed about 4.5 billion years ago, and previous research suggested the moon arose a short time later. The leading explanation for the moon's origin is that it resulted from the collision of two protoplanets, or embryonic worlds. One of those was the young proto-Earth, and the other was a Mars-size rock nicknamed Theia, after the mother of the moon in Greek myth.

- In the new study, Qian Yuan, a geodynamicist at the California Institute of Technology in Pasadena, and his colleagues investigated two continent-size blobs of rock in the lowermost mantle, about 1,800 miles (2,900 kilometers) below Earth's surface. Previous research found seismic waves rippling through Earth's interior traveled unusually slowly through these anomalies. This suggested they were denser than and differed in composition from the surrounding mantle.

- The research team's computer simulations revealed a fraction of Theia's mantle could have made its way to proto-Earth's lower mantle. This rock from Theia would have been 2 to 3.5 percent denser than proto-Earth's mantle, based on what is known from the moon and previous models of Theia.



LATEST WEBB/HUBBLE IMAGES

WEBB CELEBRATED ITS FIRST YEAR OF SCIENCE OPERATIONS WITH THIS VIEW OF THE RHO OPHIUCHI CLOUD COMPLEX

HUBBLE CAPTURES SPIRAL GALAXY IC 5332 FACE-ON

Hubble captures barred spiral galaxy NGC 685

NASA's Webb captures an ethereal view of NGC 346

WHAT'S UP

STRATFORD ASTRONOMY GROUP

WHAT'S UP FOR NOVEMBER

This is a month of "Almost for us"

<< October | November 2023 | December >>

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31	1	2	3	4
			Waning gibbous Visible: 85% ↓ Age: 18.56 days	Waning gibbous Visible: 77% ↓ Age: 19.52 days	Waning gibbous Visible: 68% ↓ Age: 20.45 days	Last quarter Visible: 59% ↓ Age: 21.37 days
5	6	7	8	9	10	11
Last quarter **Visible: 49% ↓** **Age: 22.26 days**	Last quarter Visible: 40% ↓ Age: 23.15 days	Waning crescent Visible: 31% ↓ Age: 24.04 days	Waning crescent Visible: 23% ↓ Age: 24.93 days	Waning crescent Visible: 15% ↓ Age: 25.83 days	Waning crescent Visible: 9% ↓ Age: 26.75 days	Waning crescent Visible: 4% ↓ Age: 27.69 days
12	13	14	15	16	17	18
New Visible: 1% ↓ Age: 28.65 days	**New** **Visible: 1% ↑** **Age: 0.10 days**	New Visible: 2% ↑ Age: 1.11 days	Waxing crescent Visible: 6% ↑ Age: 2.13 days	Waxing crescent Visible: 11% ↑ Age: 3.17 days	Waxing crescent Visible: 19% ↑ Age: 4.22 days	Waxing crescent Visible: 29% ↑ Age: 5.29 days
19	20	21	22	23	24	25
First quarter Visible: 40% ↑ Age: 6.35 days	**First quarter** **Visible: 51% ↑** **Age: 7.43 days**	First quarter Visible: 62% ↑ Age: 8.50 days	Waxing gibbous Visible: 73% ↑ Age: 9.58 days	Waxing gibbous Visible: 83% ↑ Age: 10.66 days	Waxing gibbous Visible: 90% ↑ Age: 11.74 days	Waxing gibbous Visible: 96% ↑ Age: 12.81 days
26	27	28	29	30	1	2
Full moon Visible: 100% ↑ Age: 13.86 days	**Full moon** **Visible: 100%** **Age: 14.90 days**	Full moon Visible: 99% ↓ Age: 15.91 days	Waning gibbous Visible: 95% ↓ Age: 16.89 days	Waning gibbous Visible: 90% ↓ Age: 17.85 days		

HEY, THERE BE A MOON OVERHEAD

MOON PHASES FOR THE MONTH OF NOVEMBER

« November 2023 »

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 Lunar occultation of Beta Tauri Jupiter at perigee	2	3 Jupiter at opposition	4 Saturn ends retrograde motion
5 Moon at Last Quarter Asteroid 18 Melpomene at opposition	6 Mercury at aphelion The Moon at apogee	7	8	9 Conjunction of the Moon and Venus Close approach of the Moon and Venus Lunar occultation of Venus	10 Comet C/2023 H2 (Lemmon) passes perigee Comet C/2023 H2 (Lemmon) reaches peak brightness	11
12 Northern Taurid meteor shower 2023	13 New Moon Uranus at opposition	14 Conjunction of the Moon and Mercury The Moon at perihelion	15	16	17	18 Mars at solar conjunction Leonid meteor shower 2023 The Pleiades cluster is well placed
19	20 Moon at First Quarter Conjunction of the Moon and Saturn Close approach of the Moon and Saturn	21 1 Ceres at solar conjunction The Moon at perigee	22 α-Monocerotid meteor shower 2023	23	24	25 Close approach of the Moon and Jupiter Conjunction of the Moon and Jupiter The Moon at aphelion
26 Close approach of the Moon and M45	27 Full Moon	28 Venus at perihelion Lunar occultation of Beta Tauri November Orionid meteor shower 2023 The Hyades cluster is well placed	29	30		

NOVEMBER 9 – CONJUNCTION OF THE MOON AND VENUS

THE SKY ON 9 NOVEMBER 2023

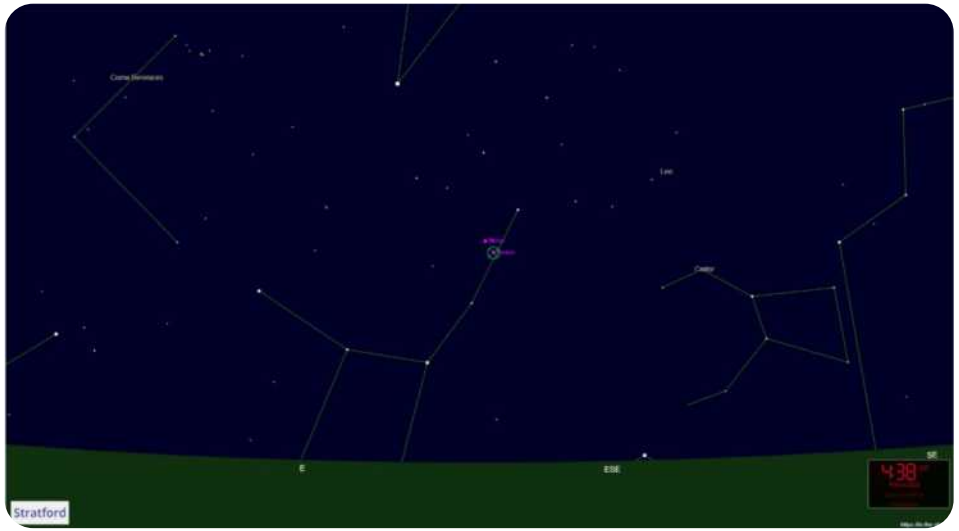
Sunrise 07:06
Sunset 17:05
Twilight ends 18:43
Twilight begins 05:28

Waning Crescent
11%
26 days old

Planets

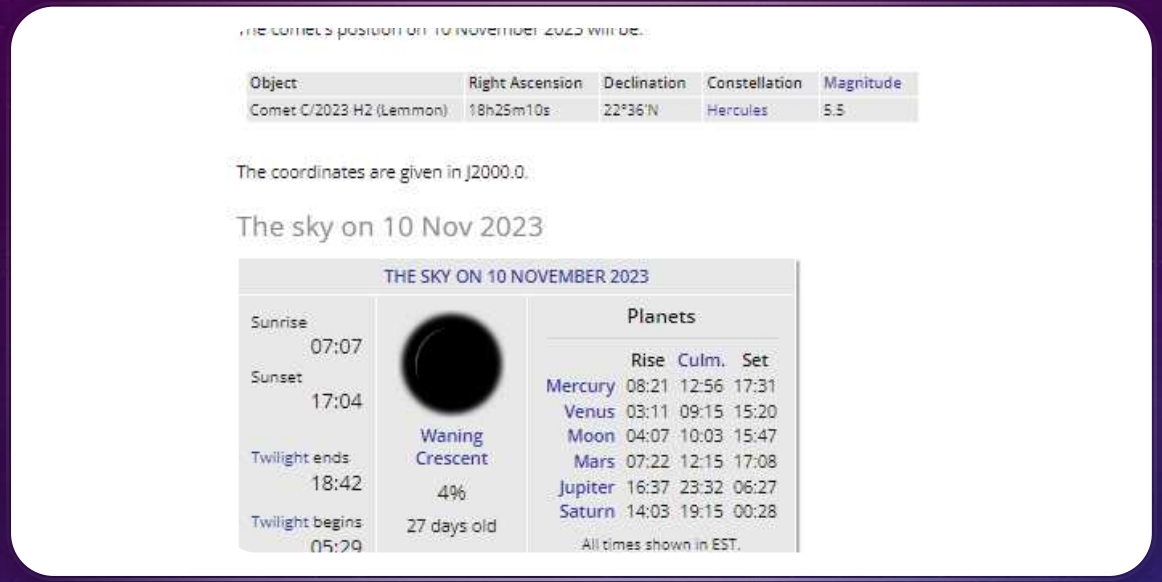
	Rise	Culm.	Set
Mercury	08:16	12:54	17:31
Venus	03:09	09:15	15:21
Moon	03:03	09:22	15:30
Mars	07:22	12:16	17:10
Jupiter	16:42	23:36	06:31
Saturn	14:06	19:19	00:32

All times shown in EST.



- The Moon and Venus will share the same right ascension, with the Moon passing 1°00' to the north of Venus. The Moon will be 26 days old.
- At around the same time, the two objects will also make a close approach, technically called an appulse.
- From Stratford , the pair will be visible from soon after it rises, at 03:08, until soon before it sets at 15:20.
- The Moon will be at mag -10.6, and Venus at mag -4.3, both in the constellation Virgo.
- 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.

NOVEMBER 10– COMET C/2023 H2 (LEMMON) REACHES PEAK BRIGHTNESS



The comet's position on 10 November 2023 will be:

Object	Right Ascension	Declination	Constellation	Magnitude
Comet C/2023 H2 (Lemmon)	18h25m10s	22°36'N	Hercules	5.5

The coordinates are given in J2000.0.

The sky on 10 Nov 2023

THE SKY ON 10 NOVEMBER 2023

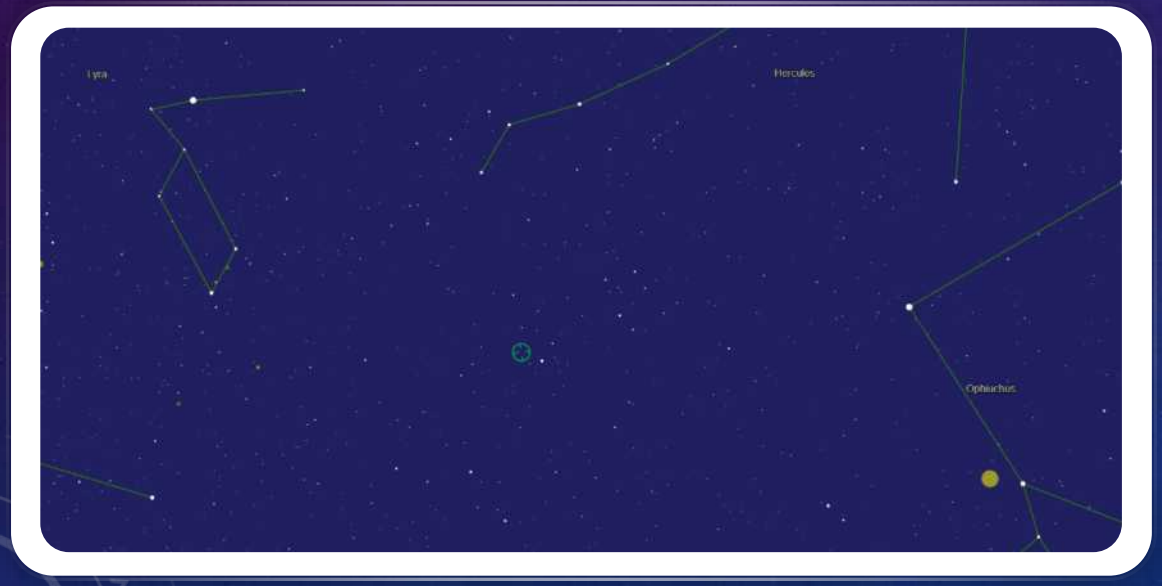
Sunrise 07:07
Sunset 17:04
Twilight ends 18:42
Twilight begins 05:29

Waning Crescent
4%
27 days old

Planets

	Rise	Culm.	Set
Mercury	08:21	12:56	17:31
Venus	03:11	09:15	15:20
Moon	04:07	10:03	15:47
Mars	07:22	12:15	17:08
Jupiter	16:37	23:32	06:27
Saturn	14:03	19:15	00:28

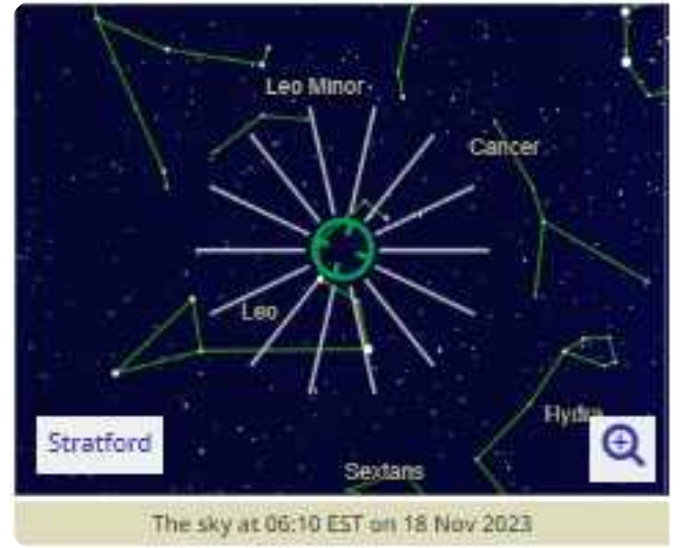
All times shown in EST.



- Comet C/2023 H2 (Lemmon) is forecast to reach the brightest point in its 2023 apparition on 10 November. At that time, it will lie at a distance of 0.92 AU from the Sun, and at a distance of 0.19 AU from the Earth.
- From Stratford on 10 November it will become visible at around 18:14 (EST), 50° above your western horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 23:06.

NOVEMBER 18: LEONID METEOR SHOWER

- The Leonid meteor shower will be active from 6 November to 30 November, producing its peak rate of meteors around 18 November.
- Over this period, there will be a chance of seeing Leonid meteors whenever the shower's radiant point – in the constellation Leo – is above the horizon, with the number of visible meteors increasing the higher the radiant point is in the sky.
- Seen from Stratford , the shower will not be visible before around 23:09 each night, when its radiant point rises above your eastern horizon. It will then remain active until dawn breaks around 06:47.
- The radiant point culminates (is highest in the sky) after dawn – at around 07:00 EST – and so the shower is likely producing its best displays shortly before dawn, when its radiant point is highest.
- At this time, the Earth's rotation turns Stratford to face optimally towards the direction of the incoming meteors, maximizing the number that rain vertically downwards, producing short trails close to the radiant point. At other times, there will be fewer meteors burning up over Stratford, but those that do will tend to enter the atmosphere at an oblique angle, producing long-lived meteors that may traverse a wide area of the sky before completely burning up.
- The shower is expected to reach peak activity at around 01:00 EST on 18 November 2023.



THE SKY ON 18 NOVEMBER 2023

Sunrise	07:18
Sunset	16:56
Twilight ends	18:36
Twilight begins	05:38

Waxing Crescent
33%
5 days old

Planets

	Rise	Culm.	Set
Mercury	08:52	13:15	17:37
Venus	03:25	09:17	15:10
Moon	12:42	17:11	21:47
Mars	07:20	12:06	16:53
Jupiter	16:03	22:56	05:50
Saturn	13:31	18:44	23:58

All times shown in EST.

NOVEMBER 20 CLOSE APPROACH OF THE MOON AND SATURN

- The Moon and Saturn will make a close approach, passing within 2°29' of each other. The Moon will be 7 days old.
- From Stratford , the pair will be visible from soon after it rises, at 13:24, until soon before it sets at 23:50.
- The Moon will be at mag -12.1; and Saturn will be at mag 0.6. Both objects will lie in the constellation Aquarius.
- They 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.
- At around the same time, the pair will also share the same right ascension – called a conjunction.

NOVEMBER 26 – CLOSE APPROACH OF THE MOON AND M45 (PLEIADES)

- The Moon and M45 will make a close approach, passing within 1°00' of each other. The Moon will be 14 days old.
- From Stratford , the pair will be visible from soon after it rises, at 16:04, until soon before it sets at 07:31.
- The Moon will be at mag -12.7; and M45 will be at mag 1.3. Both objects will lie in the constellation Taurus.
- They 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.

SHOW AND TELL

COSMOLOGY TALK