

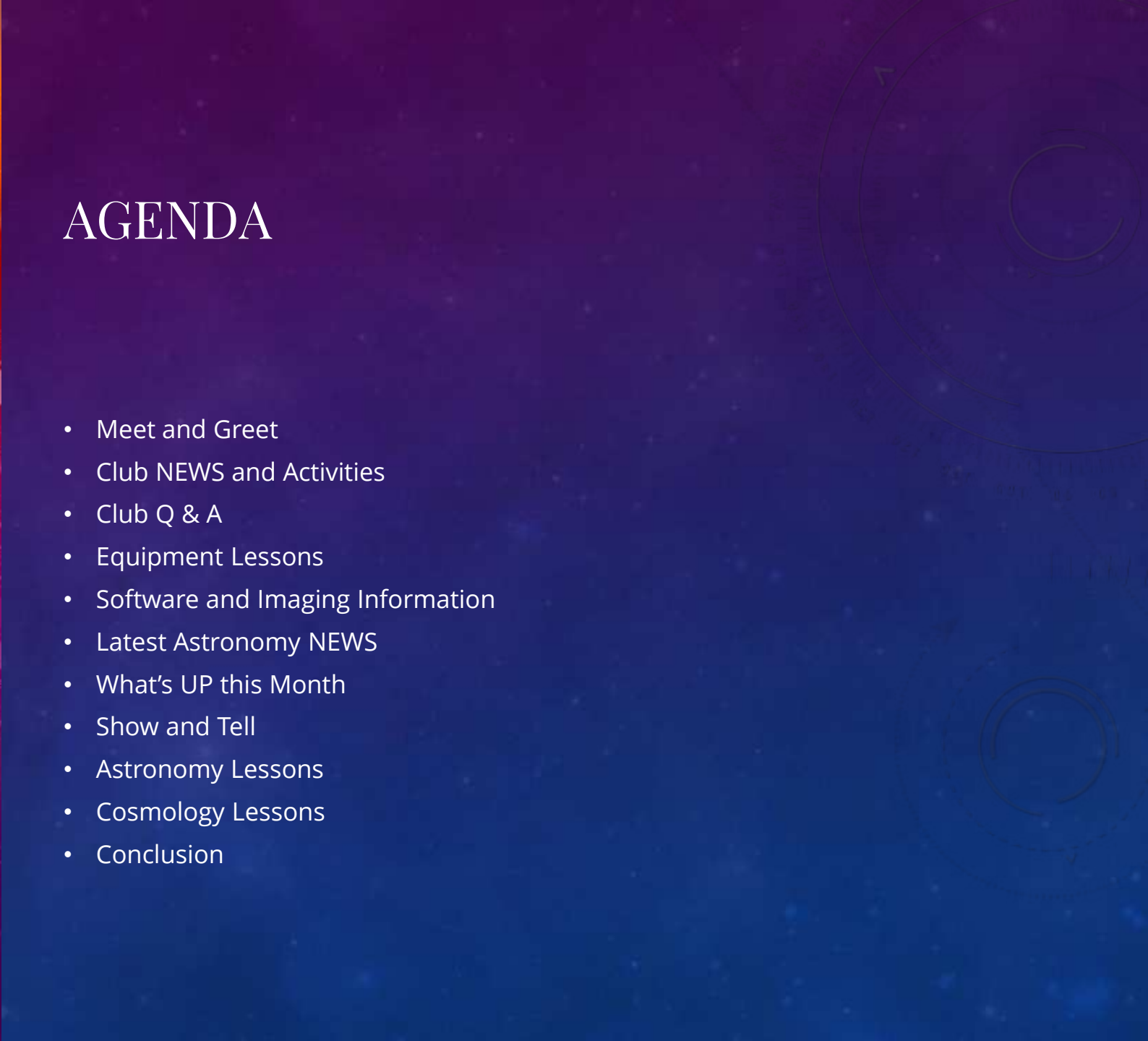
# STRATFORD ASTRONOMY GROUP

FEBRUARY 6<sup>TH</sup>, 2024





# 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  
13:



Paul Bartlett  
Michael Burns  
Doug Fyfe  
Patrick Hayes  
Alex Huddleston  
Derek Huddleston  
Wolfgang Keller  
Jim Nafziger  
David Orr  
Jamie Page  
Ken Roberts  
Peter Tenits  
Tim Pauly

## CLUB NEWS AND ACTIVITIES

Group Funds

**Total = \$1519.42**

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

[timannemariepauli@gmail.com](mailto: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](mailto:1948paul.bartlett@gmail.com)

519-274-2010

**New Equipment Donation: Tim**

# UPCOMING MEETINGS

## NEXT MEETING DATES

Date	Start	End	Facility and Spaces
<del>September 12, 2023</del>	<del>7:00 PM</del>	<del>9:00 PM</del>	<del>St. Michael's CSS, Room 104</del>
<del>October 3, 2023</del>	<del>7:00 PM</del>	<del>9:00 PM</del>	<del>St. Michael's CSS, Room 104</del>
<del>November 7, 2023</del>	<del>7:00 PM</del>	<del>9:00 PM</del>	<del>St. Michael's CSS, Room 104</del>
<del>December 12, 2023</del>	<del>7:00 PM</del>	<del>9:00 PM</del>	<del>St. Michael's CSS, Room 104</del>
<del>January 9, 2024</del>	<del>7:00 PM</del>	<del>9:00 PM</del>	<del>St. Michael's CSS, Room 104</del>
<del>February 6, 2024</del>	<del>7:00 PM</del>	<del>9:00 PM</del>	<del>St. Michael's CSS, Room 104</del>
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.
  
- **Post Christmas Get together:** Tim





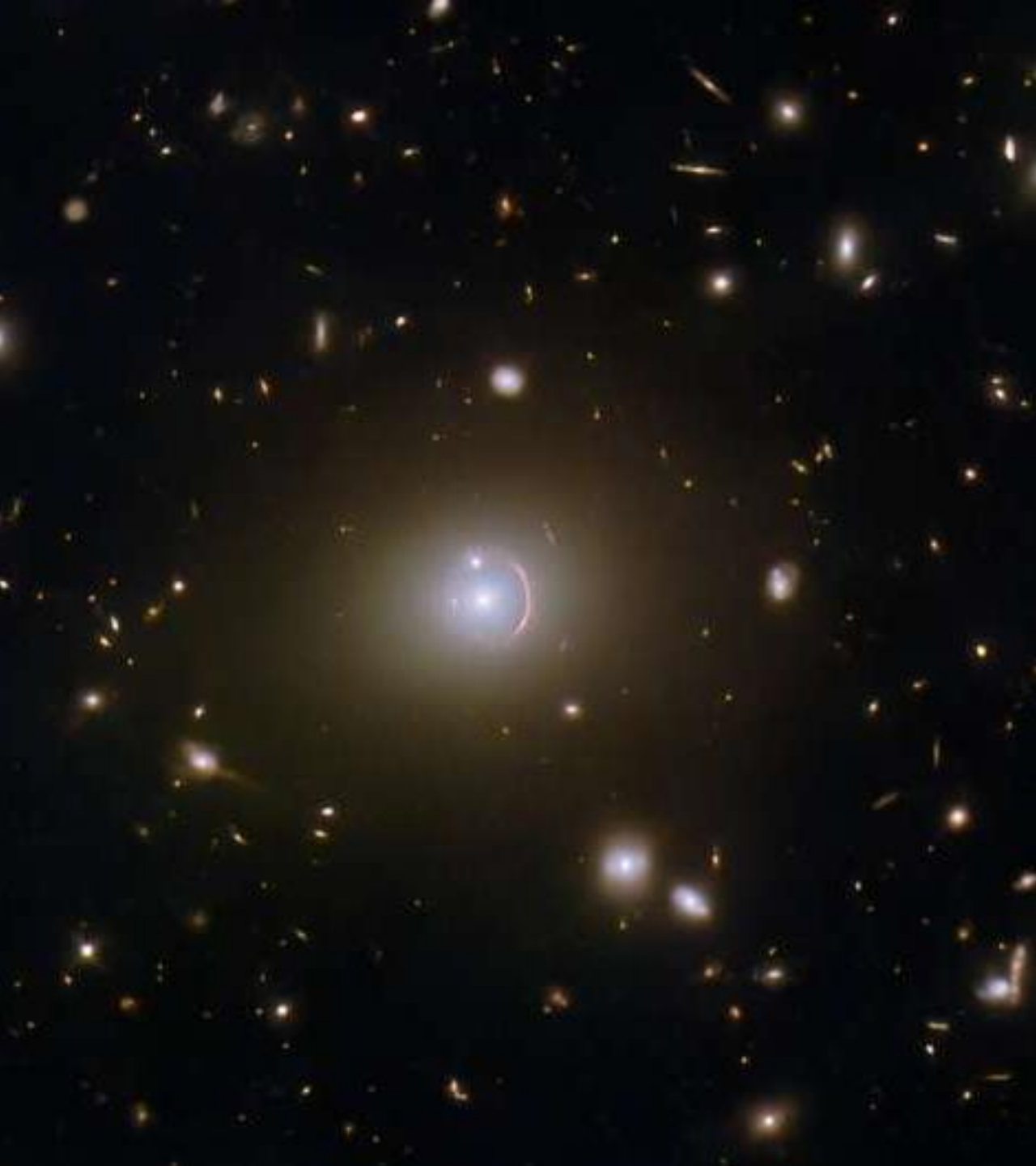
CLUB Q & A



LATEST ASTRONOMY NEWS

JANUARY





# JANUARY 11 – ANOTHER EXAMPLE OF A FANTASTIC EINSTEIN RING

- The most evocative astronomy images take us across space and time to stars and galaxies billions of light-years away. Nestled at the center of this one, taken by the Hubble Space Telescope, is a collection of three galaxies. They're not all that close together, although they appear to be in this image. What's fascinating about this image is that it's a fine example of an Einstein gravitational ring—and its discovery was enabled by members of the public.
- Let's examine this image in more detail. Start with the central point source of light. It's a foreground galaxy called SDSS J020941.27+001558.4 that lies nearly three billion light-years away. It's likely home to millions or billions of stars, planets, nebulae, and other objects. There's another galaxy, called SDSS J020941.23+001600.7, that appears just above the central one—and it, too, is home to millions of stars.
- Both of these galaxies look like they're surrounded by a reddish ring of light. Believe it or not, that's also a galaxy. But what we see is its distorted image. It's very distant and we see it as it was when the universe was only 2.6 billion years old.

# JAN 15TH: RESEARCH SHEDS NEW LIGHT ON MOON ROCK FORMATION SOLVING MAJOR PUZZLE IN LUNAR GEOLOGY

- New research has cracked a vital process in the creation of a unique rock type from the moon. The discovery explains its signature composition and very presence on the lunar surface at all, unraveling a mystery that has long eluded scientists.

- The study, published today in *Nature Geoscience*, reveals a key step in the genesis of these distinctive magmas. A combination of high-temperature laboratory experiments using molten rocks and sophisticated isotopic analyses of lunar samples identify a critical reaction that controls their composition.

- This reaction took place in the deep lunar interior some three and a half billion years ago, involving the exchange of the element iron (Fe) in the magma with the element magnesium (Mg) in the surrounding rocks, modifying the chemical and physical properties of the melt.



## JAN 17TH: CITIZEN SCIENTISTS NEEDED TO DISCOVER ELUSIVE BLACK HOLES



- Could you help scientists uncover the mysterious world of invisible black holes? Become a Black Hole Hunter and you'll be taking part in scientific research that has the potential to reveal more about one of space's most intriguing aspects.

- By volunteering to take part in this online citizen science project, you'll be assisting astrophysicists Dr. Matt Middleton and Adam McMaster from the University of Southampton, and Dr. Hugh Dickinson from the Open University, with their research into elusive black holes.

- Dr. Hugh Dickinson, of The Open University, said, "We're really excited to see the launch of this new Black Hole Hunter project. Using the amazing data from the TESS satellite means that there's a good chance that one or more citizen scientists will be able to spot one of the elusive gravitational lensing events that we're looking for."

- To get involved go to [Black Hole Hunters: https://www.zooniverse.org/projects/cobalt-lensing/black-hole-hunters](https://www.zooniverse.org/projects/cobalt-lensing/black-hole-hunters)

# JAN 17TH: STUDY DELIVERS DETAILED PHOTOS OF GALAXIES' INNER STRUCTURES

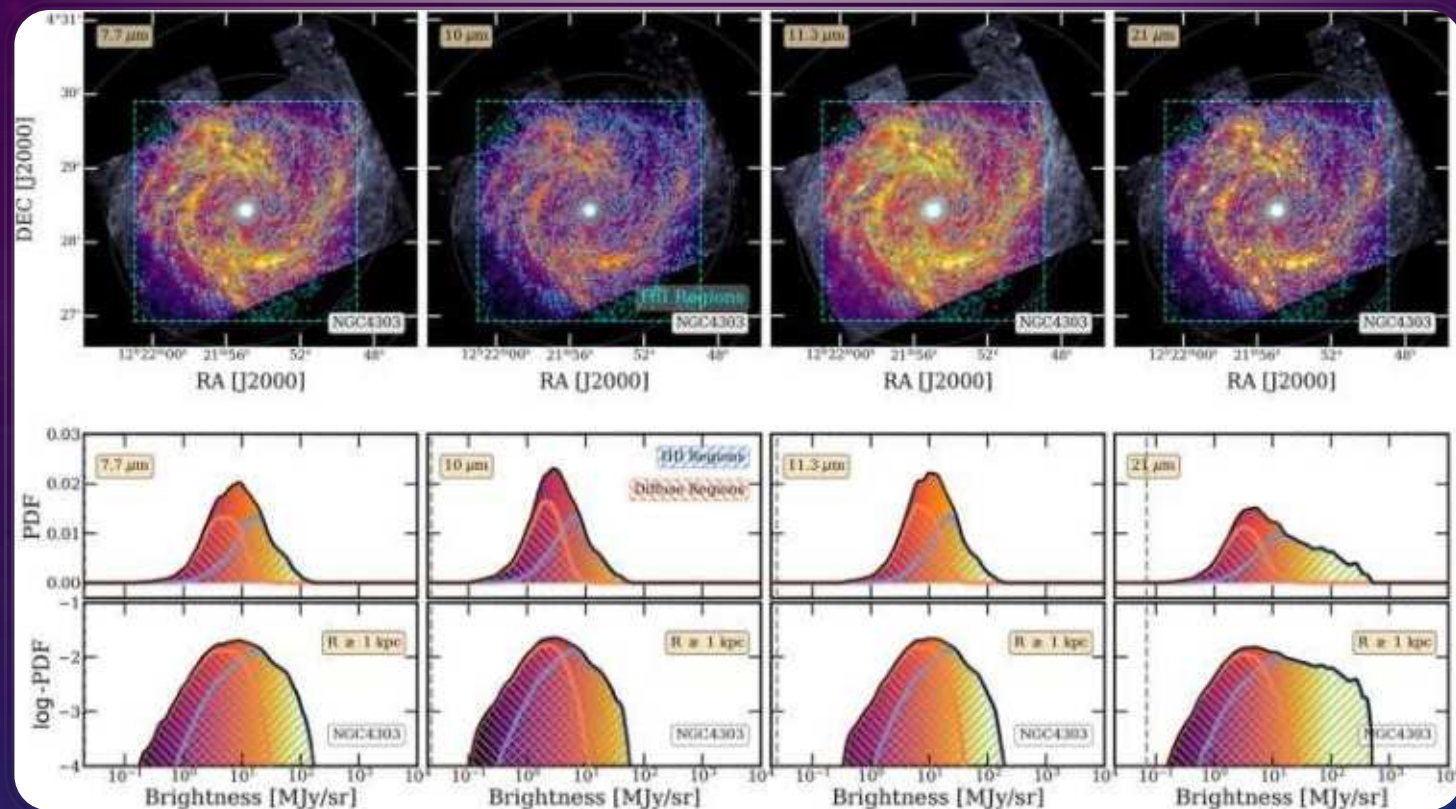
•For the first time, high-resolution images captured by the James Webb Space Telescope are offering powerful insights into the complex dust patterns of nearby star-forming galaxies.

•One of the most fundamental building blocks in the universe, cosmic dust is a vital ingredient to the growth of a galaxy. When scattered, these tiny grains help plant the seeds for the creation of stars and planets alike—yet only recently, through rapid leaps in technology, have astronomers begun to shine a brighter light on their intricate physics.

•The study, published recently in *The Astronomical Journal*, suggests that because the patterns of infrared light emitted by these observed galaxies seem to be uniform, the density of the gas inside galactic disks follows a specific pattern even when shaped by very different galactic environments.

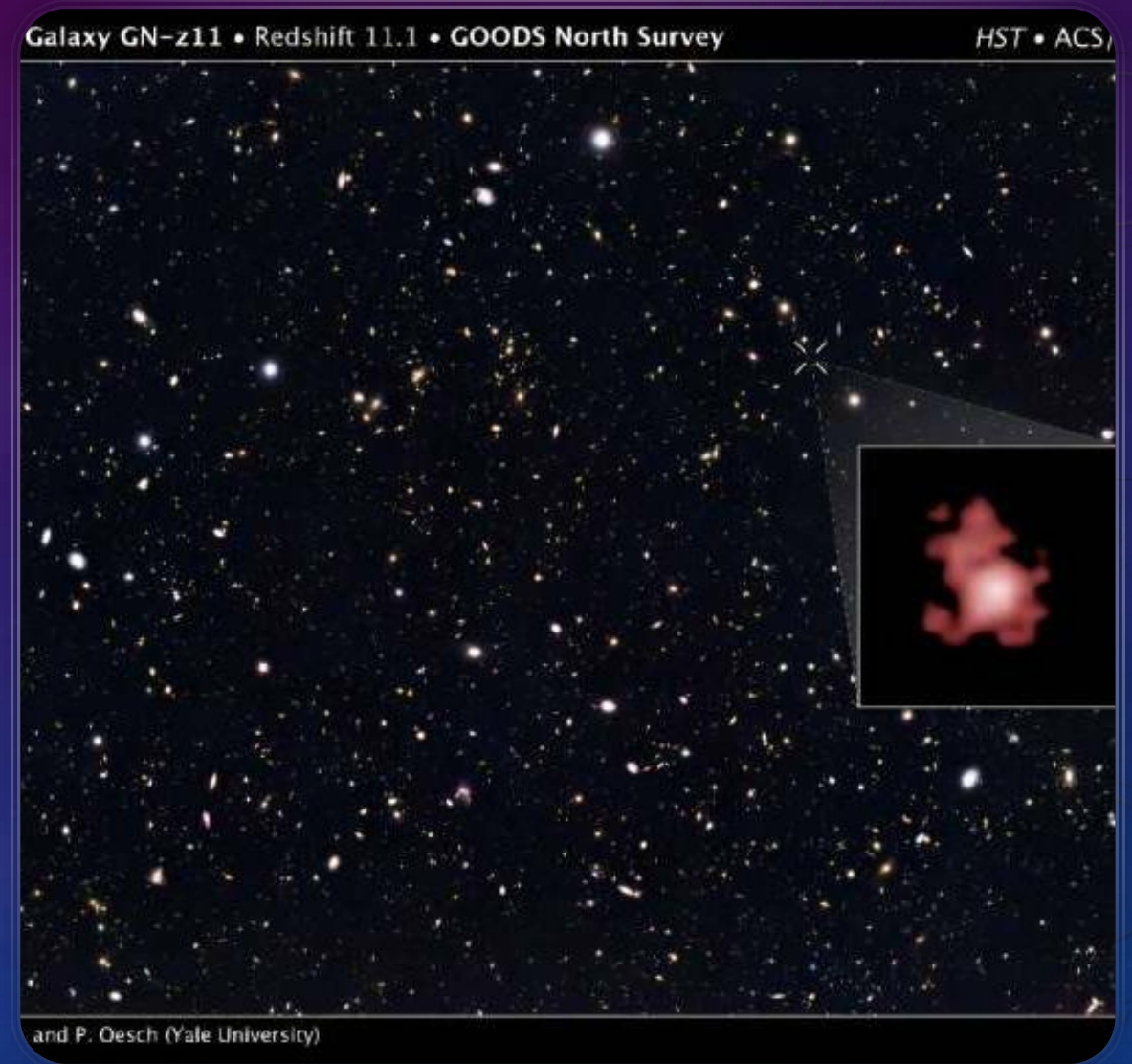
•"Because this dust traces out the fuel for future generations of stars," Pathak said, "the similarity we see among galaxies hints that some aspects of star and planet formation may be universal across galaxies."

•Webb showed us that the early Universe was full of fully-formed galaxies similar to the ones we see today. The widely-held belief is that the early Universe was too chaotic in its early years, and frequent mergers would've disrupted galaxies' graceful shapes.



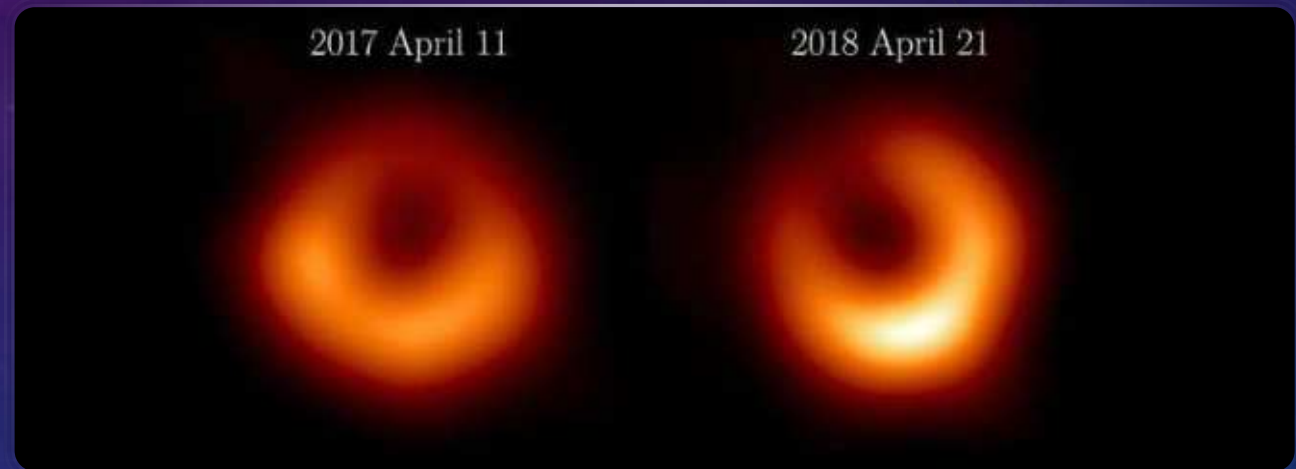
# JAN 17<sup>TH</sup>: ASTRONOMERS DETECT OLDEST BLACK HOLE EVER OBSERVED

- Researchers have discovered the oldest black hole ever observed, dating from the dawn of the universe, and found that it is 'eating' its host galaxy to death.
- The international team, led by the University of Cambridge, used the NASA/ESA/CSA James Webb Space Telescope (JWST) to detect the black hole, which dates from 400 million years after the Big Bang, more than 13 billion years ago. The results, which lead author Professor Roberto Maiolino says are "a giant leap forward," are reported in the journal *Nature*.
- That this surprisingly massive black hole—a few million times the mass of our sun—even exists so early in the universe challenges our assumptions about how black holes form and grow. Astronomers believe that the supermassive black holes found at the center of galaxies like the Milky Way grew to their current size over billions of years. But the size of this newly-discovered black hole suggests that they might form in other ways: they might be 'born big' or they can eat matter at a rate that's five times higher than had been thought possible.



# JAN 18<sup>TH</sup>: BRIGHTNESS PEAK OF M87 SUPERMASSIVE BLACK HOLE SHIFTS 30 DEGREES IN ONE YEAR

- The brightness peak of the ring around M87's supermassive black hole has shifted 30 degrees counterclockwise in a year. This is shown by new images released by the Event Horizon Telescope consortium.
- The Event Horizon Telescope (EHT) Collaboration, with contribution by Dutch astronomers, has released new images of M87\*, the supermassive black hole at the center of the galaxy Messier 87, using data from observations taken in April 2018. With the participation of the newly commissioned Greenland Telescope and a dramatically improved recording rate across the array, the 2018 observations give us a view of the source independent from the first observations in 2017.
- The image of the black hole revealed a bright circular ring, brighter in the southern part of the ring. Further analysis of the data also revealed the structure of M87\* in polarized light, giving us greater insight into the geometry of the magnetic field and the nature of the plasma around the black hole.
- the ring size should stay pretty fixed, the emission from the turbulent, messy accretion disk around the black hole will cause the brightest part of the ring to wobble around a common center. The amount of wobble we see over time is something we can use to test our theories for the magnetic field and plasma environment around the black hole."





## FEB 1<sup>ST</sup>: SKYSCRAPER-SIZE ASTEROID WILL BUZZ EARTH ON FRIDAY, SAFELY PASSING WITHIN 2.7 MILLION KM



- An asteroid as big as a skyscraper will pass within 2.7 million km of Earth on Friday.
- Don't worry: There's no chance of it hitting us since it will pass seven times the distance from Earth to the moon.
- NASA's Center for Near Earth Object Studies estimates the space rock is between 690 feet and 1,575 feet (210 meters and 480 meters) across. That means the asteroid could be similar in size to New York City's Empire State Building or Chicago's Willis Tower.
- Discovered in 2008, the asteroid is designated as 2008 OS7. It won't be back our way again until 2032, but it will be a much more distant encounter, staying 45 million miles (72 million kilometers) away.
- The harmless flyby is one of several encounters this week. Three much smaller asteroids also will harmlessly buzz Earth on Friday, no more than tens of yards (meters) across, with another two on Saturday. On Sunday, an asteroid roughly half the size of 2008 OS7 will swing by, staying 4.5 million miles (7.3 million kilometers) away.



LATEST WEBB/HUBBLE  
IMAGES

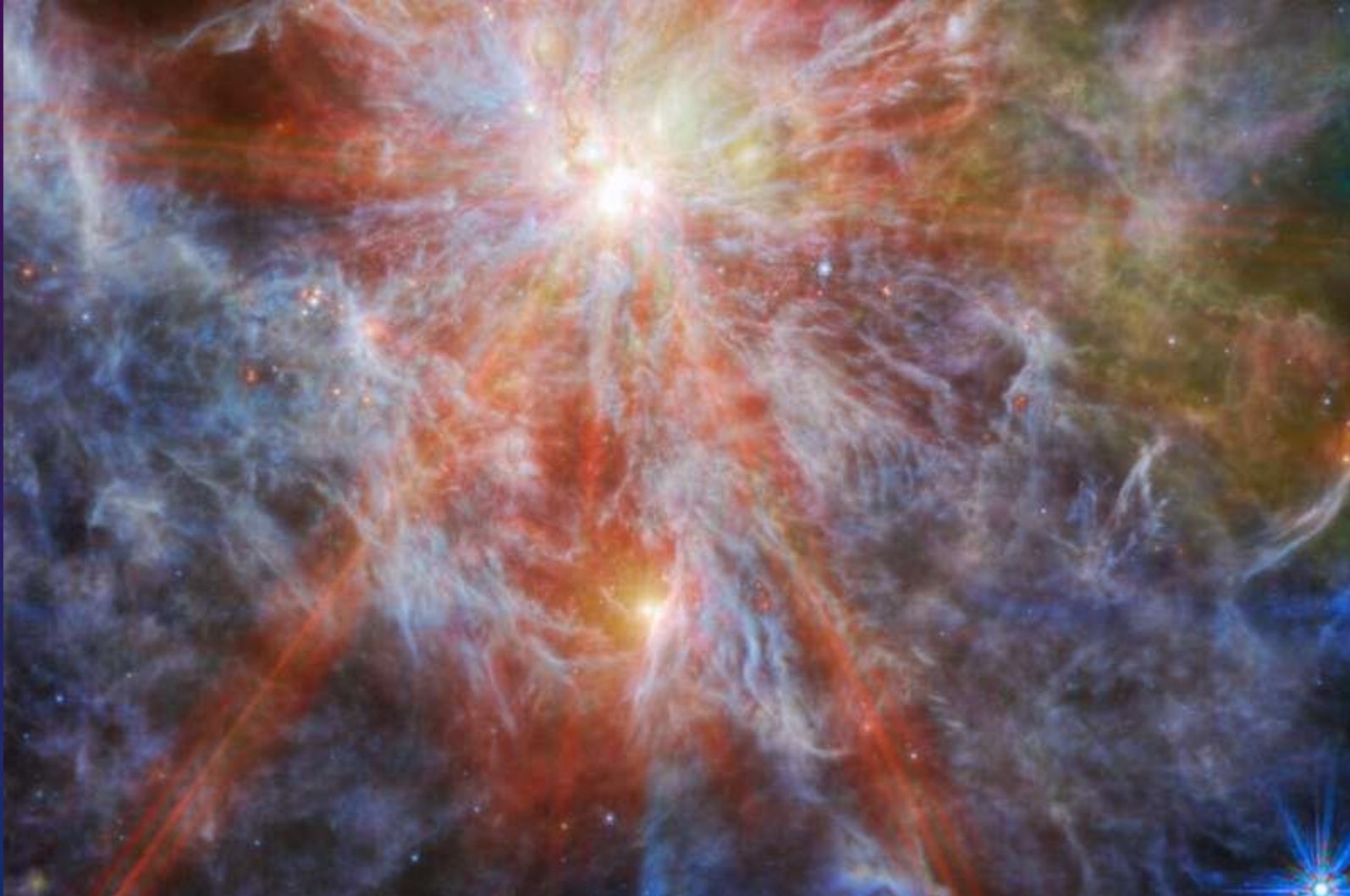


# Hubble captures a monster merger

Arp 122, a peculiar galaxy that in fact comprises two galaxies—NGC 6040, the tilted, warped spiral galaxy and LEDA 59642, the round, face-on spiral



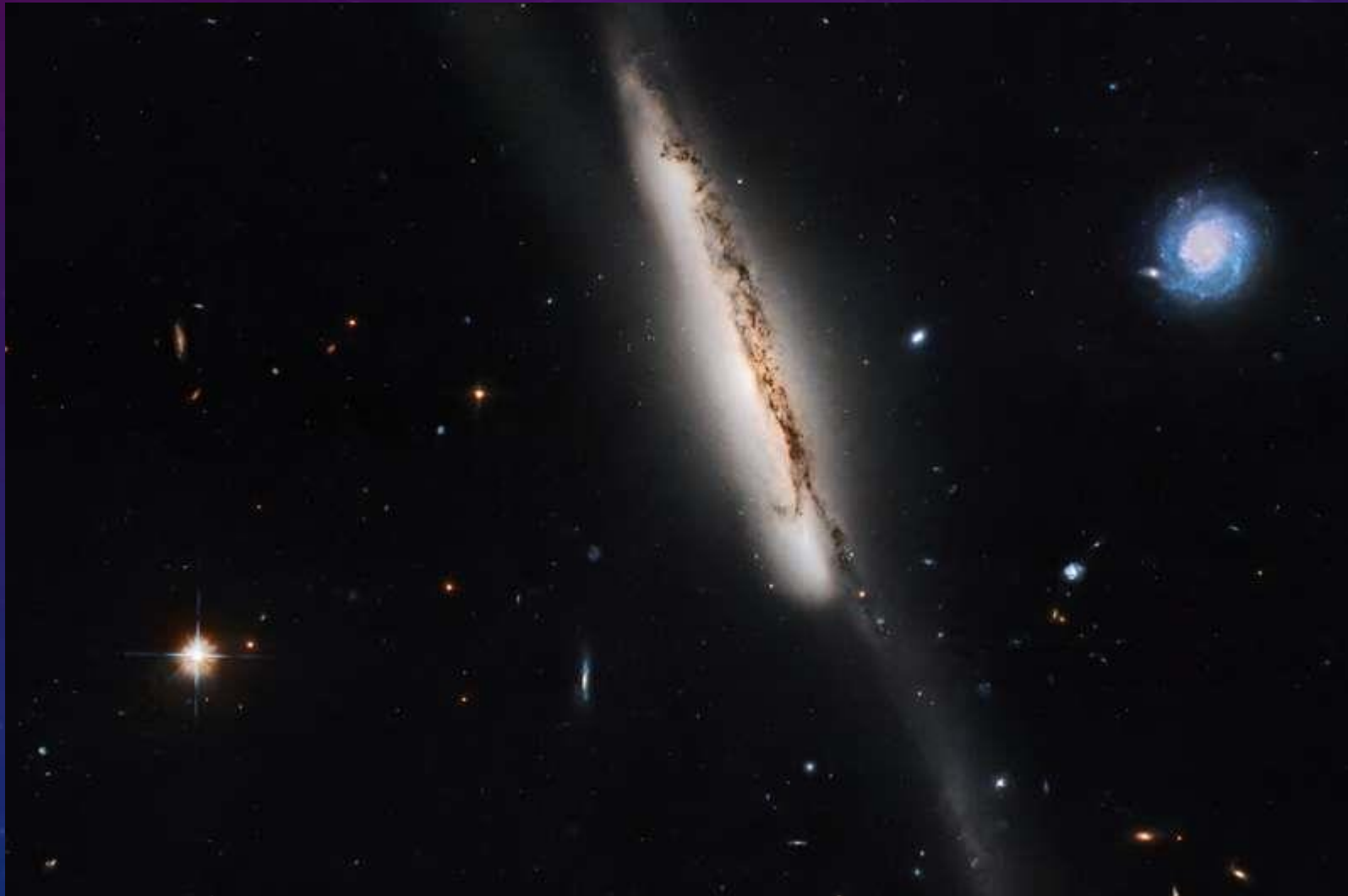
# James Webb Space Telescope features an H II region in the Large Magellanic Cloud (LMC)



# Hubble captures throng of spiral galaxies



# Hubble captures Arp 295





NGC 4303



NGC 1586



NGC 5068



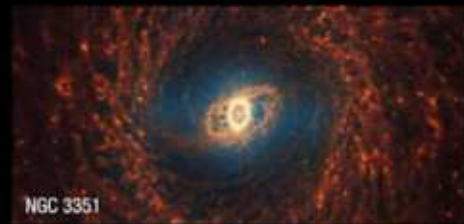
NGC 1512



NGC 1365



NGC 4535



NGC 3351



IC 5332



NGC 4321



NGC 4254



NGC 0628



NGC 2835



NGC 1300



NGC 7496



NGC 1433



NGC 3627



NGC 1385



NGC 1672



NGC 1087



# WHAT'S UP

## STRATFORD ASTRONOMY GROUP

### WHAT'S UP FOR FEBRUARY





<< January

February 2024

March >>

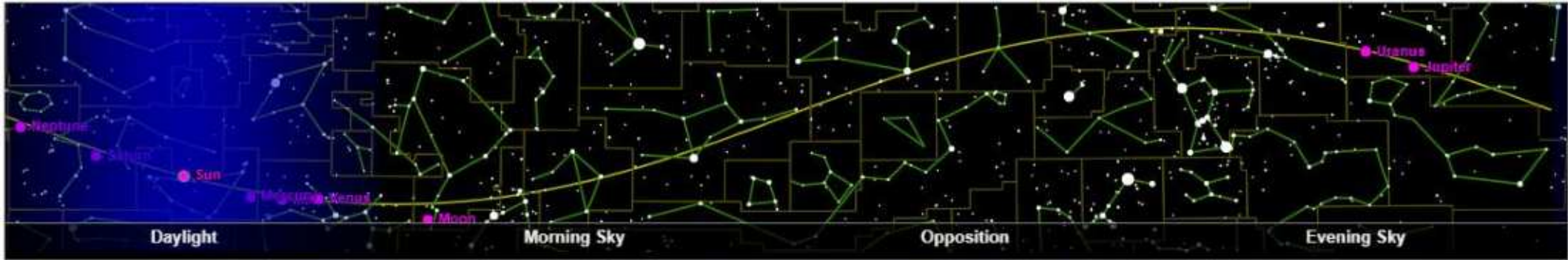
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28 	29 	30 	31 	1  Last quarter Visible: 65% ↓ Age: 20.81 days	2  Last quarter Visible: 55% ↓ Age: 21.72 days	3  Last quarter Visible: 45% ↓ Age: 22.66 days
4  Last quarter Visible: 35% ↓ Age: 23.62 days	5  Waning crescent Visible: 25% ↓ Age: 24.62 days	6  Waning crescent Visible: 17% ↓ Age: 25.65 days	7  Waning crescent Visible: 9% ↓ Age: 26.73 days	8  Waning crescent Visible: 4% ↓ Age: 27.84 days	9  New Visible: 1% ↓ Age: 28.98 days	10  New Visible: 1% ↑ Age: 0.61 days
11  Waxing crescent Visible: 4% ↑ Age: 1.77 days	12  Waxing crescent Visible: 10% ↑ Age: 2.93 days	13  Waxing crescent Visible: 18% ↑ Age: 4.06 days	14  Waxing crescent Visible: 28% ↑ Age: 5.15 days	15  First quarter Visible: 38% ↑ Age: 6.22 days	16  First quarter Visible: 49% ↑ Age: 7.25 days	17  First quarter Visible: 60% ↑ Age: 8.25 days
18  Waxing gibbous Visible: 70% ↑ Age: 9.23 days	19  Waxing gibbous Visible: 79% ↑ Age: 10.18 days	20  Waxing gibbous Visible: 86% ↑ Age: 11.11 days	21  Waxing gibbous Visible: 92% ↑ Age: 12.03 days	22  Waxing gibbous Visible: 97% ↑ Age: 12.94 days	23  Full moon Visible: 100% ↑ Age: 13.84 days	24  Full moon Visible: 100% Age: 14.74 days
25  Full moon Visible: 100% ↓ Age: 15.63 days	26  Waning gibbous Visible: 97% ↓ Age: 16.52 days	27  Waning gibbous Visible: 93% ↓ Age: 17.41 days	28  Waning gibbous Visible: 87% ↓ Age: 18.31 days	29  Waning gibbous Visible: 80% ↓ Age: 19.21 days	1 	2 

# HEY, THERE BE A MOON OVERHEAD

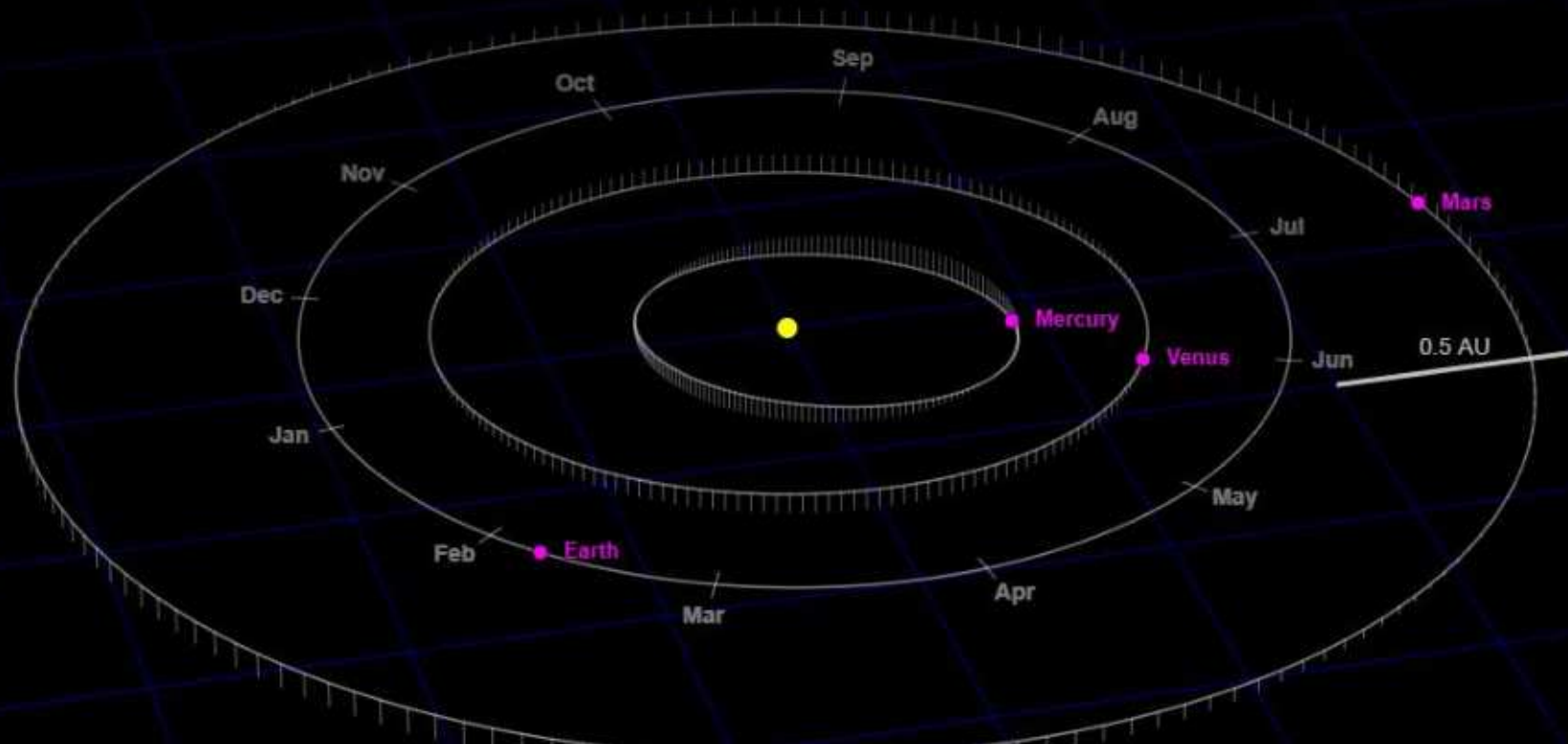
MOON PHASES FOR THE  
MONTH OF FEBRUARY

## « February 2024 »

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				<b>1</b> <a href="#">The cluster IC 2395 is well placed</a>	<b>2</b> <a href="#">Mercury at aphelion</a> <a href="#">Moon at Last Quarter</a>	<b>3</b>
<b>4</b> <a href="#">Lunar occultation of Antares</a>	<b>5</b> <a href="#">Conjunction of Mercury and Pluto</a>	<b>6</b>	<b>7</b> <a href="#">Conjunction of the Moon and Venus</a>	<b>8</b> <a href="#">Conjunction of the Moon and Mars</a> <a href="#">The Moon at perihelion</a> <a href="#">α-Centaurid meteor shower 2024</a> <a href="#">Conjunction of the Moon and Mercury</a> <a href="#">NGC 2808 is well placed</a>	<b>9</b> <a href="#">New Moon</a>	<b>10</b> <a href="#">The Moon at perigee</a> <a href="#">Conjunction of the Moon and Saturn</a>
<b>11</b>	<b>12</b> <a href="#">Lunar occultation of Neptune</a>	<b>13</b>	<b>14</b> <a href="#">Comet C/2021 S3 (PANSTARRS) passes perihelion</a>	<b>15</b> <a href="#">Close approach of the Moon and Jupiter</a> <a href="#">Conjunction of Mars and Pluto</a> <a href="#">Conjunction of the Moon and Jupiter</a>	<b>16</b> <a href="#">Moon at First Quarter</a> <a href="#">Close approach of the Moon and M45</a>	<b>17</b> <a href="#">Conjunction of Venus and Pluto</a>
<b>18</b> <a href="#">Lunar occultation of Beta Tauri</a>	<b>19</b> <a href="#">Messier 81 is well placed</a>	<b>20</b>	<b>21</b> <a href="#">The cluster NGC 3114 is well placed</a>	<b>22</b> <a href="#">Close approach of Venus and Mars</a> <a href="#">Conjunction of Venus and Mars</a>	<b>23</b>	<b>24</b> <a href="#">Full Moon</a>
<b>25</b> <a href="#">The Moon at apogee</a>	<b>26</b> <a href="#">The Moon at aphelion</a>	<b>27</b> <a href="#">The cluster IC 2581 is well placed</a>	<b>28</b> <a href="#">Mercury at superior solar conjunction</a> <a href="#">Saturn at solar conjunction</a>	<b>29</b>		



6 Feb 2024



## WED, 07 FEB 2024 AT 13:52 EST: CONJUNCTION OF THE MOON AND VENUS

- The Moon and Venus will share the same right ascension, with the Moon passing  $5^{\circ}25'$  to the south of Venus. The Moon will be 27 days old.

- From Stratford , the pair will be difficult to observe as they will appear no higher than  $9^{\circ}$  above the horizon. They will be visible in the dawn sky, rising at 06:00 (EST) – 1 hour and 31 minutes before the Sun – and reaching an altitude of  $9^{\circ}$  above the south-eastern horizon before fading from view as dawn breaks at around 07:12.

- The Moon will be at mag -9.9, and Venus at mag -4.0, both in the constellation Sagittarius.

- The pair will be too widely separated to fit within the field of view of a telescope or pair of binoculars, but will be visible to the naked eye.



THE SKY ON 7 FEBRUARY 2024																														
Sunrise	07:31	 Waning Crescent 4% 27 days old																												
Sunset	17:42																													
Twilight ends	19:19																													
Twilight begins	05:54																													
		<b>Planets</b>																												
		<table><thead><tr><th></th><th>Rise</th><th>Culm.</th><th>Set</th></tr></thead><tbody><tr><td>Mercury</td><td>07:00</td><td>11:39</td><td>16:18</td></tr><tr><td>Venus</td><td>06:00</td><td>10:35</td><td>15:09</td></tr><tr><td>Moon</td><td>06:15</td><td>10:25</td><td>14:40</td></tr><tr><td>Mars</td><td>06:30</td><td>11:04</td><td>15:39</td></tr><tr><td>Jupiter</td><td>10:42</td><td>17:36</td><td>00:30</td></tr><tr><td>Saturn</td><td>08:28</td><td>13:51</td><td>19:14</td></tr></tbody></table>		Rise	Culm.	Set	Mercury	07:00	11:39	16:18	Venus	06:00	10:35	15:09	Moon	06:15	10:25	14:40	Mars	06:30	11:04	15:39	Jupiter	10:42	17:36	00:30	Saturn	08:28	13:51	19:14
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Saturn	08:28	13:51	19:14																											
All times shown in EST.																														

THE SKY ON 15 FEBRUARY 2024

Sunrise	07:20	 <p>Waxing Crescent</p> <p>40%</p> <p>6 days old</p>	Planets			
Sunset	17:53		Rise	Culm.	Set	
Twilight ends	19:29		Mercury	07:08	12:01	16:53
Twilight begins	05:44		Venus	06:04	10:45	15:26
			Moon	10:12	17:40	01:22
		Mars	06:19	10:59	15:38	
		Jupiter	10:13	17:08	00:04	
		Saturn	07:58	13:23	18:47	

All times shown in EST.



## THU, 15 FEB 2024 AT 01:05 EST (06:05 UTC) CLOSE APPROACH OF THE MOON AND JUPITER

- The Moon and Jupiter will make a close approach, passing within  $2^{\circ}53'$  of each other. The Moon will be 6 days old.
- From Stratford , the pair will become visible at around 18:11 (EST),  $57^{\circ}$  above your south-western horizon, as dusk fades to darkness. They will then sink towards the horizon, setting at 00:04.
- The Moon will be at mag -11.6; and Jupiter will be at mag -2.3. Both objects will lie in the constellation Aries.
- 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.



FRI, 16 FEB 2024 AT 15:18 EST (20:18 UTC)  
 CLOSE APPROACH OF THE MOON AND M45


- The Moon and M45 will make a close approach, passing within a mere 30.9 arcminutes of each other. The Moon will be 7 days old.

- From Stratford , the pair will become visible at around 18:38 (EST), 70° above your southern horizon, as dusk fades to darkness. They will then sink towards the horizon, setting at 02:09.

- The Moon will be at mag -12.0; and M45 will be at mag 1.3. Both objects will lie in the constellation Taurus.

- 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.



THE SKY ON 16 FEBRUARY 2024			
Sunrise	07:19	 Waxing Gibbous  57% 7 days old	
Sunset	17:54		
Twilight ends	19:30		
Twilight begins	05:43		
<b>Planets</b>			
	Rise	Culm.	Set
Mercury	07:09	12:04	16:58
Venus	06:05	10:46	15:28
Moon	10:42	18:33	02:36
Mars	06:18	10:58	15:38
Jupiter	10:09	17:05	00:01
Saturn	07:55	13:19	18:44
All times shown in EST.			

# TOM KIMBER AND THE MOON



# SHOW AND TELL



# COSMOLOGY TALK

