

# STRATFORD ASTRONOMY GROUP

OCTOBER 3<sup>RD</sup>, 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**

Ken Roberts  
Mary Montizambert

# PREVIOUS MEETING REVIEW

Meeting  
attended by  
13:



Michael Burns  
Colleen Devine  
Patrick Hayes  
Wolfgang Keller  
Tim Pauli  
Peter Tinitis  
Richard Rosenthal  
Rena Spevack  
Tom Kimber  
David Orr  
Bob Greer  
Jamie Page  
Ken Roberts

## 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](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

# 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> |
| 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

- [Tim Museum Report](#)
  - [Our September 22 at the Museum](#)





Doug Fyfe from Scotland



# LATEST ASTRONOMY NEWS

SEPT

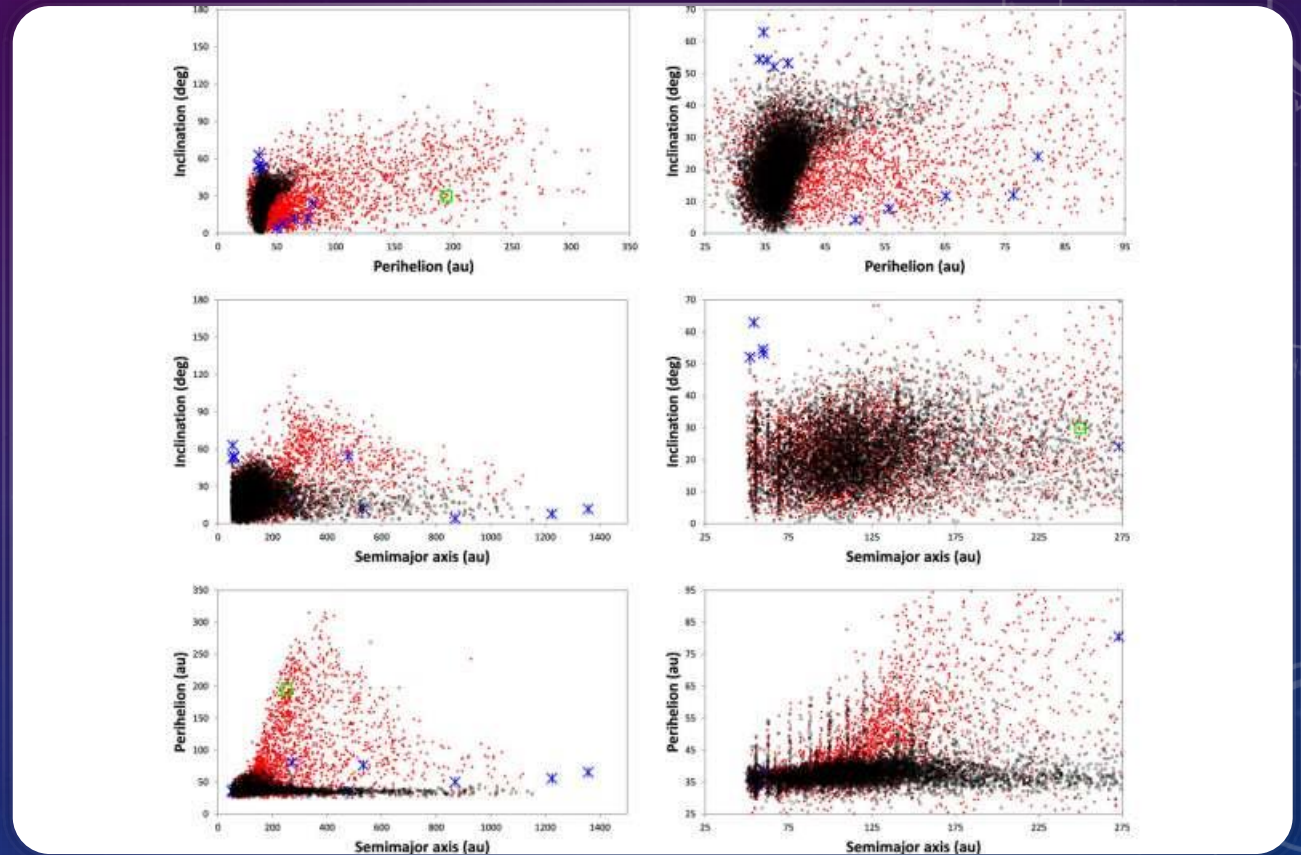


# SEPT 1<sup>ST</sup>: JAPANESE ASTROPHYSICISTS SUGGEST POSSIBILITY OF HIDDEN PLANET IN THE KUIPER BELT

- A pair of astrophysicists, one with [Kindai University](#), the other the National Astronomical Observatory of Japan, both in Japan, have found possible evidence of an Earth-like planet residing in the Kuiper Belt. In their paper published in *The Astronomical Journal*, [Patryk Sofia Lykawka](#) and [Takashi Ito](#) describe properties of the Kuiper Belt that they believe are consistent with the existence of a planet not much bigger than Earth.

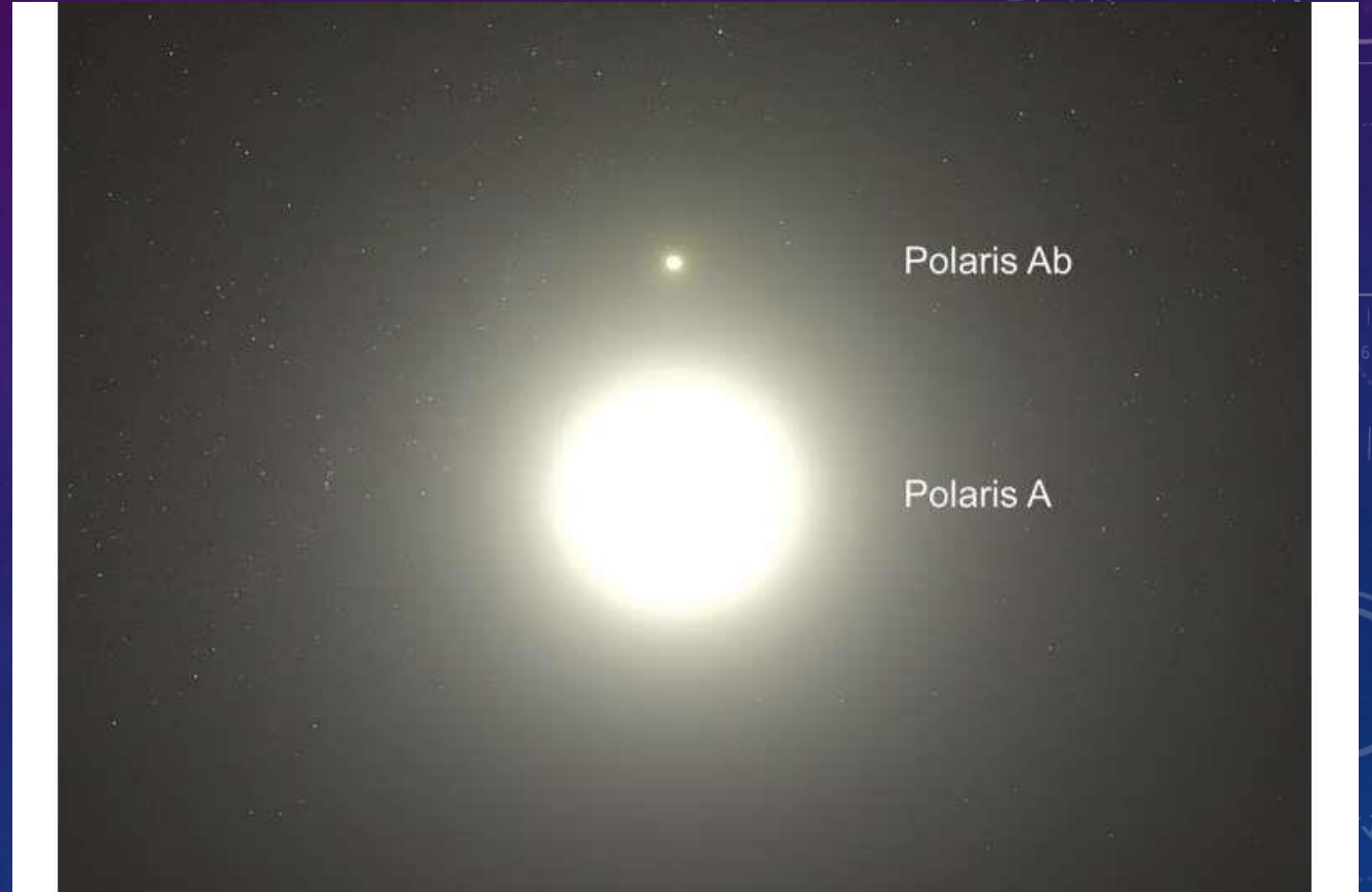
- Over the past decade, several studies have led credence to theories regarding the possible existence of a planet in the far outer edges of the solar system, which has come to be known theoretically as Planet Nine. In this new effort, the researchers suggest it is possible that there is a planet much closer—in the Kuiper Belt. In their work, the researchers found that some of the objects in the Kuiper Belt behave in a way that suggests that there is a small planet among them—one that is approximately 500 AU from the sun. For comparison, Neptune is approximately 30 AU from the sun

- The simulations also showed that such a planet, if it exists, would have a mass 1.5 to 3 times that of Earth, an inclination of approximately 30 degrees



## SEPT 11TH: POLARIS IS THE CLOSEST, BRIGHTEST CEPHEID VARIABLE. VERY RECENTLY, SOMETHING CHANGED

- When you look up in the night sky and find your way to the North Star, you are looking at Polaris. Further observations revealed that Polaris is a classic Cepheid variable, a stellar class that pulses regularly. Dr. Torres explained to Universe Today via email, this recently began to change, leading many astronomers to question what is driving Polaris' pulsations. "For more than 150 years and up until about 2010, the period had been getting longer by about four or five seconds each year," he said. "Modern observations have shown that this trend has now reversed, and the pulsation period is getting shorter. This is an unexpected change, showing that there is still much that we do not understand about Polaris and other stars like it."



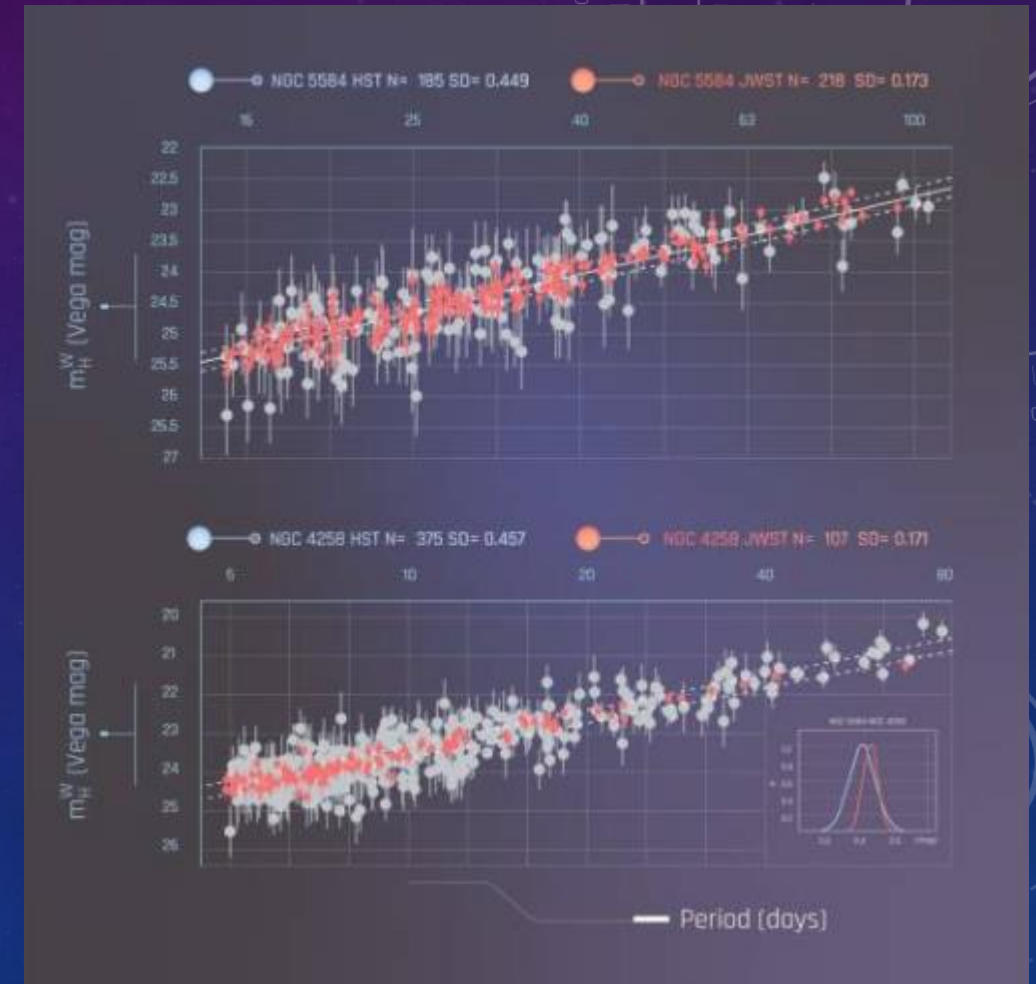
## SEPT 12TH: WEBB CONFIRMS ACCURACY OF UNIVERSE'S EXPANSION RATE, DEEPENS MYSTERY OF HUBBLE CONSTANT TENSION

The rate at which the universe is expanding, known as the [Hubble Constant](#), is one of the fundamental parameters for understanding the evolution and ultimate fate of the cosmos. However, a persistent difference called the "[Hubble Tension](#)" is seen between the value of the constant measured with a wide range of independent distance indicators and its value predicted from the big bang afterglow.

"A particular class of stars, Cepheid variables, has given us the most precise measurements of distance for over a century because these stars are extraordinarily bright: They are supergiant stars, a hundred thousand times the luminosity of the sun. What's more, they pulsate (that is, expand and contract in size) over a period of weeks that indicates their relative luminosity. The longer the period, the intrinsically brighter they are."

"What the results still do not explain is why the universe appears to be expanding so fast! We can predict the expansion rate of the universe by observing its baby picture, the cosmic microwave background, and then employing our best model of how it grows up over time to tell us how fast the universe should be expanding today."

"The fact that the present measure of the expansion rate significantly exceeds the prediction is a now decade-long problem called 'The Hubble Tension'. The most exciting possibility is that the Tension is a clue about something we are missing in our understanding of the cosmos."



SEPTEMBER 24<sup>TH</sup>: ASTEROID SAMPLE  
RETURNED TO EARTH BY NASA MAY REVEAL  
CLUES TO THE SOLAR SYSTEM'S ORIGINS

- On the morning of September 24, a capsule the size of a mini-fridge dropped from the skies over western Utah, carrying a first-of-its-kind package: about 250 grams of dirt and dust plucked from the surface of an asteroid. As a candy-striped parachute billowed open to slow its freefall, the capsule plummeted down to the sand, slightly ahead of schedule. The special delivery came courtesy of **OSIRIS-REx**, the first NASA mission to travel to an asteroid and return a sample of its contents to Earth. Launched in 2016, the mission's target was **Bennu**, a "near-Earth" asteroid that is thought to have formed during the solar system's first 10 million years. The asteroid is made mostly of carbon and minerals, and has not been altered much since it formed. Samples from its surface could therefore offer valuable clues about the kinds of minerals and materials that first came together to shape the early solar system.

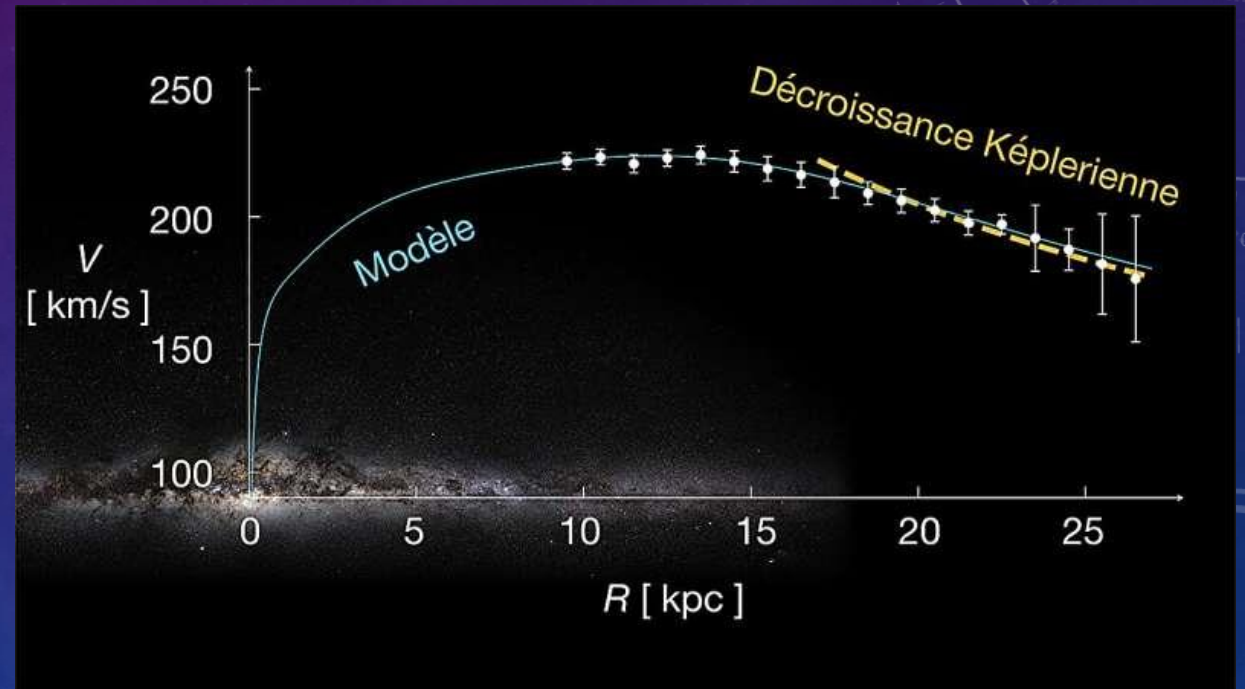




## SEPT 27TH: THE REVISITED MASS OF THE MILKY WAY IS MUCH SMALLER THAN EXPECTATIONS FROM COSMOLOGY

Thanks to the latest Gaia satellite catalog from the European Space Agency (ESA), an international team led by astronomers from the Paris Observatory–PSL and the CNRS has achieved the most accurate measurement of the mass of the Milky Way. This study opens important questions in cosmology, particularly on the amount of dark matter contained in our galaxy.

The total mass of the Milky Way is estimated to be only two hundred billion times that of the sun ( $2.06 \times 10^{11}$  solar masses), marking a significant downward revision—approximately four to five times lower than previous estimates.

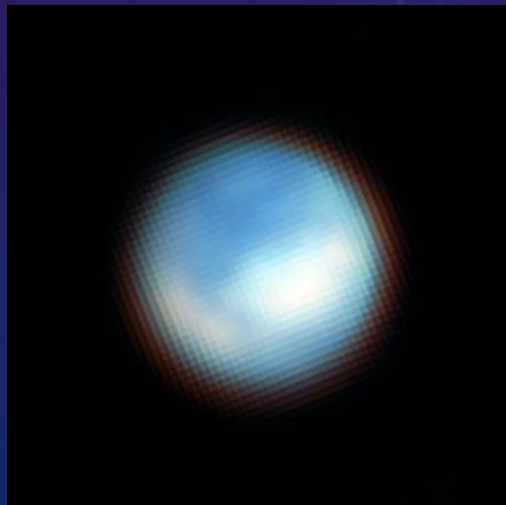
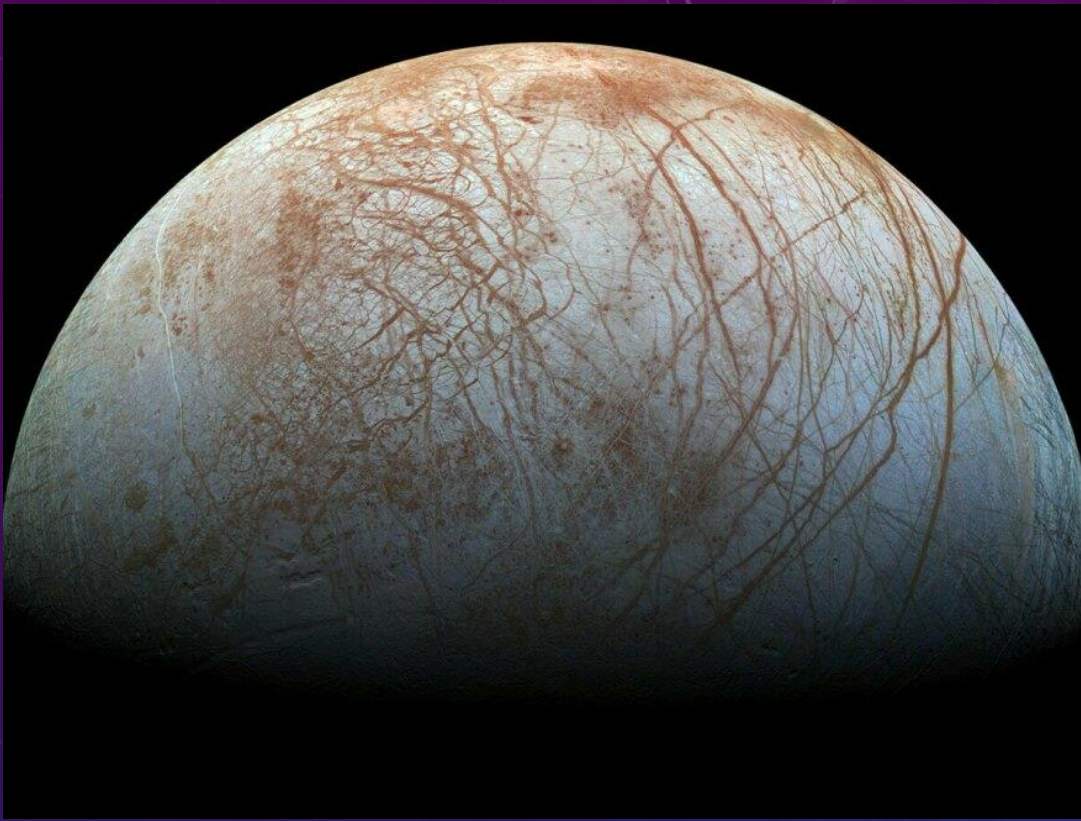


## SEPT 29<sup>TH</sup>: A SOURCE OF CARBON — A BUILDING BLOCK OF LIFE — IS FOUND ON JUPITER'S MOON EUROPA

Astronomers using data from NASA's [James Webb Space Telescope](#) have identified carbon dioxide in a specific region on the icy surface of [Europa](#). Analysis indicates that this carbon likely originated in the subsurface ocean and was not delivered by meteorites or other external sources. Moreover, it was deposited on a geologically recent timescale. This discovery has important implications for the potential habitability of Europa's ocean.

"On Earth, life likes chemical diversity – the more diversity, the better. We're carbon-based life. Understanding the chemistry of Europa's ocean will help us determine whether it's hostile to life as we know it, or if it might be a good place for life," said Geronimo Villanueva of NASA's Goddard Space Flight Center in Greenbelt, Maryland, lead author of one of two independent papers describing the findings.

"We now think that we have observational evidence that the carbon we see on Europa's surface came from the ocean. That's not a trivial thing. Carbon is a biologically essential element," added Samantha Trumbo of Cornell University in Ithaca, New York, lead author of the second paper analyzing these data.



## SEPT 30<sup>TH</sup>: COMET NISHIMURA'S TAIL GET WHIPPED AWAY BY POWERFUL SOLAR STORM AS IT SLINGSHOTS AROUND THE SUN



- After surviving its closest approach to the sun, [Comet Nishimura](#) was buffeted by a possible coronal mass ejection that briefly blew its tail away. The rare event was captured by a NASA spacecraft. The recently discovered green comet Nishimura has been body slammed by a potential coronal mass ejection (CME) after surviving a close encounter with the sun. The unexpected collision, which briefly blew away the comet's tail, was caught on camera by a NASA spacecraft.

- In footage captured by NASA's Solar Terrestrial Relations Observatory ([STEREO-A](#)) spacecraft, the plasma plume slammed into [Nishimura](#) and "jostled around" the comet's tail — the trailing stream of dust and gas that was blown off the comet by [the sun](#) — before completely pinching it off

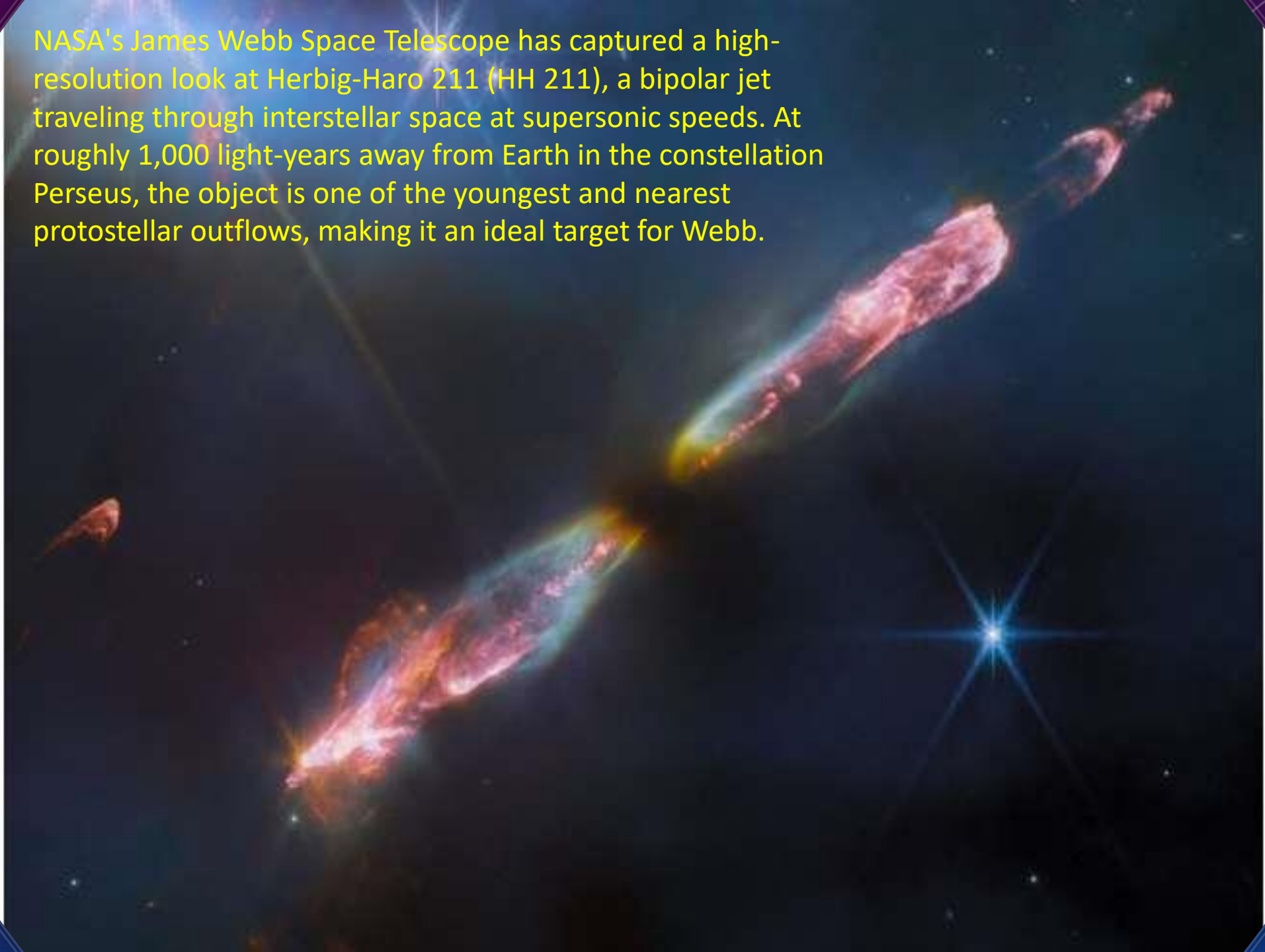
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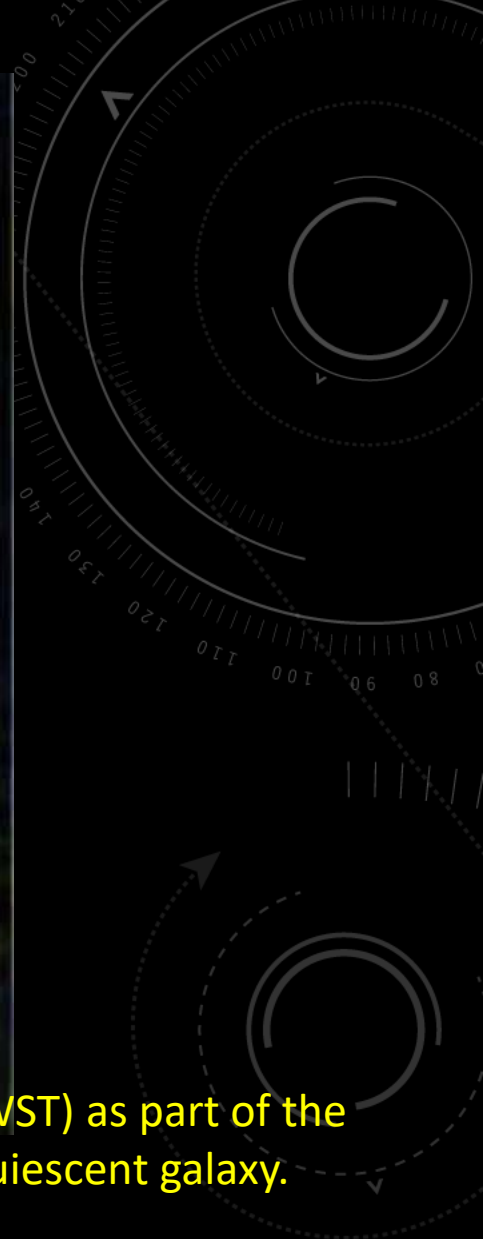


LATEST WEBB IMAGES



NASA's James Webb Space Telescope has captured a high-resolution look at Herbig-Haro 211 (HH 211), a bipolar jet traveling through interstellar space at supersonic speeds. At roughly 1,000 light-years away from Earth in the constellation Perseus, the object is one of the youngest and nearest protostellar outflows, making it an ideal target for Webb.

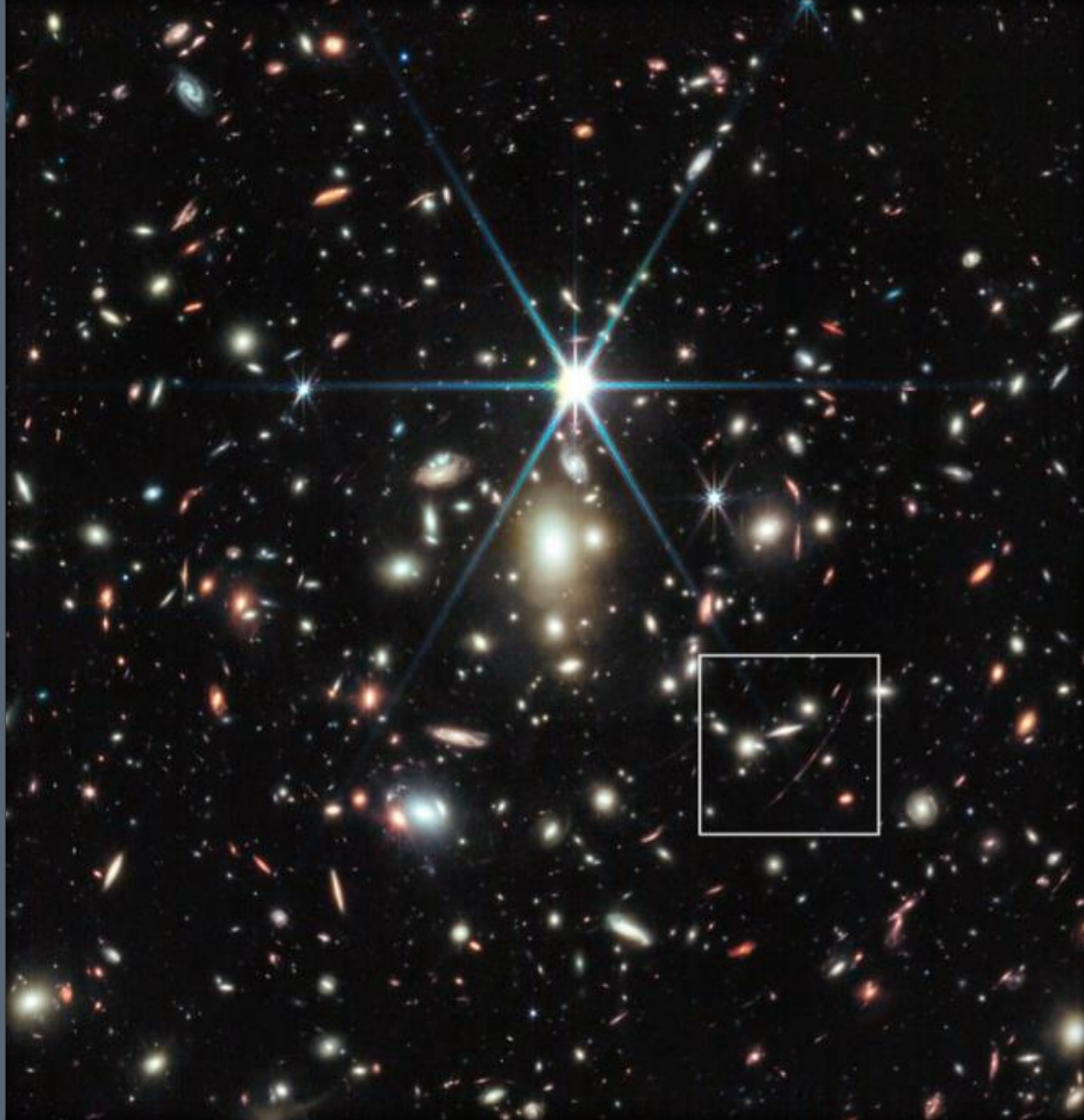




Astronomers have reported the discovery of a new galaxy using the James Webb Space Telescope (JWST) as part of the JWST COSMOS-Web survey. The newfound object, designated JWST-ER1 is a massive and compact quiescent galaxy.

The findings were detailed in a paper published September 14 on the pre-print server *arXiv*.

Massive galaxies that stopped forming stars (known as massive quiescent galaxies) are plausible progenitors of giant elliptical galaxies. Given that these objects formed stars earlier and assembled their stellar masses more quickly, they could be key to improving our understanding of the process of galaxy evolution.



Earendel

Earendel ( massive B-type star, more than twice as hot as our Sun and about a million times more luminous) is the most distant star ever imaged, 1 Billion years after Big Bang

# WHAT'S UP

## STRATFORD ASTRONOMY GROUP

### WHAT'S UP FOR OCTOBER



This is a month of “Almost for us”



<< September

October 2023

November >>

| Sunday  | Monday   | Tuesday  | Wednesday   | Thursday  | Friday   | Saturday   |
|---|--|--|---|---|--|--|
| 1<br><br>Waning gibbous<br>Visible: 94% ↓<br>Age: 17.09 days  | 2<br><br>Waning gibbous<br>Visible: 88% ↓<br>Age: 18.16 days    | 3<br><br>Waning gibbous<br>Visible: 80% ↓<br>Age: 19.19 days    | 4<br><br>Waning gibbous<br>Visible: 71% ↓<br>Age: 20.18 days   | 5<br><br>Last quarter<br>Visible: 61% ↓<br>Age: 21.14 days     | 6<br><br>Last quarter<br>Visible: 51% ↓<br>Age: 22.07 days     | 7<br><br>Last quarter<br>Visible: 42% ↓<br>Age: 22.98 days  |
| 8<br><br>Waning crescent<br>Visible: 32% ↓<br>Age: 23.88 days | 9<br><br>Waning crescent<br>Visible: 24% ↓<br>Age: 24.77 days   | 10<br><br>Waning crescent<br>Visible: 17% ↓<br>Age: 25.66 days  | 11<br><br>Waning crescent<br>Visible: 10% ↓<br>Age: 26.55 days | 12<br><br>Waning crescent<br>Visible: 5% ↓<br>Age: 27.45 days  | 13<br><br>New<br>Visible: 2% ↓<br>Age: 28.37 days              | 14<br><br>New<br>Visible: 1% ↓<br>Age: 29.29 days           |
| 15<br><br>New<br>Visible: 1% ↑<br>Age: 0.70 days              | 16<br><br>Waxing crescent<br>Visible: 4% ↑<br>Age: 1.66 days    | 17<br><br>Waxing crescent<br>Visible: 8% ↑<br>Age: 2.64 days    | 18<br><br>Waxing crescent<br>Visible: 15% ↑<br>Age: 3.63 days  | 19<br><br>Waxing crescent<br>Visible: 23% ↑<br>Age: 4.64 days  | 20<br><br>Waxing crescent<br>Visible: 33% ↑<br>Age: 5.66 days  | 21<br><br>First quarter<br>Visible: 43% ↑<br>Age: 6.70 days |
| 22<br><br>First quarter<br>Visible: 55% ↑<br>Age: 7.76 days  | 23<br><br>First quarter<br>Visible: 66% ↑<br>Age: 8.84 days    | 24<br><br>Waxing gibbous<br>Visible: 76% ↑<br>Age: 9.94 days   | 25<br><br>Waxing gibbous<br>Visible: 86% ↑<br>Age: 11.04 days | 26<br><br>Waxing gibbous<br>Visible: 93% ↑<br>Age: 12.16 days | 27<br><br>Waxing gibbous<br>Visible: 98% ↑<br>Age: 13.28 days | 28<br><br>Full moon<br>Visible: 100%<br>Age: 14.39 days    |
| 29<br><br>Full moon<br>Visible: 100% ↓<br>Age: 15.48 days   | 30<br><br>Waning gibbous<br>Visible: 97% ↓<br>Age: 16.54 days | 31<br><br>Waning gibbous<br>Visible: 92% ↓<br>Age: 17.56 days | 1<br>  | 2<br>  | 3<br>  | 4<br>   |

# HEY, THERE BE A MOON OVERHEAD

MOON PHASES FOR THE  
MONTH OF OCTOBER




« October 2023 »

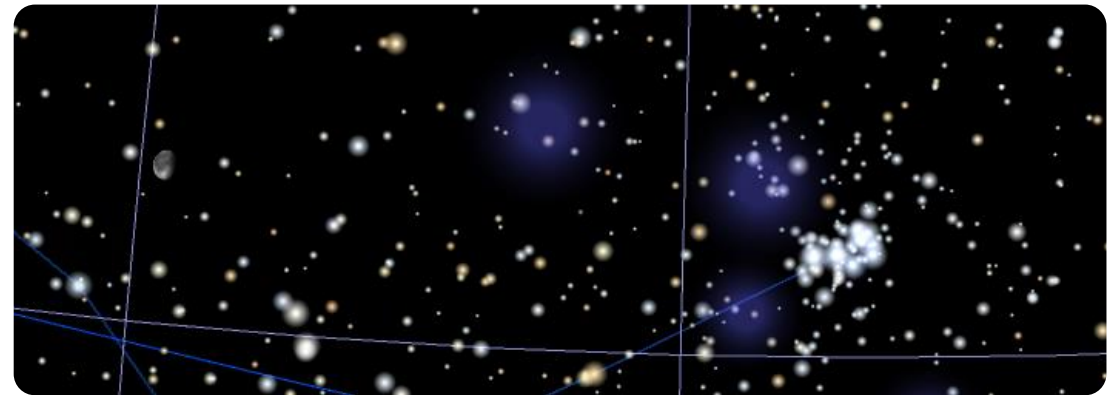
| Sunday   | Monday   | Tuesday   | Wednesday  | Thursday  | Friday  | Saturday  |
|--|--|---|--|---|---|---|
| <p><b>1</b></p> <p><a href="#">Close approach of the Moon and Jupiter</a><br/><a href="#">Conjunction of the Moon and Jupiter</a></p>                          | <p><b>2</b></p> <p><a href="#">Asteroid 29 Amphitrite at opposition</a><br/><a href="#">The Andromeda Galaxy is well placed</a><br/><a href="#">136472 Makemake at solar conjunction</a></p> | <p><b>3</b></p> <p><a href="#">Close approach of the Moon and M45</a><br/><a href="#">NGC 253 is well placed</a></p>  | <p><b>4</b></p> <p><a href="#">Lunar occultation of Beta Tauri</a></p>   | <p><b>5</b></p> <p><a href="#">The Small Magellanic Cloud is well placed</a><br/><a href="#">NGC 300 is well placed</a></p> | <p><b>6</b></p> <p><a href="#">October Camelopardalid meteor shower 2023</a><br/><a href="#">Moon at Last Quarter</a></p> | <p><b>7</b></p> <p><a href="#">NGC 362 is well placed</a></p>                               |
| <p><b>8</b></p>  | <p><b>9</b></p> <p><a href="#">Draconid meteor shower 2023</a><br/><a href="#">The Moon at apogee</a></p>  | <p><b>10</b></p> <p><a href="#">Conjunction of the Moon and Venus</a><br/><a href="#">Close approach of the Moon and Venus</a><br/><a href="#">Southern Taurid meteor shower 2023</a></p>   | <p><b>11</b></p> <p><a href="#">δ-Aurigid meteor shower 2023</a></p>   | <p><b>12</b></p>  | <p><b>13</b></p>  | <p><b>14</b></p> <p><a href="#">New Moon</a><br/><a href="#">Annular solar eclipse</a></p>  |
| <p><b>15</b></p> <p><a href="#">The Triangulum Galaxy is well placed</a></p>   | <p><b>16</b></p>   | <p><b>17</b></p> <p><a href="#">The Moon at perihelion</a></p>  | <p><b>18</b></p> <p><a href="#">Mars at apogee</a><br/><a href="#">Lunar occultation of Antares</a><br/><a href="#">136199 Eris at opposition</a><br/><a href="#">ε-Geminid meteor shower 2023</a></p> | <p><b>19</b></p> <p><a href="#">Venus at highest altitude in morning sky</a></p>  | <p><b>20</b></p> <p><a href="#">Mercury at superior solar conjunction</a></p>   | <p><b>21</b></p> <p><a href="#">Moon at First Quarter</a></p>                               |
| <p><b>22</b></p> <p><a href="#">Orionid meteor shower 2023</a><br/><a href="#">Comet 2P/Encke passes perihelion</a><br/><a href="#">Venus at dichotomy</a></p> | <p><b>23</b></p> <p><a href="#">Venus at greatest elongation west</a></p>  | <p><b>24</b></p> <p><a href="#">Conjunction of the Moon and Saturn</a><br/><a href="#">Close approach of the Moon and Saturn</a><br/><a href="#">136108 Haumea at solar conjunction</a></p> | <p><b>25</b></p> <p><a href="#">Leonis Minorid meteor shower 2023</a><br/><a href="#">The Moon at perigee</a></p>  | <p><b>26</b></p> <p><a href="#">The Moon at aphelion</a></p>  | <p><b>27</b></p> <p><a href="#">The Perseus Double Cluster is well placed</a></p>   | <p><b>28</b></p> <p><a href="#">Partial lunar eclipse</a><br/><a href="#">Full Moon</a></p> |
| <p><b>29</b></p> <p><a href="#">Close approach of the Moon and Jupiter</a><br/><a href="#">Conjunction of the Moon and Jupiter</a></p>                         | <p><b>30</b></p> <p><a href="#">Close approach of the Moon and M45</a></p>   | <p><b>31</b></p>  |  |   |   |   |

## OCTOBER 3 – CLOSE APPROACH OF THE MOON AND M45 (THE PLEIADES)

- The Moon and M45 will make a close approach, passing within a mere 59.5 arcminutes of each other. The Moon will be 18 days old.
- From Stratford, the pair will be visible from soon after it rises, at 20:40, until soon before it sets at 12:07.
- The Moon will be at mag -12.5; 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 3 Oct 2023

| THE SKY ON 3 OCTOBER 2023 |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
|---------------------------|--|---|-------|------|-------|-----|---------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|---------|-------|-------|-------|--------|-------|-------|-------|
| Sunrise                   | <br>Waning<br>Gibbous<br>77%<br>18 days old | Planets   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 07:20                     |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Sunset                    |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 19:01                     |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Twilight ends             |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 20:36                     |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Twilight begins           |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 05:45                     |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
|                           |  | <table><thead><tr><th></th><th>Rise</th><th>Culm.</th><th>Set</th></tr></thead><tbody><tr><td>Mercury</td><td>06:14</td><td>12:28</td><td>18:42</td></tr><tr><td>Venus</td><td>03:38</td><td>10:22</td><td>17:06</td></tr><tr><td>Moon</td><td>20:43</td><td>04:31</td><td>12:32</td></tr><tr><td>Mars</td><td>08:35</td><td>14:04</td><td>19:33</td></tr><tr><td>Jupiter</td><td>20:23</td><td>03:24</td><td>10:24</td></tr><tr><td>Saturn</td><td>17:34</td><td>22:48</td><td>04:02</td></tr></tbody></table> |       | Rise | Culm. | Set | Mercury | 06:14 | 12:28 | 18:42 | Venus | 03:38 | 10:22 | 17:06 | Moon | 20:43 | 04:31 | 12:32 | Mars | 08:35 | 14:04 | 19:33 | Jupiter | 20:23 | 03:24 | 10:24 | Saturn | 17:34 | 22:48 | 04:02 |
|                           | Rise   | Culm.   | Set   |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Mercury                   | 06:14  | 12:28   | 18:42 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Venus                     | 03:38  | 10:22   | 17:06 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Moon                      | 20:43  | 04:31   | 12:32 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Mars                      | 08:35  | 14:04   | 19:33 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Jupiter                   | 20:23  | 03:24   | 10:24 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Saturn                    | 17:34  | 22:48   | 04:02 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
|                           |  | All times shown in EDT.   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |



### THE SKY ON 10 OCTOBER 2023

Sunrise

07:28

Sunset

18:49

Twilight ends

20:24

Twilight begins

05:53



Waning  
Crescent

13%

25 days old

### Planets

|  | Rise | Culm. | Set |
|--|------|-------|-----|
|--|------|-------|-----|

|         |       |       |       |
|---------|-------|-------|-------|
| Mercury | 06:51 | 12:45 | 18:40 |
|---------|-------|-------|-------|

|       |       |       |       |
|-------|-------|-------|-------|
| Venus | 03:38 | 10:18 | 16:57 |
|-------|-------|-------|-------|

|      |       |       |       |
|------|-------|-------|-------|
| Moon | 03:07 | 10:25 | 17:31 |
|------|-------|-------|-------|

|      |       |       |       |
|------|-------|-------|-------|
| Mars | 08:32 | 13:54 | 19:16 |
|------|-------|-------|-------|

|         |       |       |       |
|---------|-------|-------|-------|
| Jupiter | 19:54 | 02:53 | 09:53 |
|---------|-------|-------|-------|

|        |       |       |       |
|--------|-------|-------|-------|
| Saturn | 17:06 | 22:19 | 03:33 |
|--------|-------|-------|-------|

All times shown in EDT.

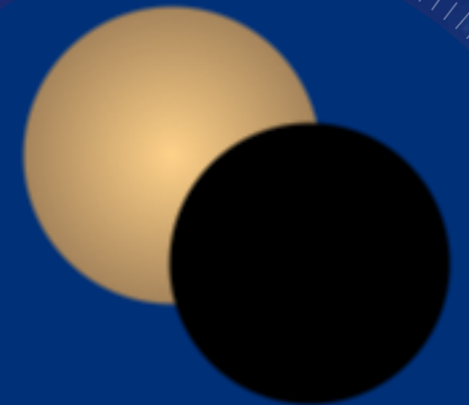
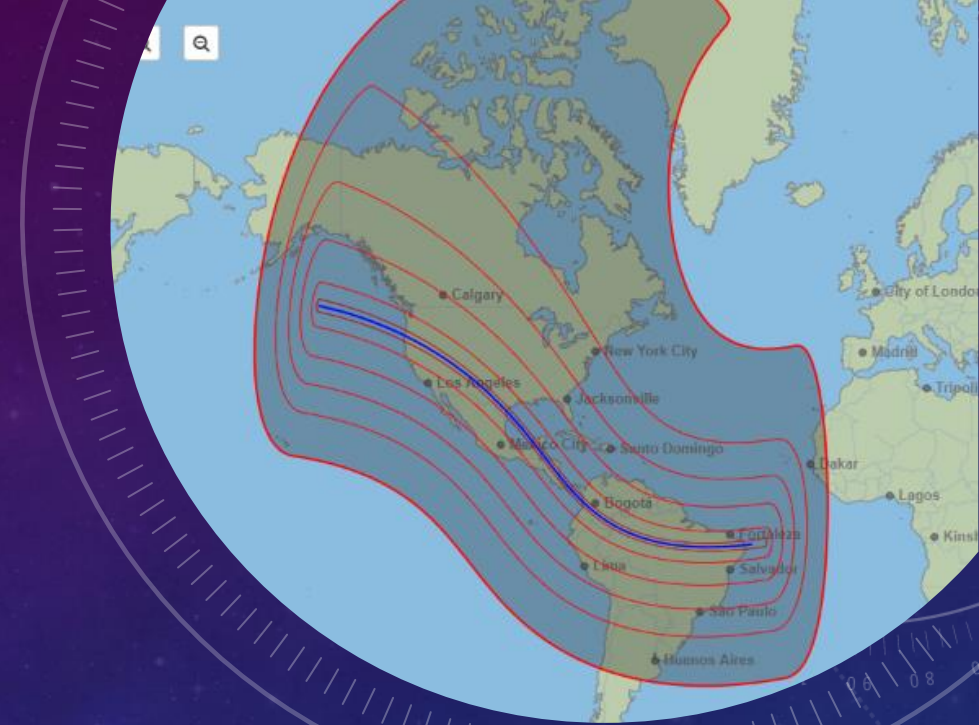
## OCTOBER 10– CONJUNCTION OF THE MOON AND VENUS

- The Moon and Venus will share the same right ascension, with the Moon passing  $6^{\circ}29'$  to the north of Venus. The Moon will be 25 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 03:37, until soon before it sets at 16:57.
- The Moon will be at mag -10.6, and Venus at mag -4.5, both in the constellation Leo.
- 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.



# OCTOBER 14 – ANNULAR SOLAR ECLIPSE


- The Moon will pass in front of the Sun, creating an annular solar eclipse visible from the Americas between 11:05 and 16:55 EDT.
- From Stratford, the Sun will be eclipsed to a maximum of 28%, but elsewhere in Canada the Sun will be eclipsed to a maximum of 78%.
- Glasses will be required (amazon: [Solar Eclipse glasses](#))



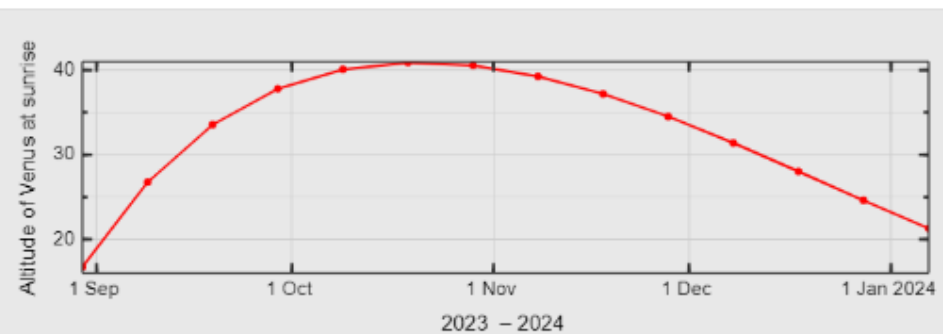
## OCTOBER 19 – VENUS AT HIGHEST ALTITUDE IN MORNING SKY

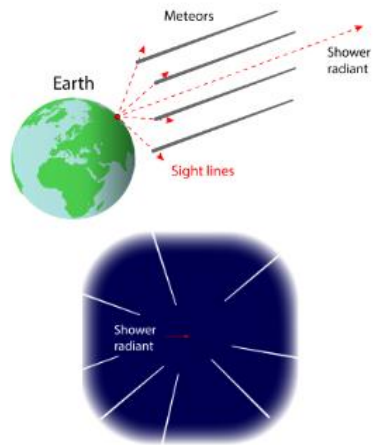
- As seen from Stratford, Venus will reach its highest point in the sky in its 2023–2024 morning apparition. It will be shining brightly at mag -4.4.
- From Stratford, this apparition will be well placed and prominent, reaching a peak altitude of  $41^\circ$  above the horizon at sunrise on 19 Oct 2023

### The sky on 19 Oct 2023

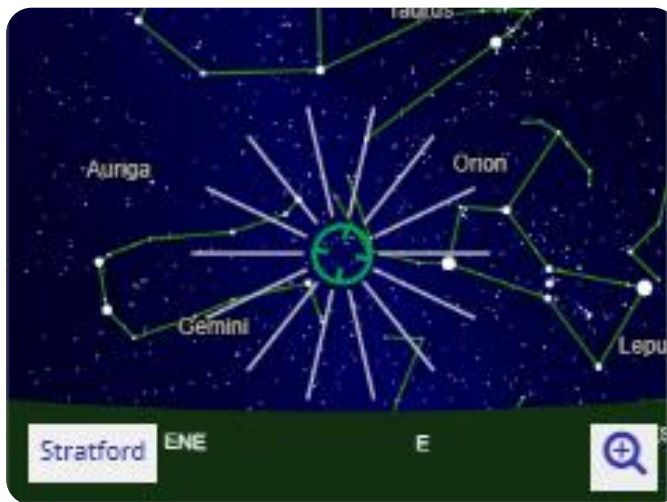
| THE SKY ON 19 OCTOBER 2023 |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
|----------------------------|--|---|-------|------|-------|-----|---------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|---------|-------|-------|-------|--------|-------|-------|-------|
| Sunrise                    | <br>Waxing<br>Crescent<br>23%<br>5 days old | <b>Planets</b>  |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 07:39                      |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Sunset                     |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 18:34                      |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Twilight ends              |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 20:09                      |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Twilight begins            |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| 06:04                      |  |   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
|                            |  | <table><thead><tr><th></th><th>Rise</th><th>Culm.</th><th>Set</th></tr></thead><tbody><tr><td>Mercury</td><td>07:38</td><td>13:07</td><td>18:35</td></tr><tr><td>Venus</td><td>03:43</td><td>10:15</td><td>16:47</td></tr><tr><td>Moon</td><td>13:08</td><td>17:17</td><td>21:25</td></tr><tr><td>Mars</td><td>08:29</td><td>13:42</td><td>18:55</td></tr><tr><td>Jupiter</td><td>19:16</td><td>02:14</td><td>09:12</td></tr><tr><td>Saturn</td><td>16:30</td><td>21:43</td><td>02:56</td></tr></tbody></table> |       | Rise | Culm. | Set | Mercury | 07:38 | 13:07 | 18:35 | Venus | 03:43 | 10:15 | 16:47 | Moon | 13:08 | 17:17 | 21:25 | Mars | 08:29 | 13:42 | 18:55 | Jupiter | 19:16 | 02:14 | 09:12 | Saturn | 16:30 | 21:43 | 02:56 |
|                            | Rise   | Culm.   | Set   |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Mercury                    | 07:38  | 13:07   | 18:35 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Venus                      | 03:43  | 10:15   | 16:47 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Moon                       | 13:08  | 17:17   | 21:25 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Mars                       | 08:29  | 13:42   | 18:55 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Jupiter                    | 19:16  | 02:14   | 09:12 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
| Saturn                     | 16:30  | 21:43   | 02:56 |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |
|                            |  | All times shown in EDT.   |       |      |       |     |         |       |       |       |       |       |       |       |      |       |       |       |      |       |       |       |         |       |       |       |        |       |       |       |

Altitude of Venus at sunrise






All of the meteors associated with any particular shower appear to radiate from a common point on the sky (not drawn to scale).

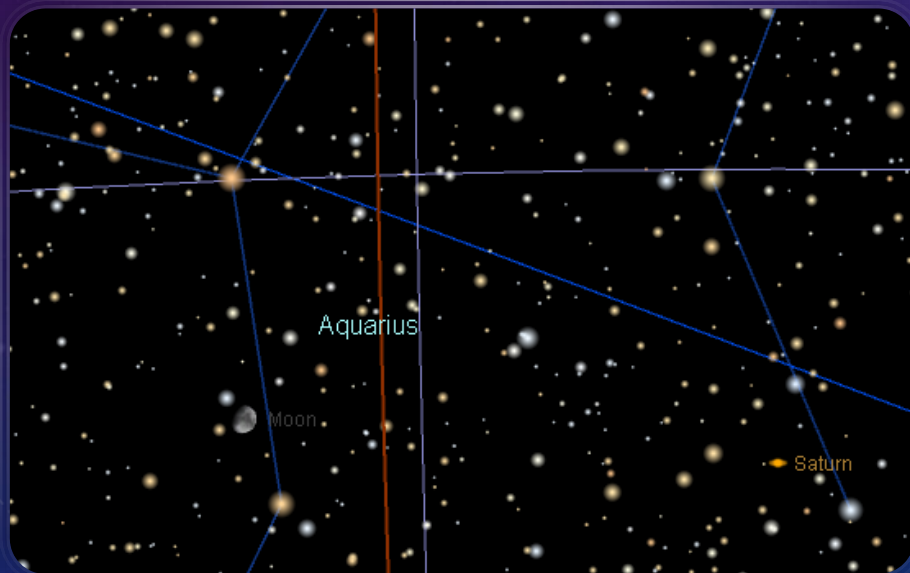


## OCTOBER 22 – ORIONID METEOR SHOWER 2023

- The Orionid meteor shower will be active from 2 October to 7 November, producing its peak rate of meteors around 22 October.
- Over this period, there will be a chance of seeing Orionid meteors whenever the shower's radiant point – in the constellation Orion – 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 22:35 each night, when its radiant point rises above your eastern horizon. It will then remain active until dawn breaks around 07:14.
- The shower is likely produce its best displays in the hours around 06:00 EDT, when its radiant point is highest in the sky.

## The sky on 24 Oct 2023

| THE SKY ON 24 OCTOBER 2023 |  |                           |
|----------------------------|--|---------------------------|
| Sunrise                    | <br>Waxing<br>Gibbous<br>79%<br>10 days old | Planets                   |
| 07:45                      |  | Rise Culm. Set            |
| Sunset                     |  | Mercury 08:03 13:18 18:33 |
| 18:26                      |  | Venus 03:48 10:14 16:41   |
| Twilight ends              |  | Moon 16:40 22:03 03:37    |
| 20:02                      | Mars 08:27 13:35 18:44   |                           |
| Twilight begins            | Jupiter 18:54 01:52 08:49  |                           |
| 06:10                      | Saturn 16:10 21:23 02:35   |                           |
|                            |  | All times shown in EDT.   |



## OCTOBER 24 – CONJUNCTION OF THE MOON AND SATURN

- The Moon and Saturn will share the same right ascension, with the Moon passing  $2^{\circ}46'$  to the south of Saturn. The Moon will be 10 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 16:10, until soon before it sets at 02:35.
- The Moon will be at mag -12.4, and Saturn at mag 0.5, 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.



# SHOW AND TELL

The background features a gradient from dark purple to blue, overlaid with a field of small white stars. Several technical diagrams are scattered across the page: a circular gauge with a scale from 0 to 210 and an arrow pointing to approximately 190 is in the top right; a circular diagram with concentric rings and arrows is in the bottom right; and a circular diagram with a dashed arrow pointing left is in the bottom left.

# COSMOLOGY TALK