

Event Horizon



**Volume 29, Number 2
December 2021**



From The Editor

There's lots of content this month about the James Webb Space Telescope. As I write this, the launch of the JWST is now scheduled for December 22, 2021.

Clear Skies,

Bob Christmas, Editor

editor 'AT'
amateurastronomy.org



Chair's Report by Bernie Venasse

Welcome to December, the month of the longest nights. I am ready for some late afternoon observing in the dark. Are you?

The HAA award programs are starting to gain some traction with several members accepting the challenges and are working diligently toward their certificates. Jo Ann Salci has completed our own HAA Rising Star Award. Congratulations, Jo Ann!!!

Other award recipients completing projects in other organizations include:

Swapna Shrivastava for her efforts within the RASC. She has received their Explore the Universe and Explore the Moon awards. She has also recently completed 'Astrobiology' and 'Big Bang to Dark Universe' programs from Coursera. Last month, I received an award from the Astronomical League for Binocular Variable Star Observing and am now finishing the telescope version of the same challenge.

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Chair's Report (continued)

There is something to be said about being a GOOber. For those of you who aren't familiar with it that's 'Goal Oriented Observer'. Congratulations!!

John Gauvreau is preparing to begin the 'Astro 101' program. Sessions will begin in January. This has been referred to as the Beginners Group, but it is not necessarily aimed at only beginners. Planned topics include:

- Telescope types
- Objects in the Sky
- How to Observe Them
- Reading the Sky (Seeing and Transparency)
- Eyepieces
- Notetaking and observing logs
- Goal oriented observing
- Stellarium
- Lunar observing
- Solar observing
- Beginning astrophotography

Sign up now by dropping a note to John via: astro101@amateurastronomy.org

Mother Nature is such a tease! The Lunar Eclipse during the morning of November 19th was a challenging event given the amount of passing cloud and the time of day. Personally, I had gone to bed early on Thursday evening and awoken at 2:00 in time to enjoy the event and make a coloured sketch to use in yet another award program. Unlike most of the other viewers, I remained up past the last contact and then went to work. I was very glad to make it home Friday... nap time!



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Credit: Bernie Venasse

Masthead Photo: The Partial Lunar Eclipse of November 19, 2021, by John Gauvreau.

Chair's Report (continued)

Next meeting *December 10, 2021 at 7:30pm.*

Our guest will be *Bill Burnyeat* presenting “The First Astronomers”

The Abstract:

“Today's highly complex and mathematical astronomy, an outcome of modern society, is often seen as distinct from folk tales, star myths and the astronomical notions found in traditional society or historically remote epochs. Although some of these "perspectives" are mentioned, from time to time, the impression is given that only modern western based astronomy has any traction in reality and that the astronomy of other peoples and epochs are "just" fairy tales.

“What is missing from this simplistic model is the marked continuity that is evident from the earliest notions of the sky, leading, in ever increasing steps, to the current picture of the cosmos based on technical tools and astrophysical insights. The first notion, encountered in the earliest astronomy is a division, both of time and space, which leads to an increasing set of subdivisions, as the sky becomes networked by horizon and then meridian based subunits. The constellations are one example. As divisions become more general, and complex, as in the Astrology of Chaucer's time, the very units used to make these divisions take on a life of their own and become a set of commonly held values that help organize life in the community.

“This increase in divisions, of which the telescope, able to section the sky into arc seconds, is yet another step, should not be seen as the linear progress of modern thought from crude error to exact truth. Instead, what it shows is a theme going through all astronomy from the first, and constitutes both a domain of freedom and a set of limitations within which astronomy continues to operate. In other words, astronomy shows the same root interests all the way through, which are given first as cognitions of the sky but are soon wedded to the desire to explain, predict and generate a nomenclature on sky patterns whose nature must be pieced together both in time and space. It is the successful manipulation of these variables, defined by each culture in its own terms, that is the goal of astronomy and not the achievement of some pan cultural absolute truth.”

A friendly reminder that all our meetings will be held online through the Zoom platform for the foreseeable future. If you have had any hesitation about joining in please feel free to get in touch and we will help you. And don't forget that you can always email ‘zoomsupport@amateurastronomy.org’ to get help joining the meeting, even once the meeting has started.

“HAA Presents”

Members of the public of any age in the GTHA can now request an in-person (once it is safe to do so) or virtual presentation from the HAA directly on our website.

Simply navigate to www.amateurastronomy.org and select “Contact” from the top menu bar and then click on “HAA Presents” (see image below). You will be presented with a request form and once all required fields are entered, click on the “Submit” button and you will see a confirmation message that your request has been successfully submitted.



Home About Newsletters Gallery Club Events Resources **Contact**

HAA Presents

Once received, our Public Education Director, Jo Ann Salci, will respond to your request within 5 business days to discuss next steps. If you have any questions, feel free to send an email to haapresents@amateurastronomy.org.

Letter to the Editor



What do I write about now?

Over the last several months, coming up with an “Event Horizon” article has been getting harder and harder to do. The plain and simple facts are that I am running out of new ideas that are somewhat challenging and that engage the readers' imaginations.

You may well say that Jo Ann and Matthew seem to be able to write about outreach and “The Sky This Month” on a regular basis. Mario is on CHCH television each Sunday with an engaging topic, as well. So what is wrong with me? Answer: The others have events and engagements that are new and interesting every month. I have to come up with various topics that are engaging and don't tread on their territory.

Over the last two months, I have come up 'blank' with any kind of topic for “Event Horizon”. This month, I struggled with the impossibility of interstellar and intergalactic travel.

Previous to the last two months, I have been very regular with topics. It is not easy coming up with either a topic for one month or writing on a regular basis. It desperately needs variety - especially when one considers that the “Event Horizon” is a major staple of “The Hamilton Amateur Astronomers”. Lose it and I fear that would present a major crisis for our organization, especially in these times of the worst sky conditions that I have ever seen in my entire life.

We need to get inventive and practice our 'craft' in imaginative ways that we have never considered before. Yes, we will continue to get some good and half-good nights for observations. There will just not be as many.

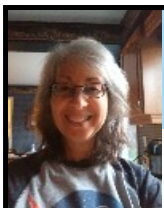
And so, as an activity to fill in fewer observing nights, more written material from a wider range of membership would go a long way to your sense of achievement and helping out “The Hamilton Amateur Astronomers” during these difficult times.

What? No time to do a full article? How about a book report, a letter to the editor, or a question to any of us about something for which you are searching for an answer? Maybe you want to sell or swap equipment. An advertisement about such would snuggle itself between the pages of “Event Horizon” very cozily.

I do not want my future articles falling under the aegis of “The Mike Jefferson Column.” More participation would fix that.

The “Hamilton Amateur Astronomers” is your club (society). It will become what you make of it.

— Mike Jefferson



...A column for young astronomers - and those young at heart!

Last month we learned about exoplanets and some of the equipment used to study them. This month we are going to explore The James Webb Space Telescope (JWST) which is now set to launch on December 22nd (as of November 23rd). One of its goals is to study the atmospheres of exoplanets! Let's explore!

A New Chapter in Astronomy!

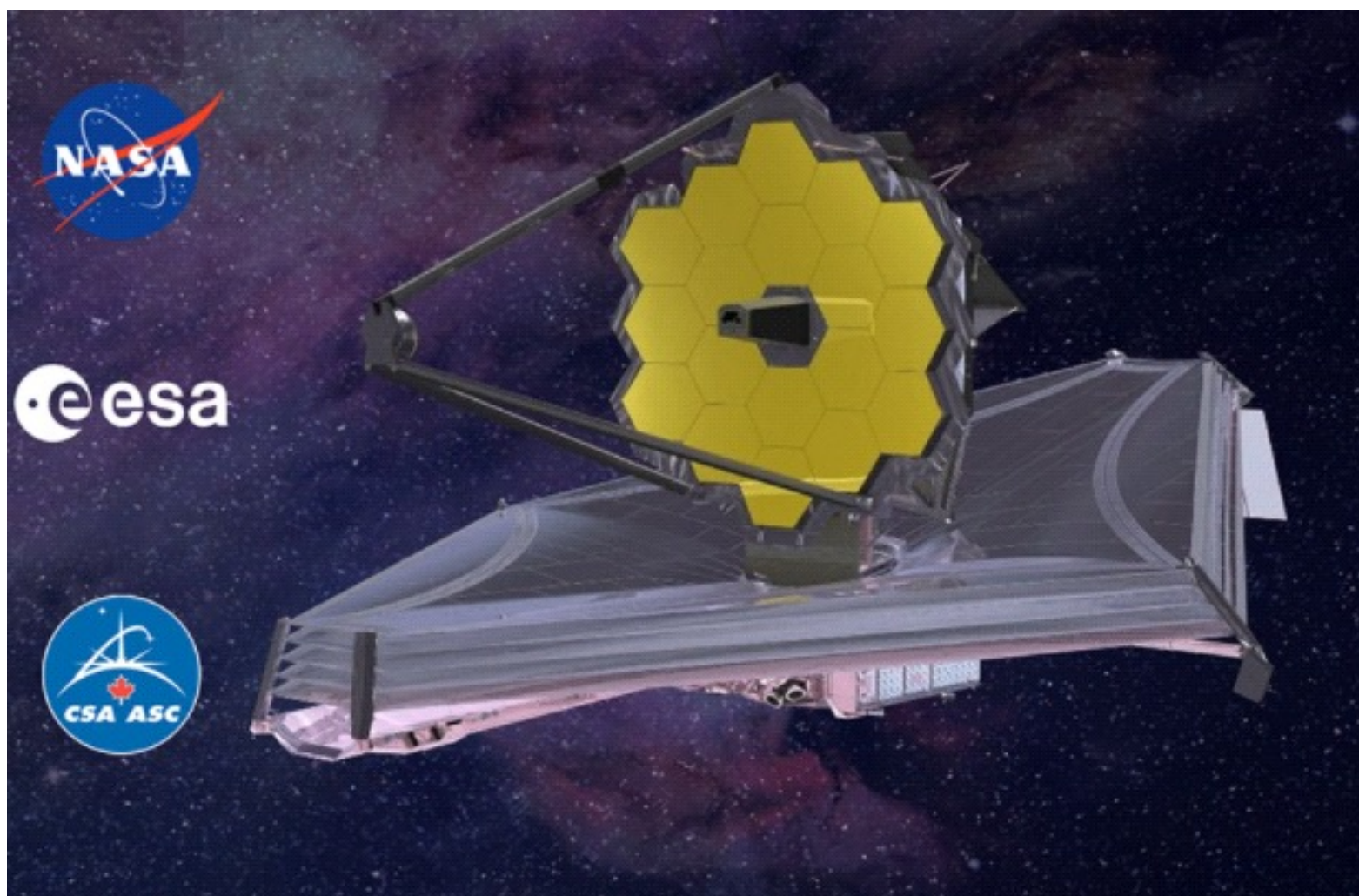


Image Credit: NASA

The JWST is the most powerful, complex and largest space telescope ever built. It has been a partnership between the National Aeronautics and Space Administration (NASA), the European Space Agency (ESA) and the Canadian Space Agency (CSA). And Canada has been involved in an important way. Canadian scientists have provided two instruments that are very important to the operation and mission of the telescope. These instruments were constructed and placed into the telescope back in 2012!

Planning for the creation of the JWST began in 1996. It has taken 25 years for this telescope to get to the launch stage! Why has it taken so long to build this telescope? This telescope will be put into an orbit very far from the Earth and we wouldn't be able to reach it for service or repairs. The telescope needed to go through very thorough testing to be ready for this journey. It continues to do so as the launch date draws near and as unexpected things can happen during preparations.

The size of this telescope is so large that it needs to unfold after its cramped journey inside its rocket! If the Hubble telescope is the size of a bus, the JWST is about the size of a tennis court, is about 3 stories

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HAA Explorers (continued)



Hubble

JWST

*Comparing the Hubble telescope with the JWST
Image credit: ESA /M. Kornmesser*

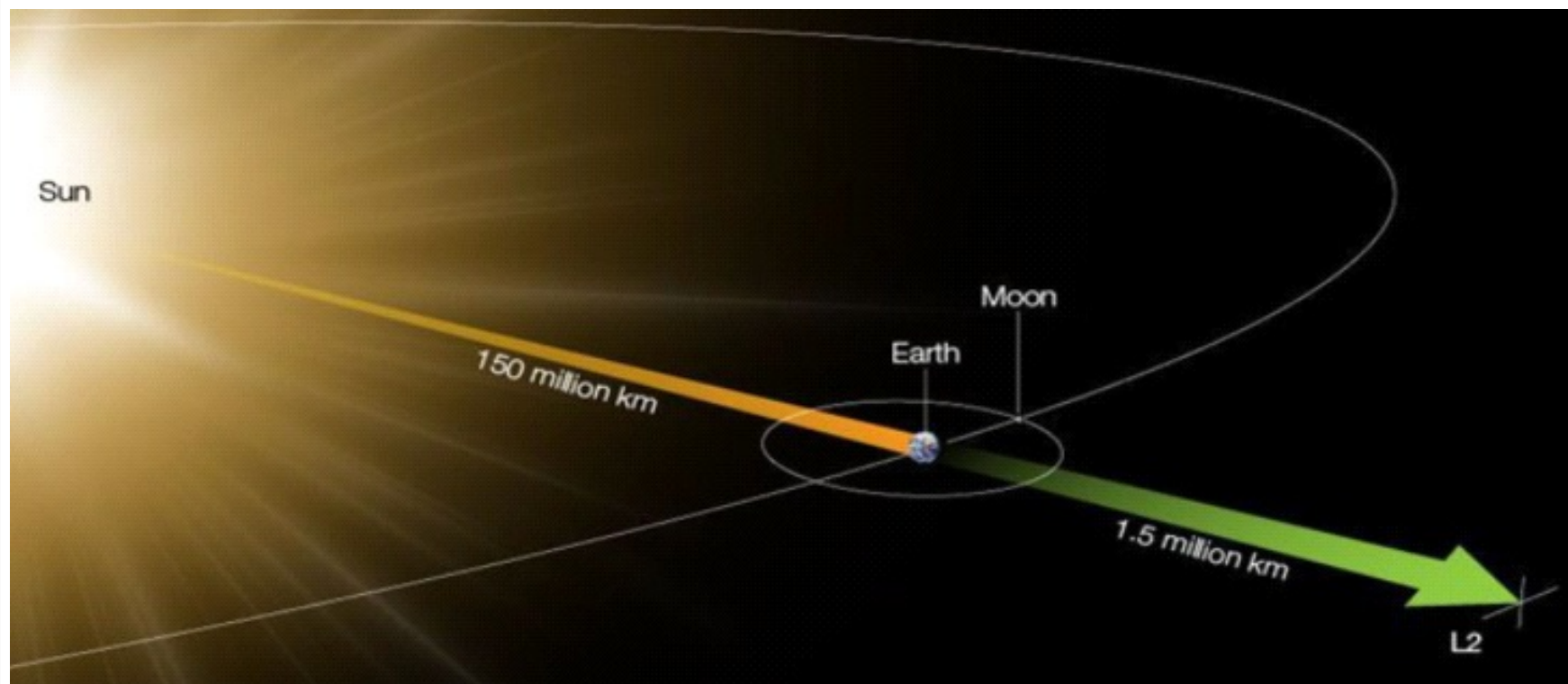
tall, and has 18 mirror-segments that total 6.5 meters when fully opened. It will be placed inside an ESA Ariane 5 rocket which will launch from French Guiana, in South America, with its launch date now set for December 22nd at 7:20 AM EST. Once its launched, it will take about 29 days to fully unfold! Watch this 8-minute video to see how it will unfold, almost like a transformer: [29 Days on the Edge - YouTube](#)

The JWST will orbit beyond Earth's atmosphere, where the Hubble telescope has orbited. If you were to draw a line from our Sun, through our Earth and past our Moon's orbit, that is where the James Webb telescope will orbit. This area is called L2, short for Lagrange Point # 2. Lagrange points are areas in space that are stable and less fuel is needed to maintain an orbit. This area is also where the telescope can be shielded from the heat of the Sun and Earth. This telescope needs to stay cold because it's taking pictures, but not of what we can see with our eyes (like Hubble did). Instead, it will be studying the universe in the infrared light. We can't see infrared light, but we can feel it as heat! Watch this short video to learn more about infrared light: <https://www.youtube.com/watch?v=XCD6fAHc97c>

The heat shields on the JWST are crucial to its mission. Like the Kepler and TESS telescopes we learned about last month, the JWST's advantage is that Earth's atmosphere doesn't get in the way of good views of space.

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HAA Explorers (continued)



L2 is where the JWST will be located and orbiting. Image Credit: ESA, CSA

There are four main goals for the JWST: To learn more about the lifecycle of stars; to look at other worlds, including some of our outer planets and their moons; to learn more about the early universe; and to look at galaxies over time. The two instruments provided by Canada will help achieve these goals: The first is the Fine Guidance System (FGS), which are like the “eyes” of the telescope and the second is the Near-Infrared Imager and Slitless Spectrograph (NIRISS), an instrument that will measure the ingredients of atmospheres surrounding exoplanets. It will help astronomers look for exoplanets where life may exist if it finds molecules of water, oxygen, methane and carbon dioxide. Because Canadian scientists have contributed to the mission, they will have time to use the JWST for observations!

The mission of the JWST should last anywhere from 5-10 years depending on when it runs out of fuel. We are fortunate to witness this new chapter of astronomy and to see all that we will learn!

Things to do until next time**:

**** Check with your parents or caregivers before checking out websites.**

1. Visit: [James Webb Space Telescope | Canadian Space Agency \(asc-csa.gc.ca\)](https://www.nasa.gov/mission_pages/webb/main/index.html) to learn more about the Canadian contributions to the James Webb Telescope.

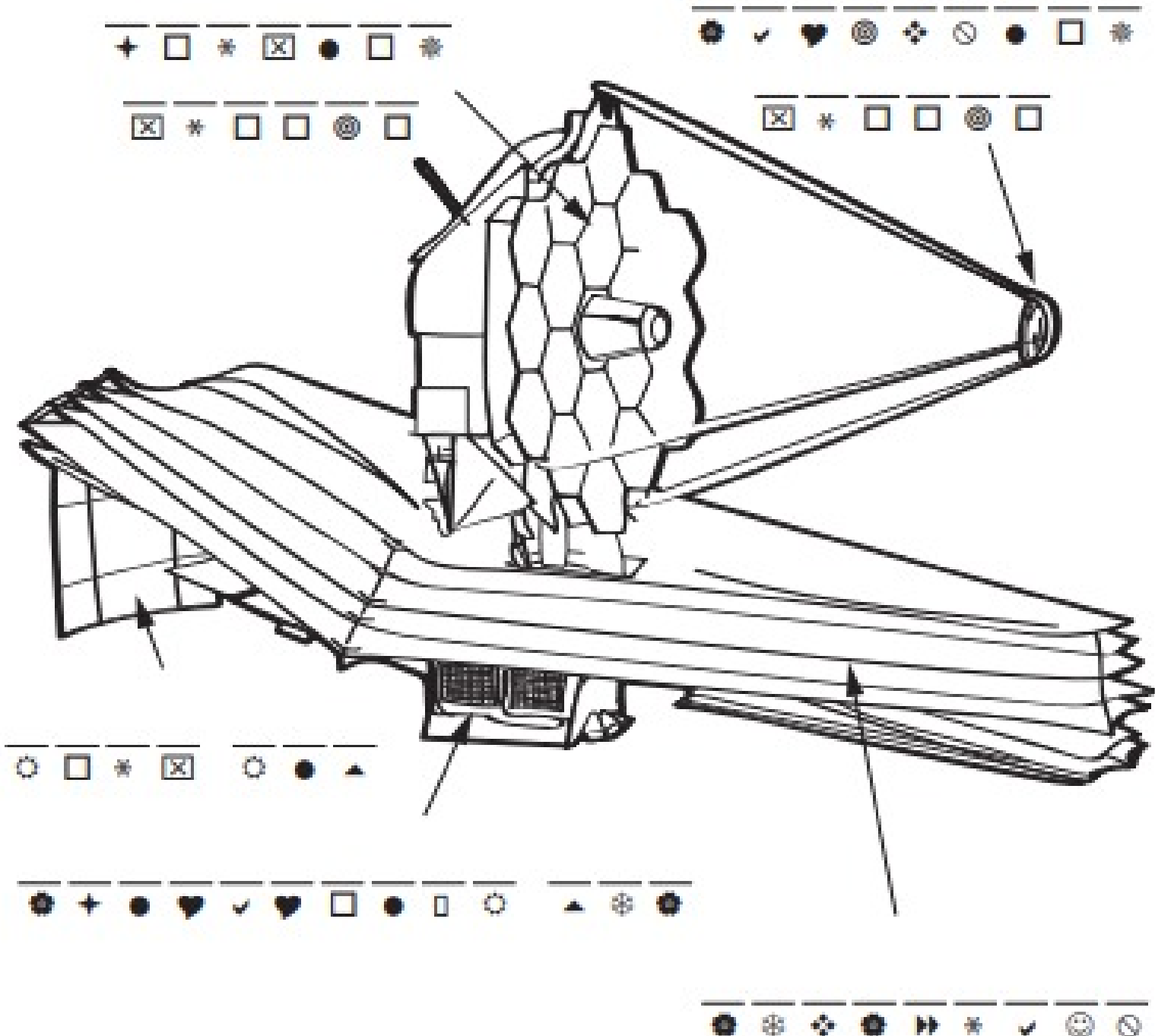
2. Enjoy: This fun book of activities about the James Webb Telescope: [JWSTScienceFunPad.pdf \(nasa.gov\)](https://www.nasa.gov/mission_pages/webb/main/index.html).

3. Visit: https://www.nasa.gov/mission_pages/webb/main/index.html to learn more about the James Webb Space Telescope.

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WEBB TELESCOPE PARTS

Use the code to name the parts of the spacecraft



A = ●	F = □	K = ♠	O = ☉	S = ⚙	W = ☉
B = ▲	G = ☉	L = ☺	P = +	T = ☉	X = ☒
C = ♥	H = ➡	M = ☒	Q = ☹	U = ✦	Y = *
D = ☊	I = *	N = ✦	R = □	V = ○	Z = ▼
E = ✓	J =				

Answers on page 10.

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HAA Explorers (continued)

During December, check out:

1. Tuesday, December 7th at 5:50 p.m.: A beautiful grouping of Jupiter, Saturn, the Moon and Venus in the South/Southwest.



2. On the evenings of December 13th and 14th (sorry they are school nights!): A few meteor showers can be seen: Geminids, Orionids and Monocerotids.



Images generated using Stellarium

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HAA Explorers (continued)

Finally:

Why is the JWST looking away from Earth?

Answer: It is looking for signs of intelligent life!

If you have a question you would like answered in the newsletter, please send it to education@amateurastronomy.org.

Thank you to Ro for reviewing this article! 😊

References:

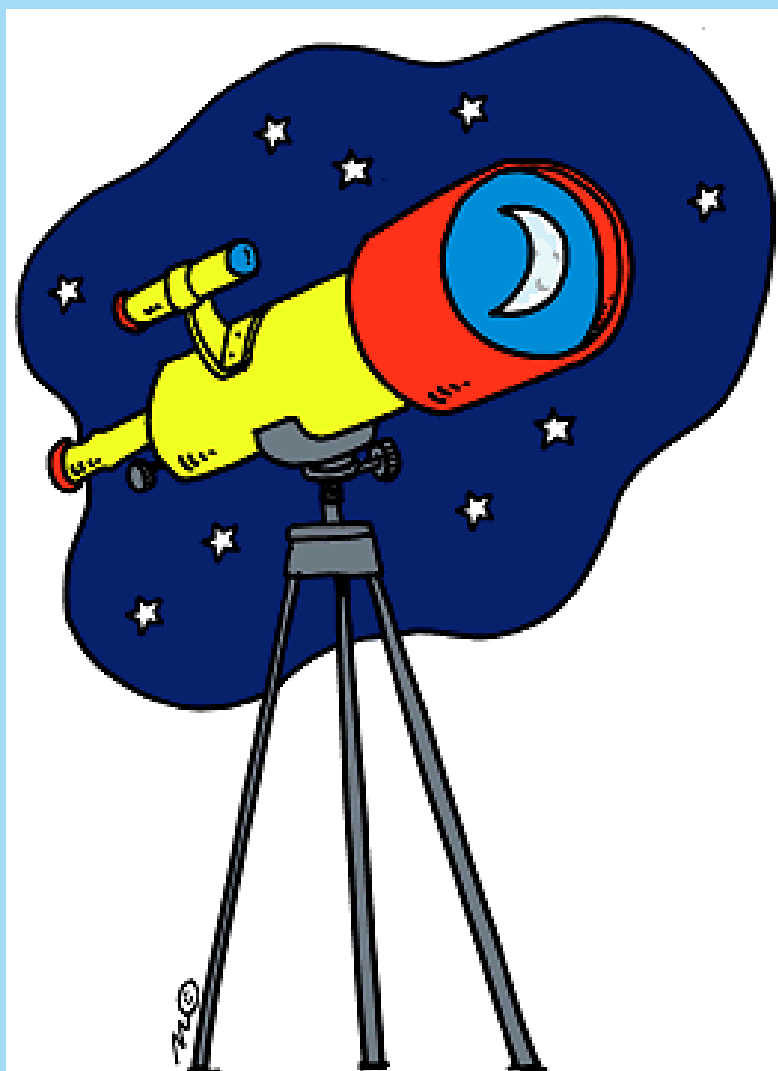
[Speakers' kit - James Webb Space Telescope | Canadian Space Agency \(asc-csa.gc.ca\)](#)

[JWSTScienceFunPad.pdf \(nasa.gov\)](#)

RASC Outreach Training: Webb Telescope, Jenna Hinds, November 2021.

Answers to Coding Activity:

Primary Mirror, Secondary Mirror, Trim Tab, Spacecraft Bus, Sunshield



H.A.A.'s Loaner Scope Program

We at the HAA are proud of our Loaner Scope Program. It allows members who don't own a telescope to get more up close with the night sky, and it allows members to explore different types of telescopes! Paid members are welcome to borrow a telescope for one month. We have telescopes of varying expertise levels, a MallinCam, a spotter scope and various eyepieces. Please visit the HAA website for more information!

If you are interested in borrowing a telescope, please contact Melissa Whitman at

loanerscope@amateurastronomy.org.

Telescopes are loaned out on a first come basis.



The Partial Lunar Eclipse of November 19, 2021

Image Credit: Matthew Mannering (both)

Last month I talked about the upcoming partial Lunar eclipse on the morning of November 19th. I didn't expect to see anything as the weather forecast was for solid overhead cloud. Well, the alarm went off at 3:40am and I was outside in five minutes. The clouds covered about 50% of the sky but lo and behold, the eclipsed Moon was in a clear patch! I steadied myself against the truck and took a series of shots over the next ten minutes. What really stood out to me was just how dark the Moon was for this eclipse. This meant that the initial exposure settings I gave you in the last Event Horizon article were totally out to lunch. Sorry about that. Here are a couple of my images from that night.

If you would like to see your images in the Event Horizon, send them to editor@amateurastronomy.org and I'm sure Bob will be happy to showcase them next month.

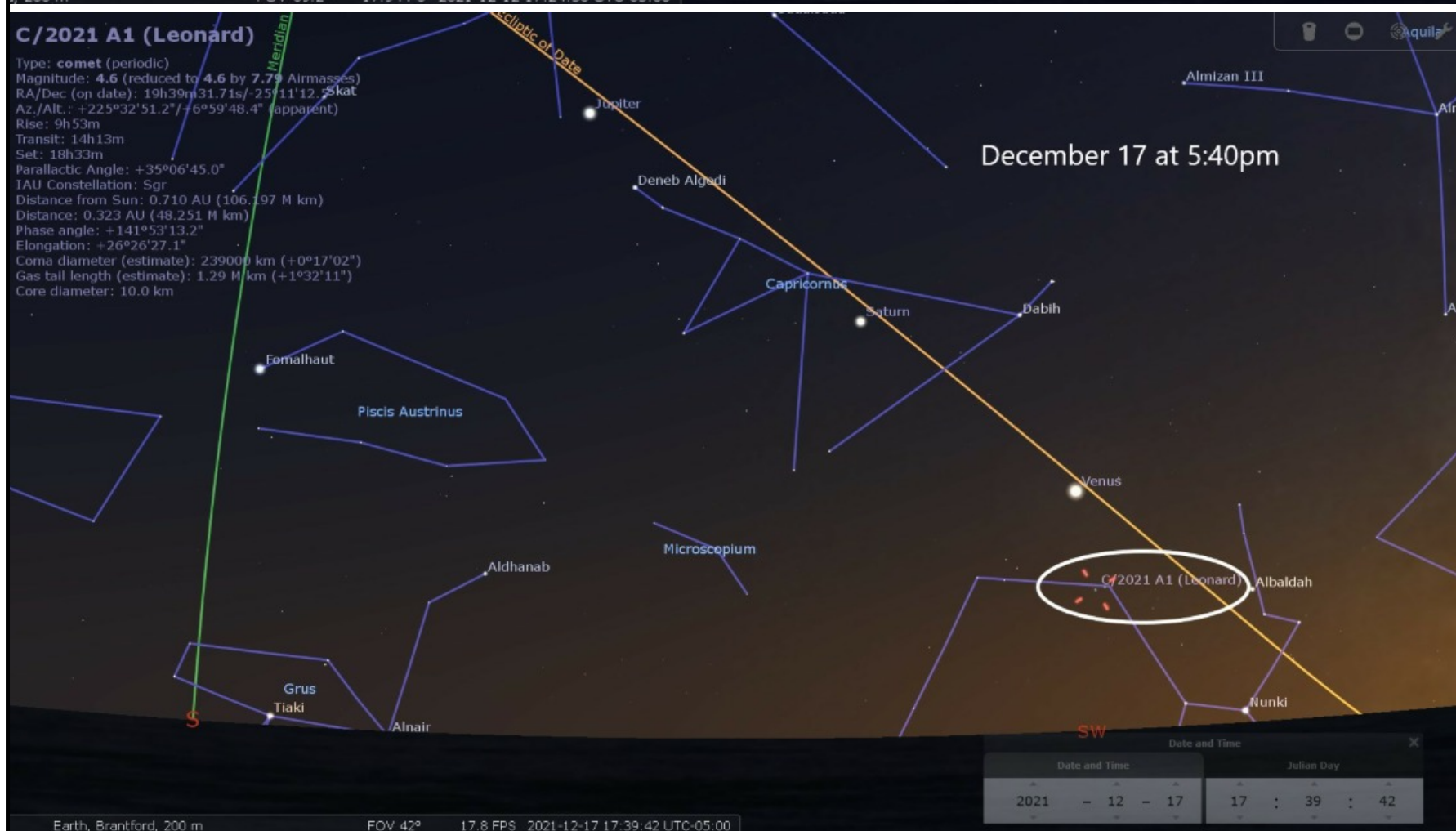
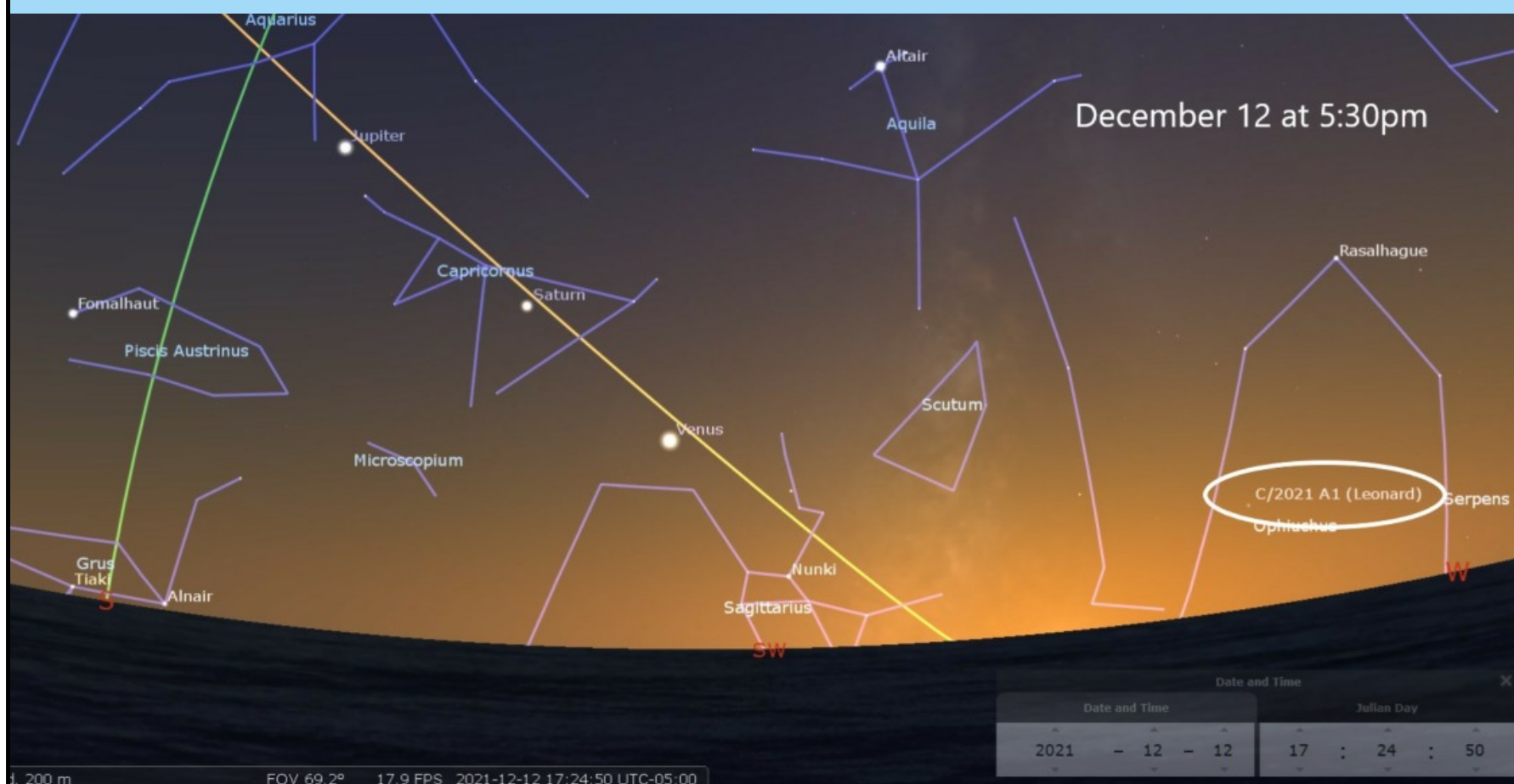
December has its own awesome highlight in the form of *Comet C/2021 A1 Leonard*. The Internet site "In-the-sky.org" provides a lot of information about the solar system. There is a page for comets <https://in-the-sky.org/data/comets.php> that will tell you if a comet is dimming or brightening, the date of peak magnitude and its location in the sky.

On December 6th, look for Leonard 5° to the left of the star Arcturus in the hours before dawn. It should be high enough in the sky by 4am to get a good view and may be a naked eye object.

By December 12th Leonard should be an evening object, due west at 5:30pm, 5° above the horizon. Then on December 17th at 5:30pm, look for Leonard directly below Venus. During this period, Leonard will be at maximum brightness and the tail will be at its longest. This is another great chance to take astronomical images with just a camera and tripod. Based on my previous attempt at predicting camera settings, I will leave that particular prediction up to you.

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The Sky This Month for December 2021 (continued)



Fast forward to Christmas day at about 5:15pm and you should be able to see Mercury, Venus, Saturn and Jupiter in the western sky. Comet Leonard joins the party about 8° above the horizon directly below Jupiter.

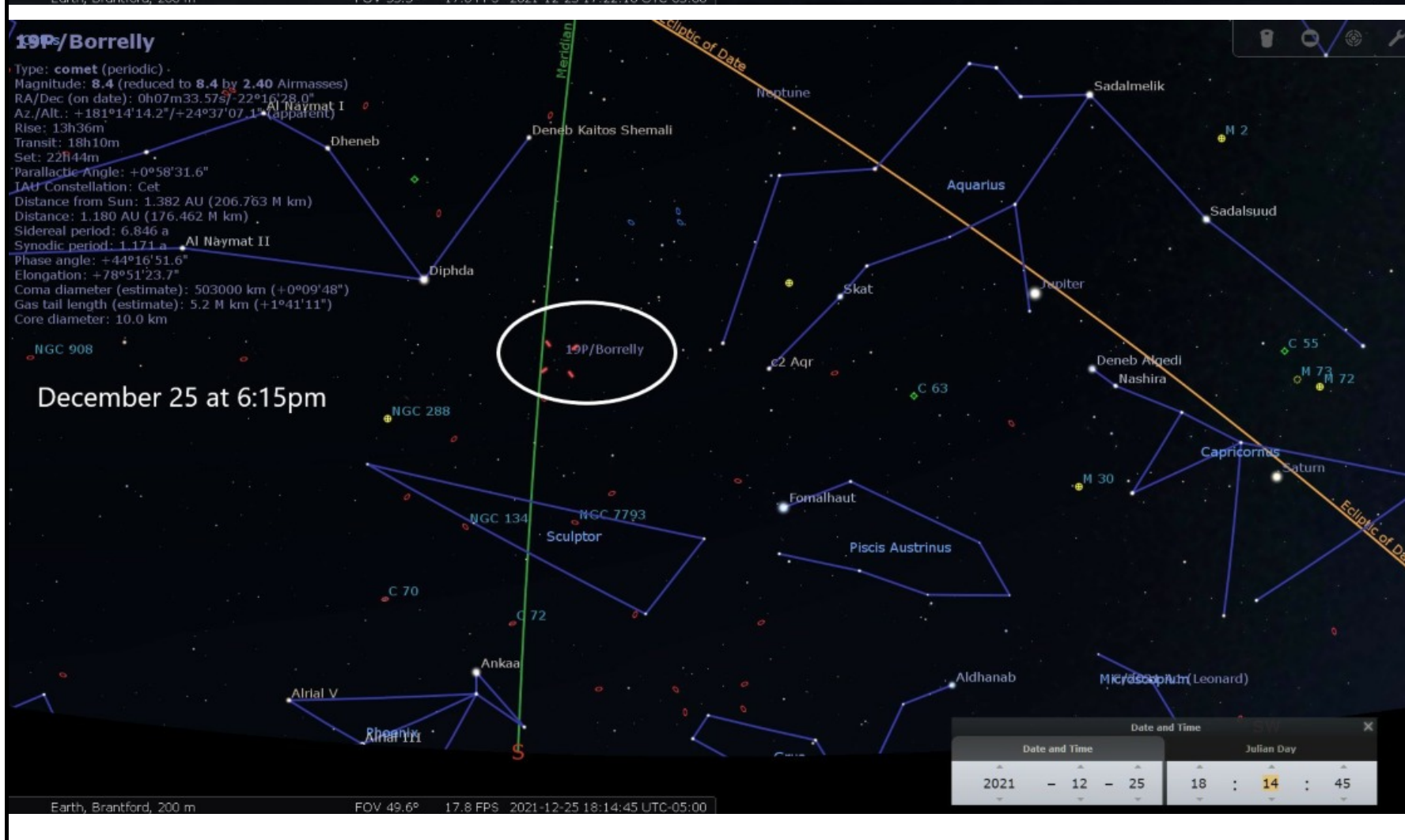
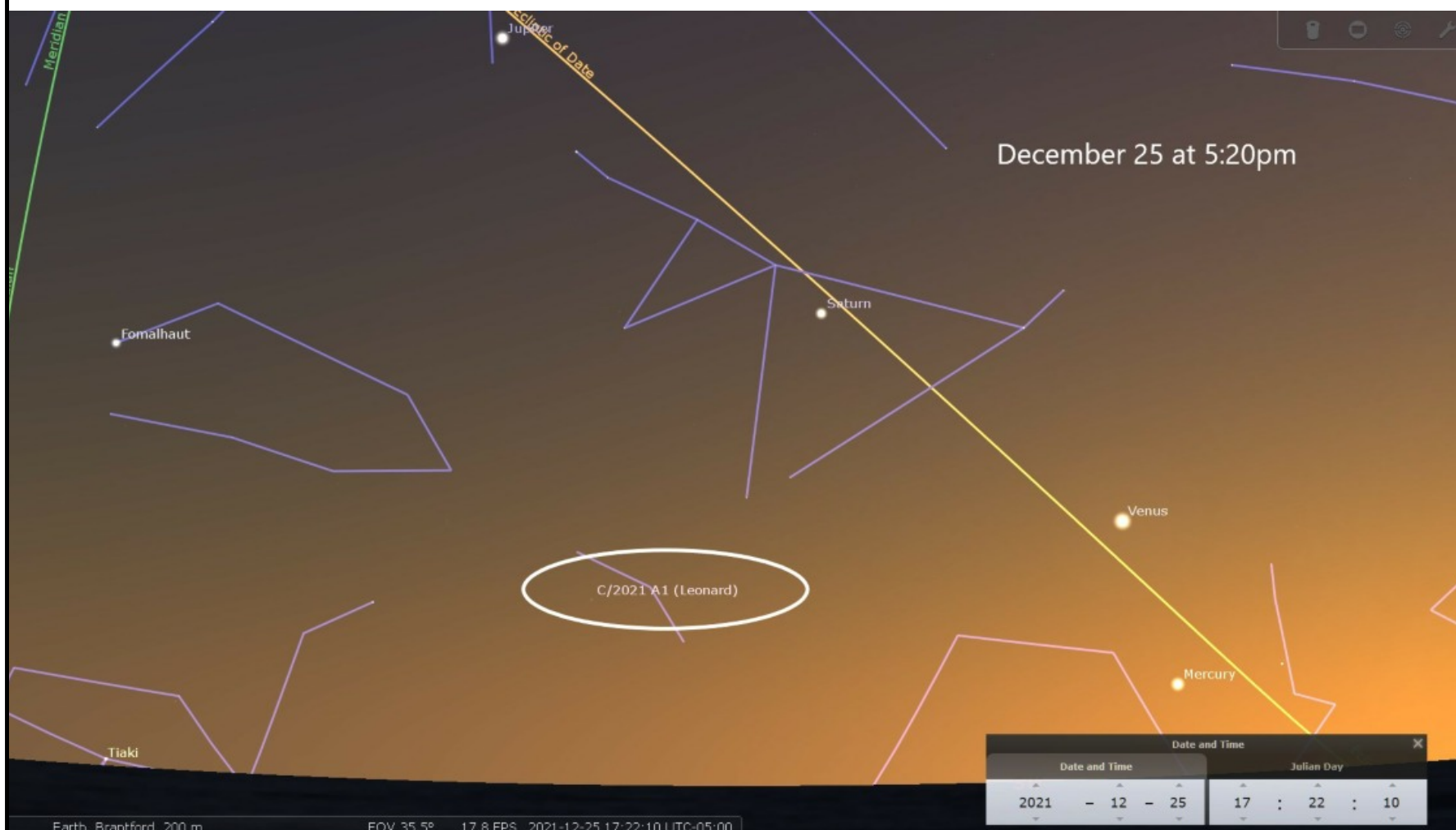
But wait, the party gets even better! The 18th brightest star in the sky Fomalhaut will be down and to the left of Jupiter. Then an hour later at 6:15pm use your small telescope or large binoculars to try and

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The Sky This Month for December 2021 (continued)

see *Comet 19p Borrelly*. It will be due south about 25° above the horizon at magnitude 8 or 9. Unfortunately, comets have a long history of disappointing observers. So, the turkey on the table may not be the only turkey you see on Christmas Day.

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The Sky This Month for December 2021 (continued)

The night sky maps in this article were created in the free programme 'Stellarium'. I really like using Stellarium but it can be a challenge to load a target if it isn't in the default database. Comet Leonard isn't in the default database so don't be surprised if you do a search and don't find it. Here is a link that explains how to load a comet into the programme.

<https://blog.martinbelan.com/2020/07/09/how-to-add-a-comet-to-stellarium/>.

You can also update the orbital elements for an existing comet using the same process. This will give a much more accurate location of the comet based on up-to-date data.

Usually in December I like to suggest a few observing related gifts ideas. However, this year is a little different. The supply-chain from China has been severely disrupted this year affecting many areas of commerce. The availability of Astro gear is no different. Prices of new gear have increased by about 20% and the price of used gear has followed suit. I have seen 15-year-old Dob scopes going for the price of what a new Dob cost just a year and a half ago. There are many reasons for these Covid related shortages. Manufacturing and distribution are a big part of this current bottleneck. Increased interest in the hobby is another. People were looking for a hobby they could do alone and outdoors. Astronomy was a natural choice. Consequently, any available new stock was gobbled up very quickly. It's hard to say how many of these new people will stay in the hobby for the long term. But there may be a flood of lightly used equipment coming into the market over the next year or so. If, however, you want/need a new piece of equipment now, expect to pay a premium and be prepared in some cases to wait a long time for delivery.

Perhaps then, this is the winter to concentrate on items such as winter clothing, books, related software and battery power systems. Many of us struggle with powering our equipment in the field. Bigger mounts combined with dew heaters, cameras and computers all add to the power requirements. There are many commercial power packs available using lead acid or lithium iron as the storage medium. Remember that lead acid batteries should only be drawn down to 50% of their rated capacity. Each time a lead acid battery is drawn down to less than 50%, its life is reduced. So, if you need 30 amps for a night of observing, the battery must have a capacity of at least 60 amps. On top of that, lead acid batteries are very heavy and must be on a trickle charger if left unused for a month or more.

Lithium iron batteries have several advantages. They are about one third the weight of lead acid batteries and they can be drawn down to 20% of capacity without decreasing battery life. A lithium iron based 60 amp battery would now provide 48 amps of useful capacity. Another advantage of lithium iron batteries is that they can be stored without charging for six months to a year with no harm to the battery. Lastly, lithium iron batteries can be charged thousands of times compared to a few hundred times for lead acid batteries.

It seems obvious then that Lithium batteries are the best choice for a power supply in the field except for one minor problem -they are very expensive! So, if you are sticking with lead acid batteries for now, remember to charge them regularly or put them on a trickle charger for the winter.

Currently, a very popular piece of equipment used by imagers is the ASIAIR Pro micro computer that sits right on the telescope and controls the whole imaging process. Up until recently the "Pro" version was the newest version with WIFI built in. If you own one of these units, you know that the range of the WIFI is poor to put it mildly. Users have found that they can add an external antenna to the box and greatly increase wireless range. This requires you to either buy the parts and do the soldering yourself or send the unit to someone who will do the upgrade for you. In the last month or so, the ASIAIR "Pro" has been replaced with a "Plus" version that has the antenna included in the build. Needless-to-say, the "Plus" version is the one to look for if buying new.

That's it for now. Janice and I hope you all stay healthy and have a safe and happy Christmas & new year.



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Rising Star Program: December, January

Timely Meteor Showers

Messier Observing Program: December, January... Including target hints!!

Upcoming Meteor showers

What's Up in Awards?

The Hamilton Amateur Astronomers Observing Programs are designed to provide direction for amateur astronomer's observations and to reward their accomplishments. A certificate is awarded when the goals of the observing program are met. The HAA offer various certificates based upon achieving specific observing goals. There is no time limit for completing the required observing but good record keeping is required. Each observer must perform all the requirements of each Observing Program themselves. However, observers are able to receive help from (an)other observer(s) as they learn to find and identify different objects. Each observer will then need to locate and observe the object on their own to meet the goals of the program. Observing logs will be submitted to and examined by the HAA Observing Programs Project Coordinator to confirm all observations before a certificate is granted.

This column tells you which objects are visible this next month for the HAA Observing Programs and other sights of interest.

Recipients

We would like to give recognition and congratulations to any member who completes an award program regardless of the sponsoring organization.

Congratulations to the following:

HAA

Rising Star Awards

001 Jean Jefferson

002 Kevin Salwach

003 Jo Ann Salci

RASC

Explore the Moon

Swapna Shrivastava

Astronomical League

Binocular Double Star Observing Program

143 Bernie Venasse

Binocular Variable Star Observing Program

051 Bernie Venasse

HAA Rising Star Observing Award

December

Constellations: Taurus, Perseus

Stars: Hamal

Double stars: Alcyone

Object Pairs: NGC 1325, NGC 1332

Messier objects: M45

January

Constellations: Auriga, Orion, Taurus

Stars: Aldebaran, Betelgeuse, Capella, Rigel

Double stars: Gamma Lepus

Object Pairs: M42, M43

Messier objects: M35, M42, M45

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Pathways Observing Program

Observable this season: October, November, December

Group C,

Autumn Constellations: Find, observe, sketch: *Perseus, Cygnus, Lyra.*

Stars: Find, observe, sketch: *Algol, Deneb, Fomalhaut.*

Asterisms: Find, observe, sketch: *Great Square, Northern Cross, Circlet.*

Planet: Any one planet that is remaining in the list.

Observable this season: January, February, March

Group D,

Winter Constellations: Find, observe, sketch: *Taurus, Orion, Gemini.*

Stars: Find, observe, sketch: *Capella, Sirius, Betelgeuse.*

Asterisms: Find, observe, sketch: *Head of the Whale, Winter Triangle, Winter Hexagon.*

Planet: Any one planet that is remaining in the list.

HAA Messier Objects Observing Award

December Messier targets

This month we will view two small but bright globular clusters, two open star clusters, and the grandest galaxy in the sky along with its two companions.

- M2** This is a small, bright globular cluster in Aquarius. A low power telescope field will show a round fuzzy patch, brighter in the center and fading to the edge, in a field with no other bright objects.
- M15** This globular cluster in Pegasus is very similar to M2 in size and brightness, except it is surrounded by several bright stars. Best view is through a telescope at medium to high power.
- M29** This galactic cluster is a small, sparse group of stars in Cygnus. A telescope will easily resolve the members of this cluster.
- M39** Dark skies will allow this large, bright cluster in Cygnus to be seen with the naked eye as a hazy patch of light. Binoculars easily resolve this cluster into its bright and widely scattered members and provide a better view than can be seen with most telescopes.
- M31** This is the famous Andromeda Galaxy, our closest galactic neighbor, and the largest, brightest galaxy to be seen in the northern sky. The ability to see M31 with the naked eye provides a good test of the darkness of your skies. M31 is so large that binoculars provide the best view, allowing the entire galaxy to be seen in one field of view. Look for an elongated patch of light, with a bright, round central core.
- M32** This is an elliptical companion galaxy to M31. Through a telescope look for a slightly oval ball of fuzz in the same low power field as the core of M31.
- M110** This is another elliptical companion galaxy to M31, lying on the opposite side of the core as M32. Through a telescope look for a large, oval patch of light. Although M110 is as bright as M32 it is much larger and thus has a lower surface brightness making it a difficult object in light polluted skies.

January Messier targets

- M33** This is a very large (about the size of the full moon) face-on spiral galaxy in the constellation Triangulum. The best and easiest views of M33 can be found with a pair of binoculars. Look for a large, round hazy patch of light with little detail at first glance. M33 can be glimpsed with the naked eye in dark clear skies. Finding M33 in a telescope can be a challenge because of its size. Use the widest field eyepiece you have and look for a change in light level to identify the galaxy.

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What's Up in Awards? December 2021 (continued)

- M103** This is a fairly small, sparse open cluster in Cassiopeia. Through a telescope the cluster is very sparse, four bright stars amidst the slight glow of much fainter companions.
- M52** A small to mid-aperture telescope will begin to resolve this cluster. Look for a triangular patch of light with some stars clearly resolved, but most of the cluster members provide only a hint of graininess.
- M76** Known as the Little Dumbell, this planetary nebula in Perseus is one of the dimmest objects in the catalogue. Look for a small, faint, oblong patch of light. Not a very obvious object, if you don't see it at first try varying magnifications in an attempt to bring it out. Fortunately, M76 is located near a bright star which aids in locating the correct field to search.
- M34** This is a large and bright, but sparse open cluster located in Perseus. Visible as a faint patch of light to the naked eye, it is quite obvious and easy to resolve in binoculars. In fact, binoculars provide a better view of this cluster than most telescopes.
- M74** This galaxy in Pisces is a smaller and fainter version of M33, a face on spiral galaxy with low surface brightness. M74 is arguably the most difficult object to find in the Catalog. You will need very dark, clear skies to easily see it, anything less than perfect conditions will make M74 nearly impossible to find. Look for a very faint fuzzy star, which is the bright central condensation, surrounded by a very faint glow. Try all of your tricks on this one; star hop to the correct field, try varying magnification, tap the scope to detect the galaxy through its motion. If all of the above fail, try again another night or seek darker skies.
- M77** This is a small faint galaxy in Cetus. Through a telescope look for a fuzzy, oval shaped patch of light, bright in the center, fading towards the edges.

The Planets... December 2021 via (BBC) Sky at Night Magazine

Mercury Evening planet, poorly positioned at the start of December. Near to Venus at the end of the month.

Venus Low evening planet. Appears near Mercury at end of December and a waxing crescent Moon on 6 and 7 December.

Mars Morning planet, with thin crescent Moon nearby on 3 December. 4.6° north of Antares on 26 December.

Jupiter Evening planet, unable to reach its highest altitude in darkness any more. Moon close on 8 and 9 December.

Saturn Compromised by the evening twilight. Waxing crescent Moon nearby on 7 and 8 December.

Uranus Well-positioned evening planet, 25 arcminutes south-southeast of 29 Arietis on 29 December.

Neptune Well placed at the start of December, but rapidly succumbs to the evening twilight as the month progresses.

Meteor Showers via American Meteor Society

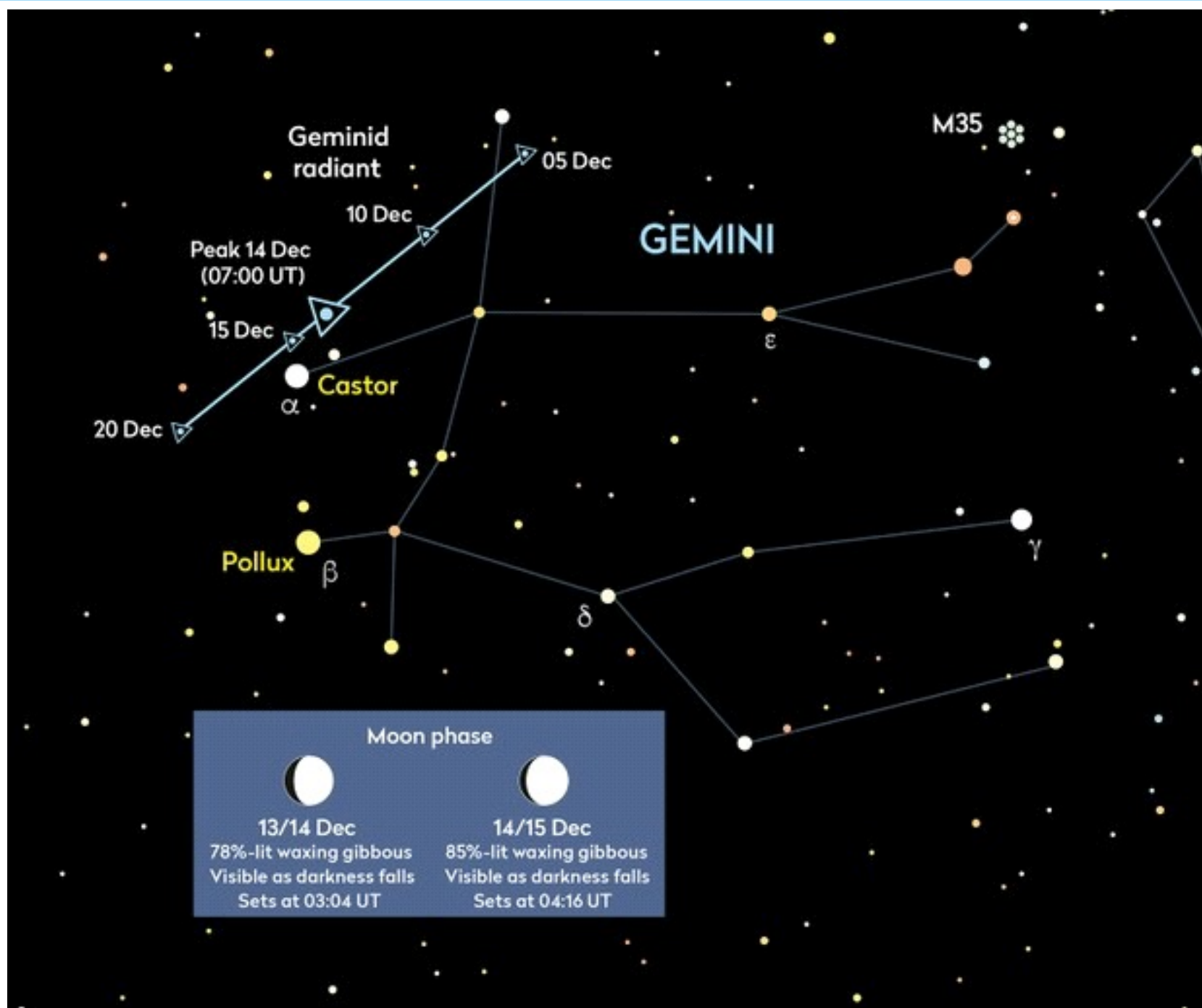
Geminids

Period of activity: November 19th, 2021 to December 24th, 2021

Peak Night: Dec 13-14, 2021

The Geminids are usually the strongest meteor shower of the year and meteor enthusiasts are certain to circle December 13 and 14 on their calendars. This is the one major shower that provides good activity prior to midnight as the constellation of Gemini is well placed from 22:00 onward. The Geminids are often bright and intensely colored. Due to their medium-slow velocity, persistent trains are not usually seen. These meteors are also seen in the southern hemisphere, but only during the middle of the night and at a reduced rate.

(Continued on [page 18](#))



A bright waxing gibbous Moon interferes for much, but not all, of the two nights that the peak period of the Geminid meteor shower falls on in 2021.

Credit: Pete Lawrence

Geminids (continued)

Shower details - Radiant: 07:24 +32.3° - **ZHR:** 150 - **Velocity:** 21 miles/sec (medium - 34km/sec)

Parent Object: 3200 Phaethon (asteroid)

Next Peak - The Geminids will next peak on the Dec 13-14, 2021 night. On this night, the moon will be 78% full.

Ursids

Period of activity: December 13th, 2021 to December 24th, 2021

Peak Night: Dec 21-22, 2021

(Continued on [page 19](#))

What's Up in Awards? December 2021 (continued)

The Ursids are often neglected due to the fact it peaks just before Christmas and the rates are much less than the Geminds, which peaks just a week before the Ursids. Observers will normally see 5-10 Ursids per hour during the late morning hours on the date of maximum activity. There have been occasional outbursts when rates have exceeded 25 per hour. These outbursts appear unrelated to the perihelion dates of comet 8P/Tuttle. This shower is strictly a northern hemisphere event as the radiant fails to clear the horizon or does so simultaneously with the start of morning twilight as seen from the southern tropics.

Shower details - Radiant: 14:36 +75.3° - **ZHR:** 10 - **Velocity:** 20.5 miles/sec (medium - 33km/sec)

Parent Object: 8P/Tuttle

Next Peak - The Ursids will next peak on the Dec 21-22, 2021 night. On this night, the moon will be 93% full.

Quadrantids

Period of activity: December 26th, 2021 to January 16th, 2022

Peak Night: Jan 2-3, 2022

The Quadrantids have the potential to be the strongest shower of the year but usually fall short due to the short length of maximum activity (6 hours) and the poor weather experienced during early January. The average hourly rates one can expect under dark skies is 25. These meteors usually lack persistent trains but often produce bright fireballs. Due to the high northerly declination (celestial latitude) these meteors are not well seen from the southern hemisphere.

Shower details - Radiant: 15:20 +49.7° - **ZHR:** 120 - **Velocity:** 25 miles/sec (medium - 40.2km/sec) -

Parent Object: 2003 EH (Asteroid)

Next Peak - The Quadrantids will next peak on the Jan 2-3, 2022 night. On this night, the moon will be 0% full.

Please feel free to contact me with any questions or comments at eclipse@amateurastronomy.org

— Bernie

HAA Helps Hamilton

While during the pandemic, the H.A.A. hasn't been able to collect donations from our members and guests for local food banks at our general meetings, the H.A.A. has always valued its relationships with food banks in the community, particularly [Hamilton Food Share](#).

In that spirit, we encourage you to continue making donations directly to your local food banks.





This article is distributed by NASA Night Sky Network.

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

The James Webb Space Telescope: Ready for Launch!

David Prosper

NASA's James Webb Space Telescope is ready for lift-off! As of this writing (November 15), the much-anticipated next-generation space telescope is being carefully prepared for launch on December 18, 2021, and will begin its mission to investigate some of the deepest mysteries of our universe.

The development of the Webb began earlier than you might expect – the concept that would develop into Webb was proposed even before the launch of the Hubble in the late 1980s! Since then, its design underwent many refinements, and the telescope experienced a series of delays during construction and testing. While frustrating, the team needs to ensure that this extremely complex and advanced scientific instrument is successfully launched and deployed. The Webb team can't take any chances; unlike the Hubble, orbiting at an astronaut-serviceable 340 miles (347 km) above Earth, the Webb will orbit about one million miles away (or 1.6 million km), at Lagrange Point 2. Lagrange Points are special positions where the gravitational influence between two different bodies, like the Sun and Earth, "balance out," allowing objects like space telescopes to be placed into stable long-term orbits, requiring only minor adjustments - saving Webb a good deal of fuel.

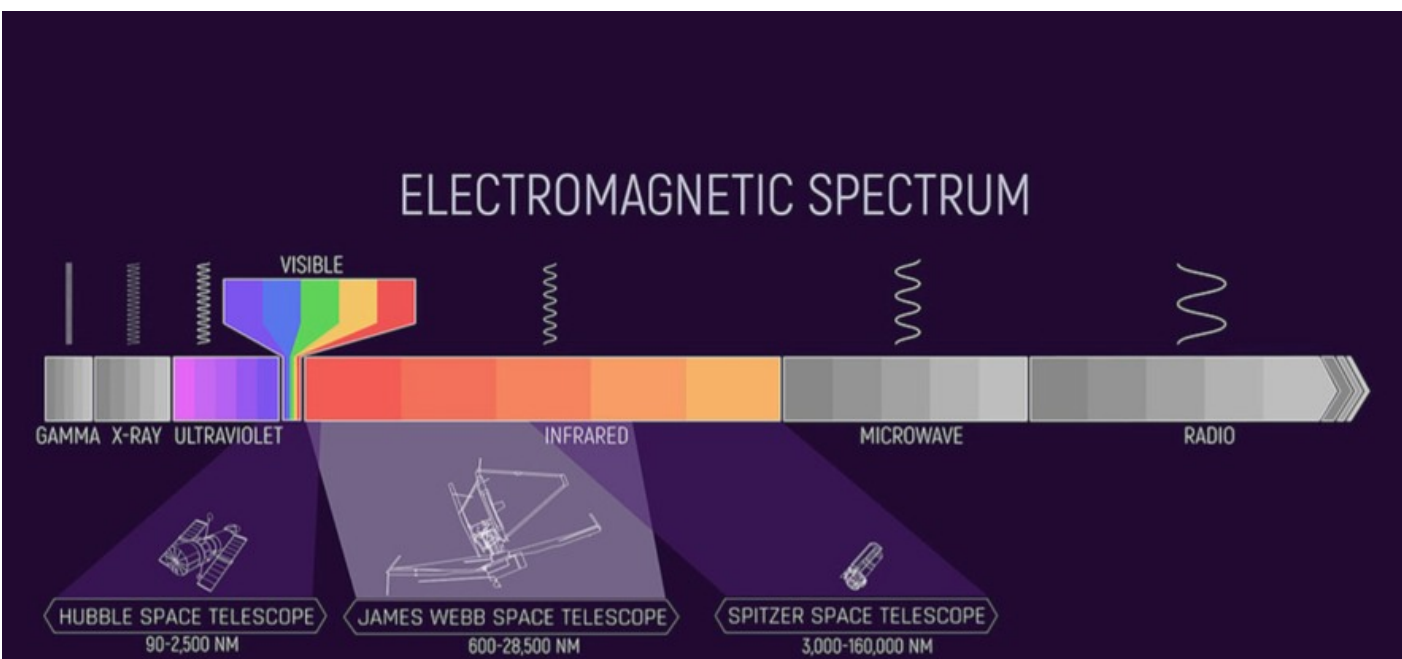
Since this position is also several times further than the Moon, Webb's sunshield will safely cover the Moon, Earth, and Sun and block any potential interference from their own infrared radiation. Even the seemingly small amount of heat from the surfaces of the Earth and Moon would interfere with Webb's extraordinarily sensitive infrared observations of our universe if left unblocked. More detailed information about Webb's orbit can be found at bit.ly/webborbitinfo, and a video showing its movement at bit.ly/webborbitvideo.

Once in its final position, its sunshield and mirror fully deployed and instruments checked out, Webb will begin observing! Webb's 21-foot segmented mirror will be trained on targets as fine and varied as planets, moons, and distant objects in our outer Solar System, active centers of galaxies, and some of the most distant stars and galaxies in our universe: objects that may be some of the first luminous objects formed after the Big Bang! Webb will join with other observatories to study black holes - including the one lurking in the center of our galaxy, and will study solar systems around other stars, including planetary atmospheres, to investigate their potential for hosting life.

(Continued on [page 21](#))

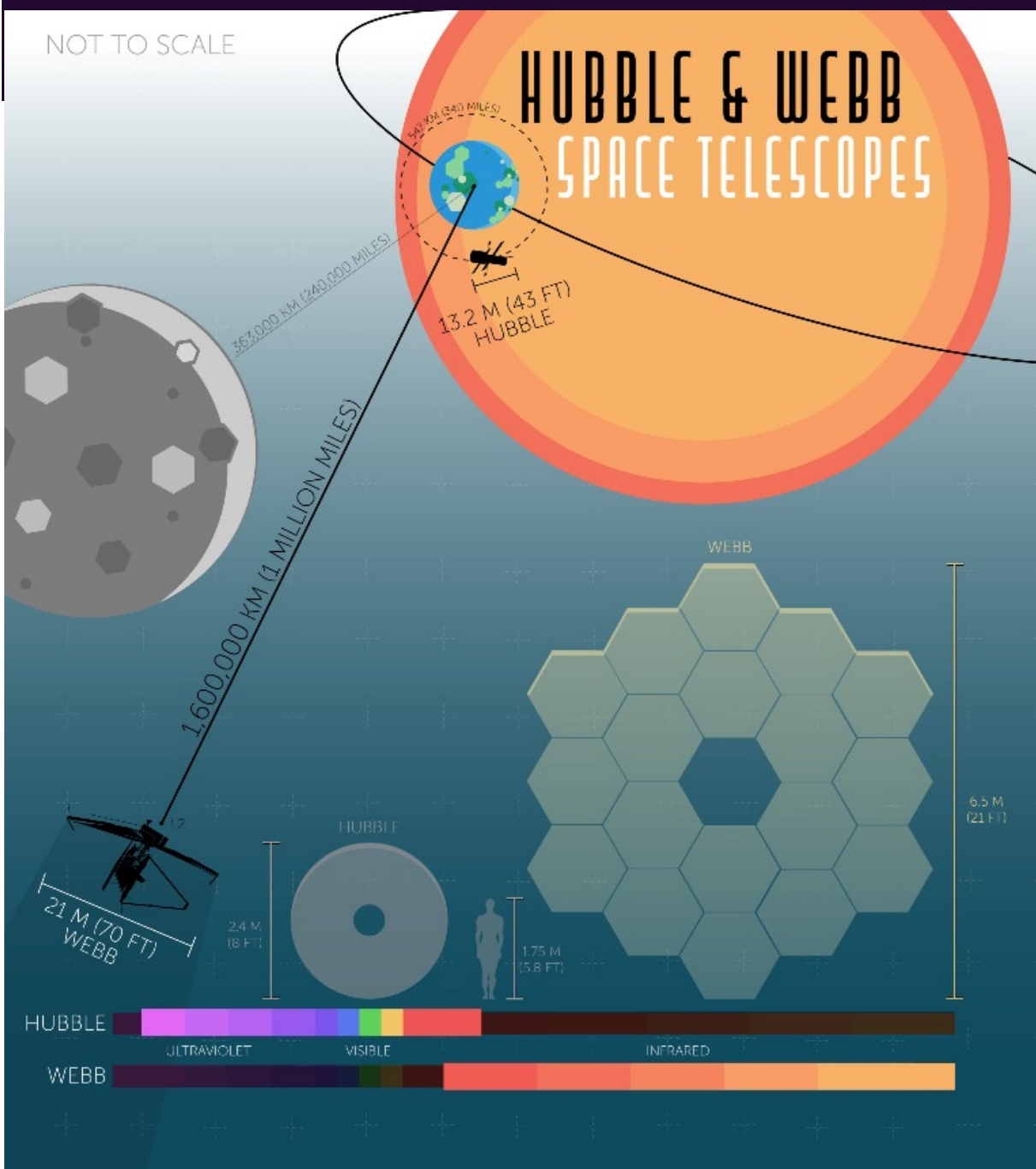
NASA Night Sky Notes (continued)

Wondering how Webb's infrared observations can reveal what visible light cannot? The "Universe in a Different Light" Night Sky Network activity can help - find it at bit.ly/different-light-nsn. Find the latest news from NASA and Webb team as it begins its mission by following #UnfoldTheUniverse on social media, and on the web at nasa.gov/webb.



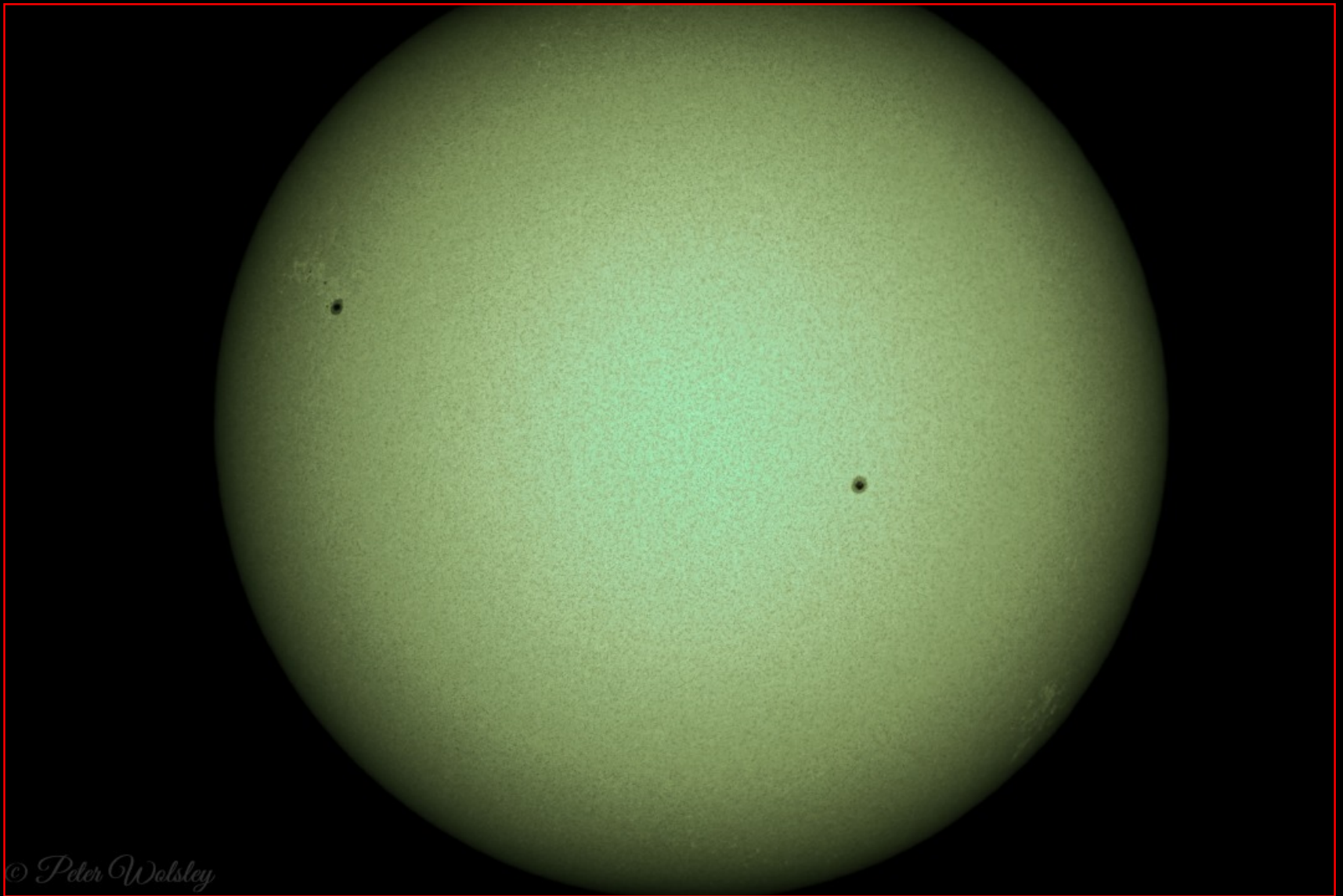
Webb will observe a wide band of the infrared spectrum, including parts observed by the Hubble - which also observes in a bit of ultraviolet light as well as visible - and the recently retired Spitzer Space Telescope. Webb will even observe parts of the infrared spectrum not seen by either of these missions!

Credits: NASA and J. Olmstead (STScI)



Webb will follow up on many of Hubble's observations and continue its mission to study the most distant galaxies and stars it can - and as you can see in this comparison, its mirror and orbit are both huge in comparison, in order to continue these studies in an even deeper fashion!

Credits: NASA, J. Olmsted (STScI)



above – **The Sun with Sunspots,**
as imaged on November 7,
2021, with full-aperture
solar filter,

by **Peter Wolsley**



left – **Comet C/2021 A1 Leonard,** November 23,
2021,

by **Jason Colavecchia**



**The Orion
Nebula
(M42/M43),
on November
7, 2021,**

**by Andrew
Brenyo**



The Partly Eclipsed Moon and the Pleiades (M45), November 19, 2021, by Bob Christmas

UPCOMING EVENTS

December 10, 2021 - 7:30 pm – Virtual Online H.A.A. Meeting. Our main speaker will be *Bill Burnyeat*. Topic: “The First Astronomers”.

Due to the COVID-19 Coronavirus pandemic, the meeting will be conducted on the platform Zoom. Be on the lookout for an invitation e-mail with a meeting link. You may download the Zoom app for various platforms from Zoom’s [Download Center](#).

We hope to return to in-person meetings very soon!

2021-2022 Council

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All active HAA members have the privilege of access to an exclusive HAA members only dark sky location.

Be on the lookout for e-mails with dark sky observing details. Space is limited.

The Harvey Garden HAA Portable Library



Contact Information

E-mail: library@amateurastronomy.org