



Event Horizon

Volume 28, Number 4
February 2021



From The Editor

Here we are, in the depths of February, in the middle of Pandemic Winter....

Stay warm, stay safe, curl up with a coffee or hot chocolate, and enjoy this month's E.H.

Bob Christmas, Editor

editor 'AT'
amateurastronomy.org



Chair's Report by John Gauvreau

So this is the dead of winter and these old bones of mine shy at the thought of observing in the frigid temperatures. What happened to me? Still, I did get to see the full moon and I hear that some others (who were braver, or at least hardier, than I) got to see more. It's ok; I have been reading a lot this past month. Speaking of which, I have to mention some of the incredible content I have seen in the newsletter recently. Last month's picture of the Flaming Star nebula by Michel Audette was amazing, and December's picture of the Veil Nebula by Mike Hamilton and Alex Kepic's image of Mars were equally impressive. So many others as well; I hope you are all enjoying the great work by your fellow members. And certainly not least, a big high five to Jo Ann Salci for the inaugural edition of her "HAA Explorers" column. Well done!

Later this month we will get to see the newest rover land on Mars. Mars probes seem to be either wildly successful (Curiosity has been going for over 8 years and has travelled over 24 kms, and Mars Odyssey has been going since 2001. That's right; coming up on 20 years!) or spectacular failures (yeah, we all remember the embarrassment of the Mars Climate Orbiter; oops, as big as space is, I still accidentally hit a planet!). There's no middle ground when it comes to interplanetary travel simply because there's no room for error. You either do everything perfectly and yield incredible results or you make one mistake and it all goes to H-E-double hockey sticks in a handbasket (or into an impact crater at thousands of kilometers an hour). And now this month we will hold our collective breath as we watch the largest and most sophisticated rover ever attempt the most challenging descent and landing ever. Bonne chance, Perseverance!

(Continued on [page 2](#))

IN THIS ISSUE:

- HAA Explorers
- The Sky This Month for February 2021
- Notes from My *Virtual* Table, January 2021

- Canadian Solar Eclipses: 0-3000
- Where Is Astronomy Going From Here?
- NASA Night Sky Notes
- Eye Candy
- Contact Information

Chair's Report (continued)

HAA Meetings

Last month, Mario Carr gave us a fun evening as we listened to stories about his time promoting astronomy through the media. Mario's relaxed and comfortable manner put everyone at ease and we all had a great time talking and asking questions. Thanks Mario!

This month, we can look forward to a presentation by Philip Groff, the Executive Director of the Royal Astronomical Society of Canada. Phil is a great guy and I look forward to his visit.

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.

Also, since we are holding our meetings online there can be no collection for the foodbank, but don't let that stop you from contributing yourself. It doesn't matter if it comes from the club or straight from the club members; there are people in need and any donation is always welcome.

The February meeting begins at the usual time of 7:30 on Friday February 12th. Hope to see you there!

Beginners Group

The Beginners' Group has already had their first meeting of the year. It's a large group this year; I think the largest ever! We had a great time getting to know one another and now are ready to plunge into some good astronomy talks. I would like to say to all who attended that it was great to meet you and I look forward to spending more time together over the next few months.

Other Projects for 2021

The eclipse glasses are completed and on schedule to be distributed when the weather is warmer and we are allowed to set up a distribution point. There will be one free pair for every member and if you need more (for family or friends) there will be extras available for a small cost. A big thank you goes out to Bernie Venasse for setting it up and placing the order, and to Ann Tekatch for handling the delivery and payment. Great job!

Conclusion

I had a great experience a couple of days ago. I participated in a Zoom meeting with a variety of other astronomy club presidents from around Ontario. We talked about how we are coping with keeping the clubs going during Covid times, and shared other ideas in an attempt to simply help the amateur astronomy community. I was reminded how cozy the astronomy community is (there was quite a bit of "Oh, you must know so-and-so!"), how good a job the HAA is doing (I got high praise from others for our calendar) and just how friendly and supportive everyone is. Some people I knew and some I just met then, but everyone was so helpful and friendly. It was great to be reminded just how much fun it is to be part of a club and just how great it is to get to know all the other members, in our club and others.

Masthead Photo: *The Almost-Full Moon Casting Backyard Shadows, by Jo Ann Salci.*

Taken on January 27, 2021 with her cell phone (ISO 200; f/1.7; 2 seconds) from Ancaster, ON.



Welcome back! Last month we took a look at what's up in the sky. This month we are staying closer to home and checking out our home – planet, Earth. Have fun!

What on Earth??

Unless you're an astronaut living on the International Space Station (ISS), you, and everyone you know, live here on planet Earth. It is one of 8 planets that go around (orbit) the star that we call our Sun. Earth is the third planet from the Sun, which is 150 million km away. Earth is special!! We haven't found life anywhere else in the Universe...yet!

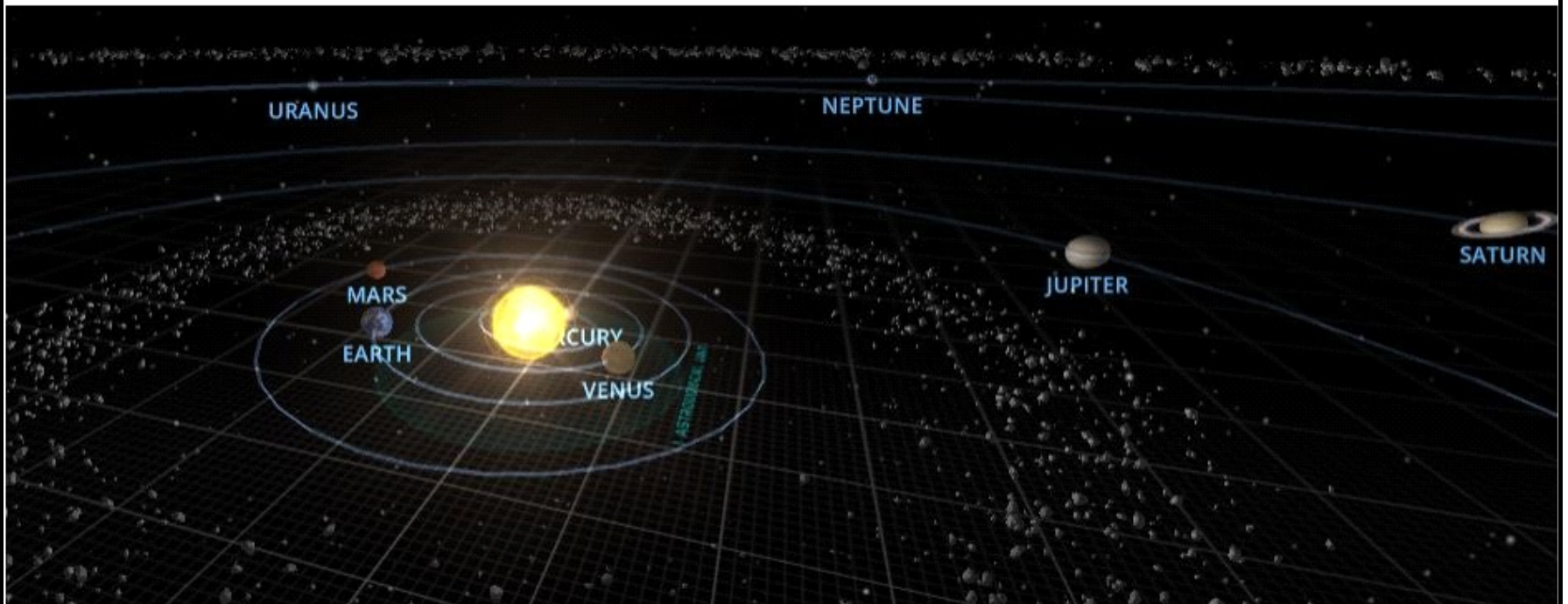


Diagram Credit: solarsystemscope.com Not drawn to scale.



Most of our Earth home is covered by water (71%) and ice (10%)! It is surrounded by an atmosphere 515 km thick which is made of gases. This atmosphere is like a blanket surrounding the Earth, protecting it from the Sun's radiation, balancing our surface's temperature and more! Earth is 12,756 km across.

Photo Credit: NASA.

(Continued on [page 4](#))

HAA Explorers (continued)

As the Earth travels around the Sun, it also spins toward the East! It spins very fast at 1,600 km per hour! Imagine a line going right through the middle of the Earth from North to South. This is called the Earth's axis.

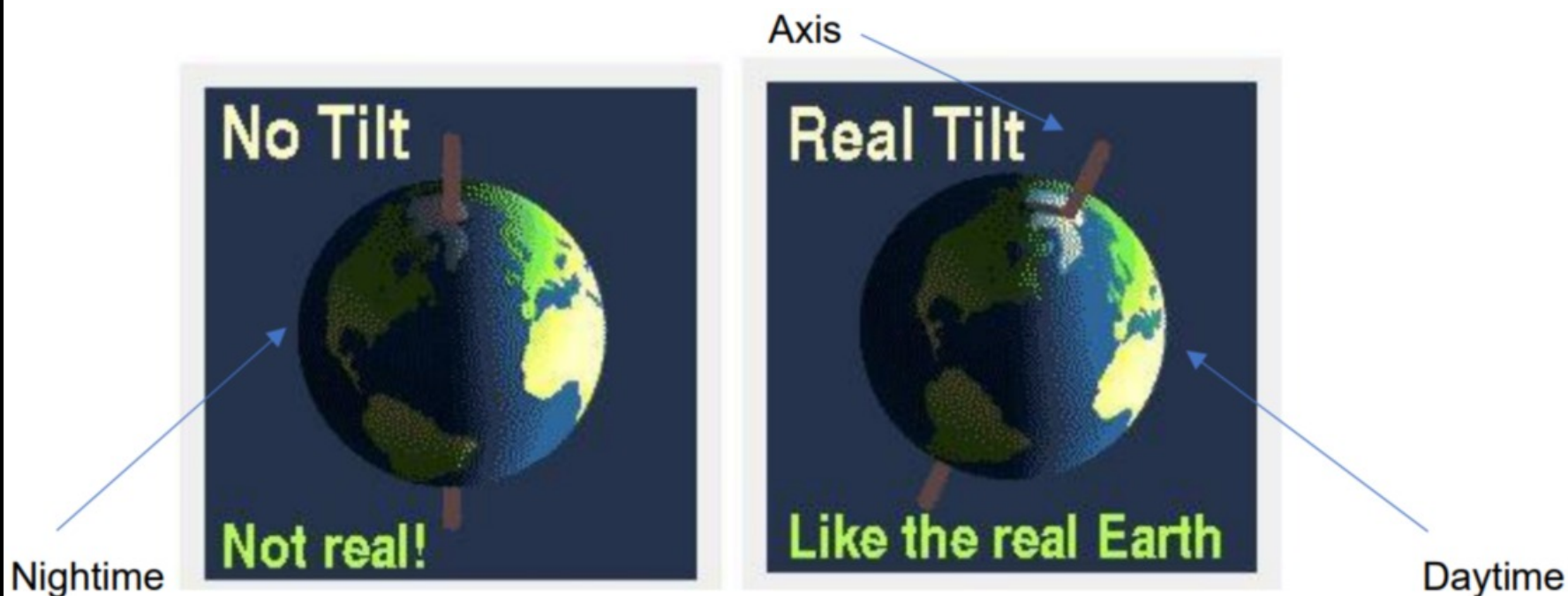


Diagram Credit: NSO (both)

You can see that the axis doesn't go straight up and down, and is tilted by 23.5° (degrees). This tilt and Earth's orbit around the Sun are the reasons why we have four seasons!

Time to put on your thinking caps! Match Column A with Column B:

Column A

A year (365.25 days)

Nighttime

A day (24 hours)

Daytime

Column B

When the part of the Earth you live on is facing away from the Sun. This is when you can see other stars and most planets!

The time it takes the Earth to orbit the Sun one time, for example, from one birthday to the next!

When the part of the Earth you live on is facing towards the Sun. We can't see other stars and most planets because the Sun's light is too bright.

The time it takes Earth to spin around one time on its axis.

Answers on page 7.

(Continued on [page 5](#))

HAA Explorers (continued)

During February, see how many of these you can see in the sky:

1. Any Clear Night: The Constellation Orion: Constellations are patterns formed by stars in the sky. Orion, also called the Hunter, appears in the February sky all evening. Orion's belt and sword are easy to see in the night sky!



The constellation of Orion, with picture and constellation lines (left) and without picture and constellation lines (right).

Charts generated using Stellarium.

(Continued on [page 6](#))

HAA Explorers (continued)

2. Mars and the Moon along with the Pleiades and some bright stars: On the evening of **February 18th around 6:30 p.m. and afterwards**, look up high in the southern sky to see the Moon near Mars. You will also see some bright stars, like Betelgeuse and Rigel in Orion (see above), and Sirius, also called the Dog star. If you look carefully, you may also see a fuzzy patch above the Moon called the Pleiades, a group of stars also called the Seven Sisters.



Chart generated using Stellarium.

Things to do until next time**:

1. Visit www.solarsystemscope.com where you can see what it looks like as the Earth and other planets actually move around the Sun.
2. Visit NASA's Space Place: <https://spaceplace.nasa.gov/menu/earth/>. This month you will learn more about the Earth. You could even make your very own Stained-Glass Earth!
<https://spaceplace.nasa.gov/stained-glass-earth/en/>
3. Watch this YouTube video about why we have 4 seasons:
<https://www.youtube.com/watch?v=UQjT5uKp2hg>

(Continued on [page 7](#))

4. *Mind Benders:*

- What would happen if the Earth didn't spin on its axis?
- What would happen if the Earth was not tilted on its axis?
- What if the Earth spun in the opposite direction?
- Do the stars travel across the night sky?
- Why can't I see stars during the day?

5. *Have a look at this video of Earth* taken from the ISS during 2020. There are some amazing views!!
<https://t.co/k90COvWXei> <https://t.co/cGd95Dj4yF>

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

Finally:

What type of hair do Earth's oceans have??

Answer: Wavy!

See you next month!

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

Answers to “Match Column A with Column B”:

Column A	Column B
A year (365.25 days)	When the part of the Earth you live on is facing away from the Sun. This is when you can see other stars and most planets!
Nighttime	The time it takes the Earth to orbit the Sun one time, for example, from one birthday to the next!
A day (24 hours)	When the part of the Earth you live on is facing towards the Sun. We can't see other stars and most planets because the Sun's light is too bright.
Daytime	The time it takes Earth to spin around one time on its axis.

(Continued on [page 8](#))

Answers to Mind Benders:

- What would happen if the Earth didn't spin on its axis?

Answer: One half of the Earth would always have daytime, and the other half would always have nighttime. Which side would you like the best?

- What would happen if the Earth was not tilted on its axis?

Answer: We would not have 4 seasons every year. Each area of the Earth would be stuck with one of the 4 seasons all the time. Which season would you like the best?

- What if the Earth spun in the opposite direction?

Answer: The Sun, Moon and stars would appear to rise in the West and set in the East instead of the way we see it now, which is from East to West!

- Do the stars travel across the night sky?

Answer: No. It appears as though the stars are moving across the night sky from East to West. It is actually the Earth spinning on its axis and moving towards the East...so we are moving at 1,600 km per hour and not the stars!!

- Why can't I see stars during the day?

Answer: Stars are all around us, we just can't see them during the day. We can only see them at nighttime when we are facing away from the Sun. The Sun's light is too bright and we can't see past the Sun to see stars.

References:

Astronomy.com: Astronomy for Kids. 2019.

National Geographic Kids: Ultimate Space Atlas. 2017.

National Schools Observatory: https://www.schoolsobservatory.org/learn/astro/esm/seasons/e_tilt



The Sky This Month for February 2021 by Matthew Mannering

As of February 1st, there are only seven more weeks till spring; but who's counting? Unfortunately, January for the most part has been a total write off as far as observing goes. Janice and I got out about a week ago at midnight with binoculars to look at the constellations. Then just a couple of days ago, I went out again with binoculars to see Mars and Uranus when they were four degrees apart. I saw them both in the same field of view and I had no trouble finding Uranus below Mars.

Last week, the Beginners Group had their first Zoom session. Everyone introduced themselves and there was a very informal chat about what to expect in the upcoming sessions. With that in mind, I thought I would tell you about the aspects of visual astronomy that frustrate so many beginners.

When I started looking for Messier objects about seventeen years ago (long before I joined the club), I was perplexed when after multiple attempts I couldn't find M1 the Crab Nebula. It turns out that M1 is a lot smaller and dimmer than you might think. Back then I had an 80mm refractor which turned out to be part of the problem. You see, an 80mm refractor has a limiting magnitude of around 11.7 in average conditions. The magnitude of the Crab is listed as 8.4 so it should have been an easy catch, but the surface brightness is only magnitude 11.9. Back then I didn't know that the listed magnitude of many of these objects represents what would happen if you took all the light from the object and squeeze it down to a point source (like a star). So, as it turns out the odds of me seeing the Crab were close to zero with that scope. Six years later I got my twelve inch Dob and found it on the first attempt.

The weird thing is that the surface brightness value is just an average value for the whole target. It doesn't tell you the magnitude of the brightest parts of a target, for instance, the spiral arms in a galaxy or filaments in a nebula. So, you need to check each target anyway to see if any/all or none of it is visible. Whoever said that being an amateur astronomer was easy, never looked through an eyepiece at an extended object!

Surface brightness isn't an issue if you are observing star clusters. However, for extended objects like nebulae and galaxies it is helpful to know three things.

- The clarity and limiting magnitude of the sky itself. Artificial light and haze pretty much wreck any chance of seeing faint fuzzies.
- The limiting magnitude of your scope or binoculars. You can use a website such as Telescope Limiting Magnitude Calculator (cruxis.com) to enter telescope and sky conditions to find that number.
- The surface brightness of your target.

Another limiting factor would be the cleanliness of the telescope or binocular optics. If the optics are dirty, they can easily lose a full magnitude of light and scatter the incoming light as well. A layer of dust on a lens is easy to remove but dirt on the mirrors of a reflector requires a little more experience to clean. In either case, it is important to get advice before cleaning any glass surface on a scope for the first time. There are club members who can give you good advice for cleaning the optics of any type of scope.

In general, I would always tell a beginner to stick to low or medium magnification. High magnification is a problem especially when using a non-tracking mount for several reasons. Most beginner eyepieces have a relatively narrow field of view. Combining a narrow field of view with high magnification and a manual mount is a recipe for frustration. The telescope needs to be moved almost continuously to follow the target and by the time the telescope settles it's time to move it again.

On the other hand, high magnification can make an extended object easier to see. However, the explanation isn't as straight forward as you might think.

(Continued on [page 10](#))

The Sky This Month for February 2021 (continued)

As an example, let's say that at low magnification the target only covers 10% of the field of view in the eyepiece. That means that 90% of the field of view contains light that you don't want or need. The net effect of this is to reduce the apparent contrast of the light within the target. In other words, it looks like a small featureless blob or it disappears into the background light. Increasing the magnification increases the image scale and reduces the amount of extraneous light around the target by reducing the field of view. This results in the perception of increased contrast within the target itself which allows you to see finer detail. This is a good thing, right? Well yes and no.

The other effect of increased magnification is that overall, the target is much dimmer. This happens because the available light is spread over a greater area in the field of view. Also, every telescope has an upper limit of magnification above which the view gets very soft. So, seeing detail in any extended object is always a balance between, seeing conditions, magnification and the limitations of both your telescope and experience. The more experience you gain, the more you will see.

Another source of frustration is finding the object in the first place. Computerized GoTo scopes eliminate a lot of that frustration once you learn how to align the scope to the sky. On the other hand, if you use a scope on a manual mount the only computer is the one in your head.

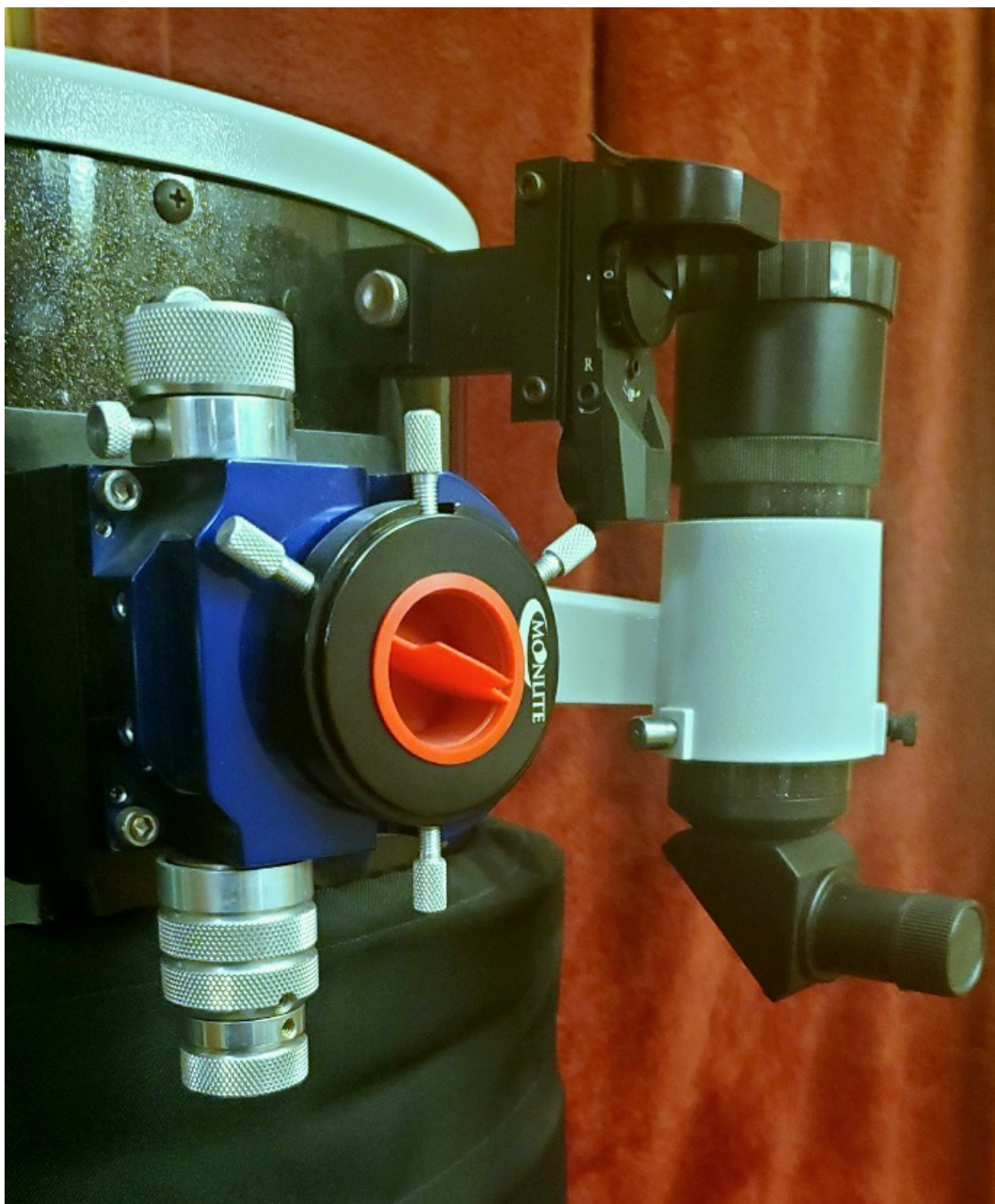
Most scopes come with a finder scope like a miniature telescope. These are usually 8x50 scopes with a 5-degree field of view. This seems like a good combination until you point the scope in the general direction

of the target and try to find it using the finder scope. All I can say is 'Good luck with that'. This is further complicated by finder scopes that show the sky upside down and right to left. I always recommend getting a 'correct image' finder scope so that the view through the finder matches your charts.

The best accessory I ever put on a scope was the addition of a Red Dot finder. A Red Dot Finder is just a glass surface with a red dot superimposed on the glass. There is no magnification. This way, you can use both eyes to move the scope and find the target.

To find a target, first use the Red Dot Finder to get close. Use the 8x50 finder scope to get the target right on the cross hairs and then look through the main eyepiece. I can pretty much guarantee that this method of target acquisition will reduce your frustration and time spent searching by about 80%. There is one caveat, finder scopes don't find much if they are not aligned with the main scope.

(Continued on [page 11](#))



The Sky This Month for February 2021 (continued)

Another piece of advice would be to start with targets that are big and bright and easy to see in binoculars. Open clusters, Globular clusters, the Orion nebula and the Andromeda galaxy are all big and bright. Once you can find them in binoculars, you should be able to find them in your telescope. Don't even bother with low surface brightness targets until you can find the big bright ones. Most beginners can't see really faint targets even if someone has centred the target in the eyepiece. Try to remember that it takes time and experience to train your eyes and brain to see them.

Planning your night out can be very helpful. There is a lot to remember. Here is a list of some things to keep in mind:

- A chair and a table.
- Red flashlights.
- Star charts and observing guides.
- Power for your equipment.
- A list of telescope equipment to take.
- Binoculars.
- A list of targets from a beginner observing guide.

When a beginner goes out for the evening, a list of 5 targets would be enough in most cases. They might find three targets in an evening if finding them manually. In order to avoid becoming too frustrated when a target can't be found, remember to move on.

I find that a half an hour is about the longest I can search for any one object. Beyond that time frame I am just getting frustrated. So, I take a break and sit down with my binoculars and just enjoy the sky. Remember, self-induced mental torture is not fun and observing is supposed to be fun.

A more experienced observer may be able to give you clues on how to approach finding a specific target. Star hopping and target recognition is a bit of an art that requires practice. I like to show the beginner the target in their own telescope if they are stuck. This isn't cheating. Once a beginner has seen the target, they have a much better chance of finding it on their own. It's hard to find a target if you have no idea what it looks like.

Lastly, start packing up before you are at the point of falling over from fatigue. The equipment is expensive and, in many cases, fragile. Also, it's generally a good thing to be awake while driving home. Remember to search the ground with a flashlight before you leave for the evening. It's very easy to drop things on the ground and some of those things are very expensive. An eyepiece doesn't make much of a sound if it lands in the grass. Oddly the things I see left behind most often are big. I have taken a chair or table home to later return to a friend more than once.

By the way, the Ontario Government has basically outlawed the use of handheld laser pointers. You can apply for a permit for an event, but the paperwork is absolutely ridiculous and needs to be repeated for every use. Anyway, let's hope for a reduction in Covid-19 by early summer so that we can meet and enjoy the sky as a club. Just be sure to leave your lasers at home.



Notes from My *Virtual* Table, January 2021 by Bernie Venasse

The purpose of the virtual table is the same as the purpose of my table in the corner at our attended meetings. Either is used to inform, educate, inspire, and challenge members.

The table offers news highlights sourced from commercial and club periodicals, newsletters, and bulletins from around the globe. Sometimes I will offer observation challenges or sometimes it might be hacks that might prove useful to you. Of course, there are always bits of information regarding award programs or other forms of goal-oriented observing. The table is also a great place to bring your questions or suggestions.

Sorry, but I have yet to figure a way to use the laminating machine through the Internet!!!

These are just a few ideas from one who is quite worried about our future as people who support the study of humanity's oldest science. The author welcomes similar ideas from other readers of "Event Horizon" either in the form of articles or letters to the editor.

Presented at the January table...

SkyNews is the bimonthly magazine from the RASC. The January-February issue had an article about the Canadian Space Agency inviting suggestions for the future direction of the Canadian space program. www.skynews.ca.

The February issue of Sky and Telescope presents an excellent article detailing the viewing opportunities in the Club of Orion. Also in this issue is a review of the Skywatcher Evostar 150 APO. www.skyandtelescope.com.

Reflector magazine is published quarterly by the Astronomical League and is included in a membership. Current issues are members-only access, but back issues are available online. www.astroleague.org/reflector

Reflector magazine September 2020 included the article, "Exoplanet Sleuths in the Era of TESS". It also featured news of the new award program, Obsolete Constellations. www.astroleague.org.

RASC offers several awards including an open-to-the-public program, Explore the Universe. rasc.ca/explore-universe.

The Hamilton Amateur Astronomers also offers a few goal-oriented observing programs, Contact me for info. eclipse at amateurastronomy.org

Pathways Observing Program is a 4-part, 4-season introduction to the night sky... using only your eyes.

Rising Star Observing Award is designed to provide the observer's observations and award their accomplishments.

HAA Messier Award. This program is offered in two parts. A silver-level certificate is offered for the observation of 75 Messier objects, while a gold-level certificate is awarded for completing the entire list.

...Looking forward to February...



Canadian Solar Eclipses: 0-3000 by Ray Badgerow

Here is a listing of Canadian solar eclipses going back for the past 3000 years. When I initially started this in 1999, my results were somewhat in error. With the advent of the 5 Millenium Catalog of Solar Eclipses I was able to update my results from before while working on this during the lockdown.

Time Period	Annular	Total	Hybrid
001-100	7	9	3
101-200	3	8	4
201-300	6	8	0
301-400	5	14	0
401-500	8	9	0
501-600	13	9	0
601-700	9	12	1
701-800	11	6	0
801-900	7	12	0
901-1000	9	6	0
1001-1100	15	5	1
1101-1200	11	11	0
1201-1300	15	8	1
1301-1400	11	7	2
1401-1500	7	10	0
1501-1600	10	10	1
1601-1700	6	8	4
1701-1800	11	5	2
1801-1900	10	9	0
1901-2000	2	12	2
2001-2100	7	7	0
2101-2200	9	9	1
2201-2300	11	8	1
2301-2400	12	9	0
2401-2500	11	10	1
2501-2600	6	6	0
2601-2700	10	11	0
2701-2800	13	5	0
2801-2900	10	6	2
2901-3000	12	12	0
	278	260	27

During the period from 0-3000, there are 565 solar eclipses that cross Canadian territory.

- 278 Annular 49.2%
- 260 Total 46.0%
- 27 Hybrid 4.8%

In addition, during this time period there are a total of 7 non-central annular solar eclipses that graze the Earth's surface, more on that in a later article. I will be writing a series of articles on this subject.



Where Is Astronomy Going From Here? by Mike Jefferson

When you look at the topic of astronomical investigation, a number of images (no pun intended) come to mind. They probably range from visions of being out under a dark sky, in the country, with fellow observing enthusiasts - club members, friends, neighbours or family. Beyond this will be dreams of being inside a large, professional observatory and collaborating with a group of professional people on a project involving quasars, gravity waves or black holes. Club meetings will certainly sit high on the list. Even council meetings have their attractions for some of us!

However, most of our activities over the last 13 or so months have been curtailed almost completely. This has been due to 2 major interruptions. One of these is a viral epidemic and the second has been due to climate change. If you are a regular observer, it is very evident that the frequency of usable nights has become almost non-existent since before Christmas of 2020. Anything that has materialized, since then, has been stifled by 'stay at home' orders. Here you are stuck with the electrified garden ornaments and streetlights of suburbia. Beyond this, you may be plagued with Elon Musk's Internet satellite trains. It just seems that a benign activity, such as ours, is being kicked and dragged down by large corporations and circumstances that we have no power to either compromise with or control. And we certainly have done a lot of good for society by showing people the beauty of the night sky and a lot of amazement of the sun by day. Mario Carr has been nothing short of super ('Mario') with his versions of (PBS') Jack Horheimer on CHCH - TV. ("And remember fellow astronomers, keep looking up!").

What to do if we lose our observing venues and have to stay home for an extended period in the near future? We will probably have to rely on satellite observations, library work and book reports, armchair astronomy, studies of meteorite collections, solar, lunar and planetary work when we can obtain it. However, I hope it never gets to that! I think we need to get far more active environmentally. It should go much further than support of the International Dark Sky Association. Maybe we need to put pamphlets on the windows of vehicles in parking lots.

These are just a few ideas from one who is quite worried about our future as people who support the study of humanity's oldest science. The author welcomes similar ideas from other readers of "Event Horizon" either in the form of articles or letters to the editor.

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!

Landing On Mars: A Tricky Feat!

David Prosper

The Perseverance rover and Ingenuity helicopter will land in Mars's Jezero crater on February 18, 2021, NASA's latest mission to explore the red planet. Landing on Mars is an incredibly difficult feat that has challenged engineers for decades: while missions like Curiosity have succeeded, its surface is littered with the wreckage of many failures as well. Why is landing on Mars so difficult?

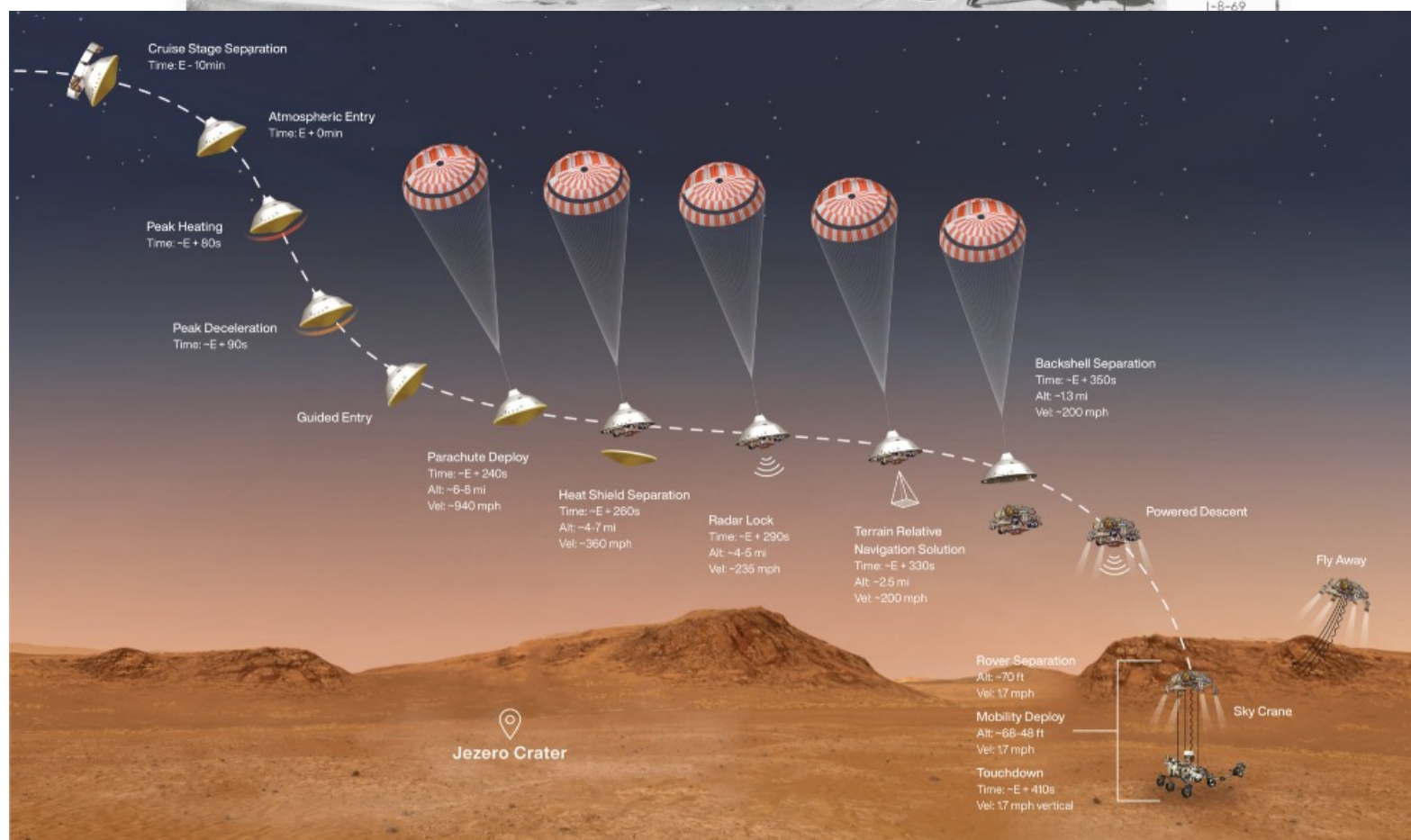
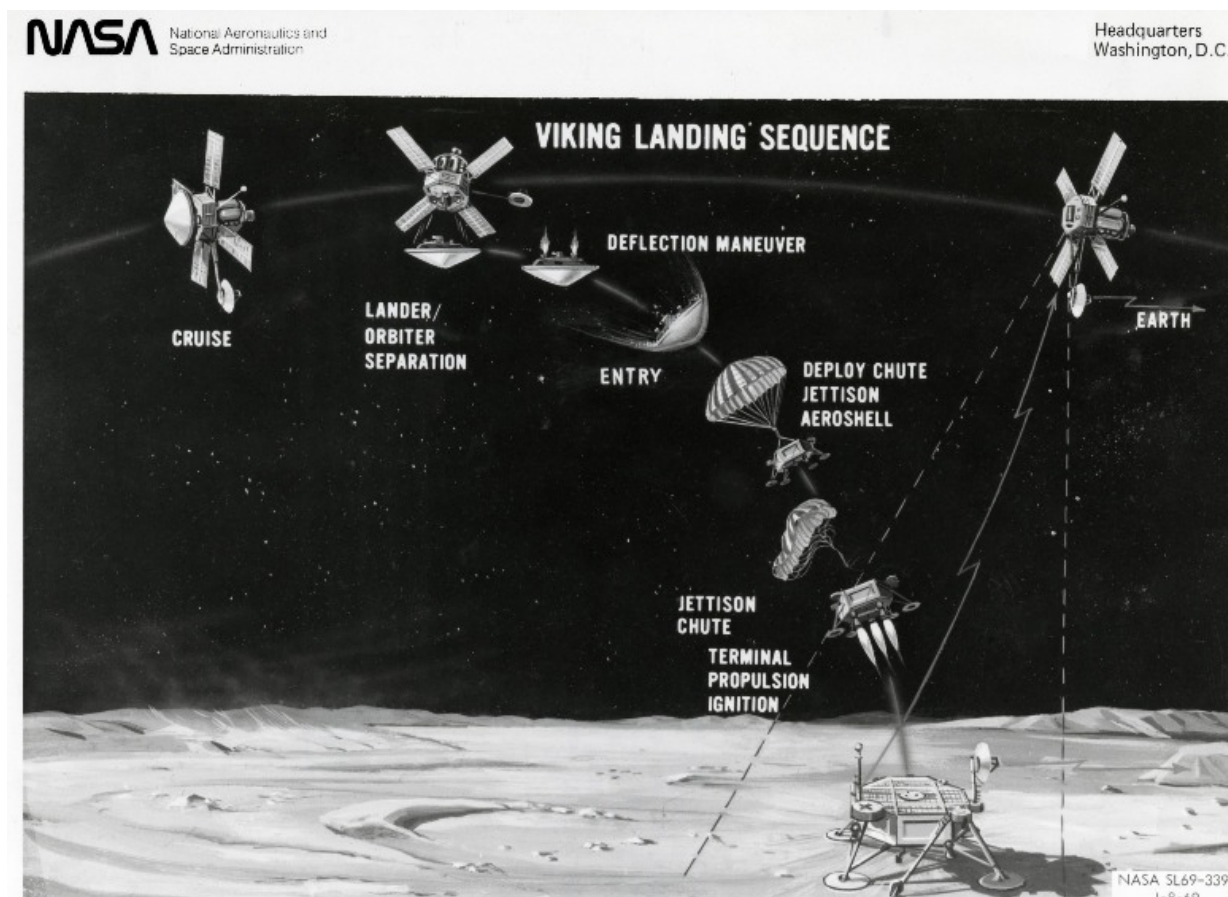
Mars presents a unique problem to potential landers as it possesses a relatively large mass and a thin, but not insubstantial, atmosphere. The atmosphere is thick enough that spacecraft are stuffed inside a streamlined aeroshell sporting a protective heat shield to prevent burning up upon entry - but that same atmosphere is not thick enough to rely on parachutes alone for a safe landing, since they can't catch sufficient air to slow down quickly enough. This is even worse for larger explorers like Perseverance, weighing in at 2,260 lbs (1,025 kg). Fortunately, engineers have crafted some ingenious landing methods over the decades to allow their spacecraft to survive what is called *Entry, Descent, and Landing (EDL)*.

The Viking landers touched down on Mars in 1976 using heat shields, parachutes, and retrorockets. Despite using large parachutes, the large Viking landers fired retrorockets at the end to land at a safe speed. This complex combination has been followed by almost every mission since, but subsequent missions have innovated in the landing segment. The 1997 Mars Pathfinder mission added airbags in conjunction with parachutes and retrorockets to safely bounce its way to a landing on the Martian surface. Then three sturdy "petals" ensured the lander was pushed into an upright position after landing on an ancient floodplain. The Opportunity and Spirit missions used a very similar method to place their rovers on the Martian surface in 2004. Phoenix (2008) and Insight (2018) actually utilized Viking-style landings. The large and heavy Curiosity rover required extra power at the end to safely land the car-sized rover, and so the daring "Sky Crane" deployment system was successfully used in 2012. After an initial descent using a massive heat shield and parachute, powerful retrorockets finished slowing down the spacecraft to about 2 miles per hour. The Sky Crane then safely lowered the rover down to the Martian surface using a strong cable. Its job done, the Sky Crane then flew off and crash-landed a safe distance away. Having proved the efficacy of the Sky Crane system, NASA will use this same method to attempt a safe landing for Perseverance this month!

(Continued on [page 16](#))

NASA Night Sky Notes (continued)

You can watch coverage of the Mars Perseverance landing starting at 11:00 AM PST (2:00 PM EST) on February 18 at nasa.gov/nasalive. Touchdown is expected around 12:55 PM PST (3:55 PM EST). NASA has great resources about the Perseverance Rover and accompanying Ingenuity helicopter on mars.nasa.gov/mars2020. And of course, find out how we plan to land on many different worlds at nasa.gov.



Illustrations of the Entry, Descent, and Landing (EDL) sequences for Viking in 1976, and Perseverance in 2021. Despite the wide gap between these missions in terms of technology, they both performed their landing maneuvers automatically, since our planets are too far apart to allow Earth-based engineers to control them in real time! (NASA/JPL/Caltech)



The Sun's Spectrum,
cast by a hexagonal-cylindrical
window-blind handle acting as a
prism.

January 28, 2021

By
Bob Christmas



Solar Pillar on January 24, 2021, from Ancaster, ON
by Jo Ann Salci

UPCOMING EVENTS

February 12, 2021 - 7:30 pm — Virtual Online H.A.A. Meeting for members. The meeting will be conducted on the platform Zoom. Our main speaker will be R.A.S.C. Executive Director Philip Groff. 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](#)

Due to the COVID-19 Coronavirus pandemic, all *in-person* Hamilton Amateur Astronomers meetings are suspended until further notice.

2020-2021 Council

Chair	John Gauvreau
Second Chair	Jim Wamsley
Treasurer	Ann Tekatch
Digital Platforms Director	Christopher Strejch
Membership Director	Leslie Webb
Observing Director	Matthew Mannering
Education Director	Jo Ann Salci
Event Horizon Editor	Bob Christmas
Recorder	Brenda Frederick
Secretary	Denise White
Publicity Director	Mario Carr
Councillors at Large	Barry Sherman Bernie Venasse Melissa Whitman Mike Jefferson Steve Germann Sue MacLachlan Swapna Shrivastava

Check out the H.A.A. Website
www.amateurastronomy.org

Follow us!



Contact Us

Hamilton Amateur Astronomers
PO Box 65578
Dundas, ON
L9H 6Y6

www.amateurastronomy.org

General Inquiries:

secretary@amateurastronomy.org

Membership:

membership@amateurastronomy.org

Meeting Inquiries:

chair@amateurastronomy.org

Public Events:

publicity@amateurastronomy.org

Observing Inquiries:

observing@amateurastronomy.org

Education:

education@amateurastronomy.org

Newsletter:

editor@amateurastronomy.org

Digital Platforms Director:

webmaster@amateurastronomy.org

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