Event Horizon

Volume 27, Number 6
April 2020

From The Editor

Well, this is a much different edition of the Event Horizon than I or any of my predecessors had ever published.

But even in these times, there's still lots of astronomy to read about, and there's a lot here!

Thanks to all contributors!

Bob Christmas, Editor

editor 'AT'
amateurastronomy.org

Chair's Report by John Gauvreau

In 1665 England was in the midst of the Great Plague. It wasn't the worst bout of plague they had endured, but it was the last major recurrence so it gets the title. At the time they had no understanding of what was causing the sickness and deaths; indeed, it would be over 200 years before the cause of bubonic plague (bacteria spread by the bite of fleas found mostly on rats) would be discovered. They did understand however, that it was most contagious in high density population areas so people fled the large cities. London emptied of much of its population in an act of what we today would call social distancing.

In August of that year, Cambridge University closed. Students, faculty and staff were sent home, many to small towns or country homes, which were much safer. Among them was Isaac Newton, a young 22 year old who, despite a rather unremarkable career as a student, had just received his bachelors degree. When the university closed, he went to his family country home for the next year where he rode out the plague in near isolation.

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Chair's Report (continued)

This suited him well, being a rather unsociable guy to begin with, and he used his time to further his studies in science. Over the two years of solitary work he studied a wide range of topics and returned to Cambridge triumphant. He did major work on his theory of universal gravity, optics, laws of motion, and mathematics. And it was here, at his family country home, that the famous incident of the falling apple occurred (although he never said it landed on his head, only that he saw it fall and wondered why).

This period of Newton's life is known as his *Annus Mirabilis*, meaning a wonderful year, or miraculous year. Often, this specific year of 1666, when Newton returned to Cambridge armed with all his work, is called the Year of Wonders.

Would these discoveries have been made without Newton? Of course, eventually. Would they have been made by Newton without his year of isolation? Possibly, but possibly others would have beat him to it (of course we all know Leibniz also developed calculus independently of Newton). But with nearly two years of quiet study, Newton did what possibly no one in history has replicated; create a multidisciplinary body of work that truly revolutionized the scientific world of the time. And it stands the test of time to this day.

Now, perhaps the story of Isaac Newton's stunning accomplishment isn't one we can all hope to replicate as we endure our own isolation during this time of pandemic (I for one, am no Isaac Newton!), but we can be reminded that even in the darkest times there are unexpected wonders, and that on a small individual scale, each of us in our isolation has the chance to find, or make, our own momentum mirabilis; a little light in the dark.

Club Activities

The March meeting was cancelled, and all further meetings are cancelled until further notice. This includes the general membership meetings at McMaster Innovation Park, club outreach events, public observing nights, member observing nights at Binbrook and council meetings. Clearly, none of these gatherings can take place under the current restrictions of group size, nor would it be safe even if those restrictions were not in place.

As soon as it is safe to do so, we will be back at it. All of our upcoming speakers can be rescheduled and all are understanding of the situation. I don't know when we will be back, but I will get the word out at the appropriate time.

Event Horizon Newsletter

In the meantime, the club newsletter (which you are now reading) carries on, thanks to the tremendous efforts of *Bob Christmas* and the many contributors who send in articles and images. If you have something to share with the club, this is the way to do it. We are all in the same boat and I know I would love to hear from the outside world. Any story, tidbit or item that you think would be of interest to your fellow members would be appreciated by all. It would be great to hear from you! If we can't get together in person, let's stay in touch through the electronic work.

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Masthead Photo: *The Moon, Mars, Jupiter and Saturn, by Bob Christmas.*

Counterclockwise from bottom right, the Moon, Mars, Jupiter, and Saturn (at far left) from Burlington, Ontario at 6:42am March 18, 2020. Canon 40D; Canon 100mm lens; ISO 400; f/3.5; 1/3-second exposure.

Chair's Report (continued)

Social Media

Our Director of Social Media Platforms, *Christopher Strejch*, has stepped up his game (which was already pretty impressive) and is providing a tremendous amount of content online. Each day he is adding great online content to our website and sharing it through our Twitter feed and Facebook page. Most of the stories are aimed at young people who are home from school. If you have any suggestions for activities or pages we can link to, please send them to Chris through the webmaster email:
(webmaster 'AT' amateurastronomy.org).

Other Cancellations

Not surprisingly, the Bay Area Science and Engineering Fair had its physical fair cancelled. They are restructuring in an attempt to allow the students to submit online projects. Our judges for this year, Chris Strejch, Bernie Venasse and Mario Carr, deserve a thank you for volunteering to help at the fair. Their time will come! Personally, I also miss the opportunity to speak to the students while their projects are being judged. I had a good presentation ready for them this year! I will instead look forward to next year.

And I mentioned above that there is no observing planned for Binbrook Conservation Area (BCA), our dark sky site. The park has been closed by the Niagara Peninsula Conservation Authority, and they have asked us, and other user groups, to suspend our activities there during the pandemic. We will all have to observe from home, and share our stories through the newsletter.

Speaking of observing at BCA, I always enjoy a visit to the park in Binbrook and the chance to share views with other observers, check out their gear and share some laughs among friends. I do notice though, that when I observe from my backyard, it is a very different experience. On my own, I focus more on specific observational goals, while at Binbrook I often just let the night take me where it will. I think it might be interesting to hear how people observe on their own. We could see, or read about, a different side of each other, through stories sent in to the newsletter about our backyard experiences.

Finally

A thank you to all the great members who have been supportive of the club and each other during this difficult time. When we all have much more serious matters on our minds, I am very appreciative of those who have taken the time to communicate and offer help with club matters. You have all been a welcome reminder of just how great it is to be part of such a great club.

Stay safe and take care; I look forward to seeing each and every one of you when this has passed and we can once again gather to enjoy the company of friends.

Astrophysics Group Update

Because of the Coronavirus pandemic, the Astrophysics Group did not meet in March. Consequently, there is nothing to report in "Event Horizon".

H.A.A.'s Loaner Scope Program

We at the HAA are proud of our Loaner Scope Program.

If you don't have a telescope of your own and want to make use of one for a month or so, you can borrow one of our fine loaner scopes.

Please contact Jim Wamsley, at:
905-627-4323
or e-mail Jim at:
secondchair 'AT' amateurastronomy.org

and we'll gladly get one signed out for you.

HAA Helps Hamilton

To support our community, we collect non-perishable food items and cash for local food banks at our general meetings. Please bring a non-perishable food item to the meeting or a donation of cash and help us help others.

Our donations go to Hamilton Food Share, which delivers them to various food banks around the Hamilton area.

If you would like to help or have any questions about this initiative, please contact the H.A.A.

Hamilton Food Share
Hunger. It's just unacceptable.

The Sky This Month for April 2020 by Bob Christmas

First of all, I am the bearer of sad news. On behalf of the H.A.A., condolences go out to Observing Director Matthew Mannering, who tragically lost his mother over the past month.

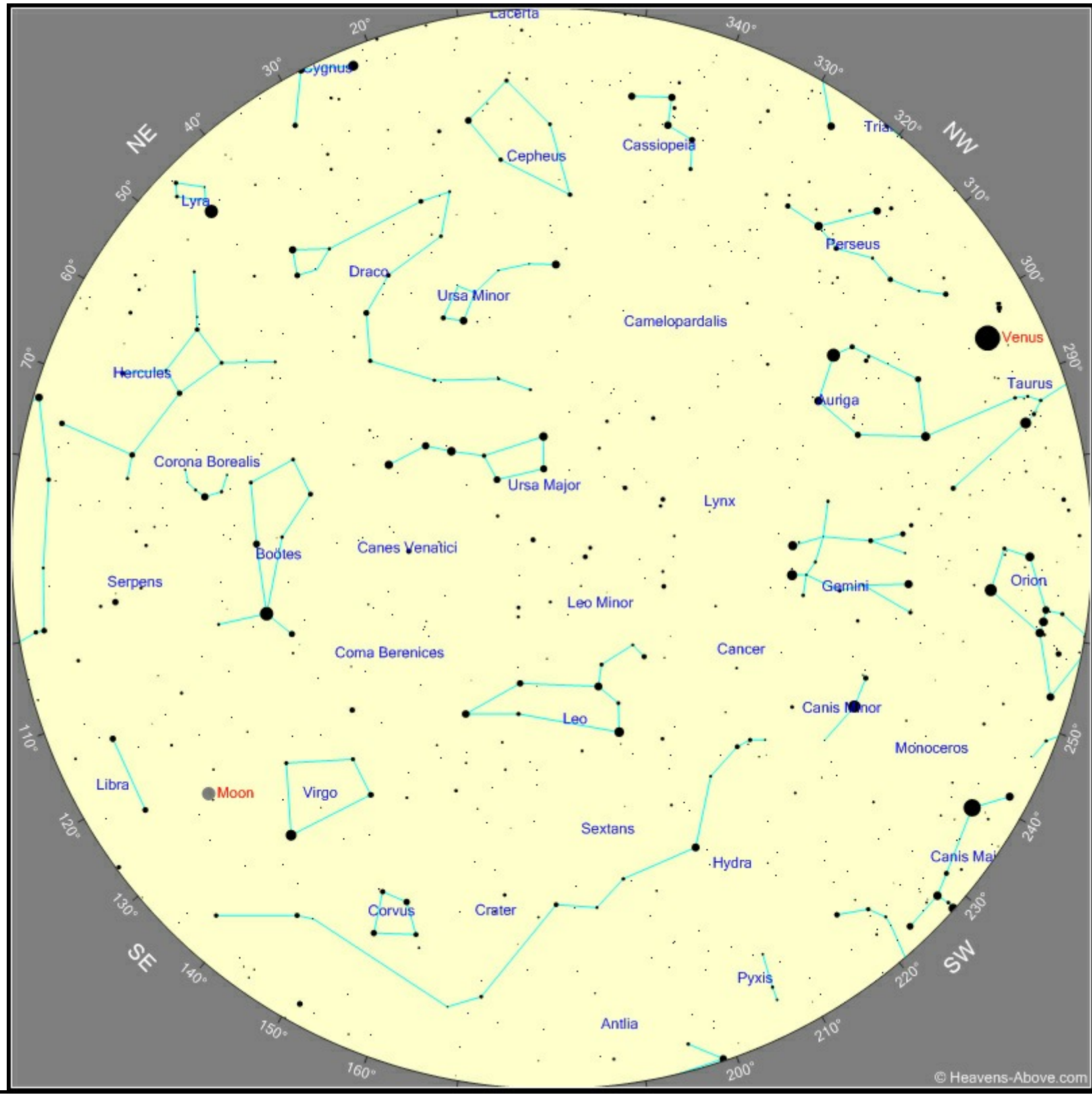
This leaves me to step up with The Sky once again, and I am more than happy to do so.

April brings a planetary encounter with a famous star cluster, a meteor shower, a brightening comet, among other things.

The Sky at a Glance

Here's an all-sky chart for *April 8, 2020, at 11:00 pm EDT* as seen from the general area of Hamilton, ON. This chart was generated using the Heavens Above website. The stars in the sky rise and set about an hour earlier every half month later. On April 24, this will be the sky at about 10:00pm; on May 8, this will be the sky at about 9:00pm, etc.

(Continued on page 6)



The Sky This Month for April 2020 (continued)

The winter constellations are waving bye-bye, so it's the last chance this season for viewing such constellations as Orion and Canis Major, including going to look for Sirius B, the "Pup". One big finale to the winter sky occurs on April 3, when Venus will be right beside the *Pleiades (M45)*!

Meanwhile, the Spring constellations are getting higher. *Leo*, *Virgo*, *Bootes, Hydra*, *Coma Berenices*, *Canes Venatici* and *Ursa Major,* including the *Big Dipper,* are nearing their highest points.

My source for all Moon and Planet info is the *RASC Observer's Handbook 2020*.

The Moon

Libration this month is as follows: The Northern limb will be most exposed on the 20th and the Southern limb on the 7th. The Western limb will be most exposed on the 2nd & 30th, and the Eastern limb will be most exposed on the 14th.

Phases this month:

- April 1 10:21 UT — 1st Quarter
- April 8 02:35 UT — Full Moon — the *Super "Pink" Moon*; brightest full moon of 2020
- April 14 22:56 UT — Last Quarter
- April 23 02:26 UT — New Moon
- April 30 20:38 UT — 1st Quarter

The Moon will have close *conjunctions* with the Beehive cluster (M44) in Cancer (1.3˚) on the 3rd, with Jupiter (2˚) on the 14th, with Saturn (2˚) on the 15th, with Mars (2˚) on the 16th, with Vesta (0.1˚) on the 26th, with the open star cluster M35 in Gemini on the 27th (0.7˚) and once again with the Beehive (1.6˚) on the 30th.

The Planets

- *Mercury* is still in the eastern morning twilight and remains there for most of the month, but will dive towards the Sun as the end of the month approaches.
- *Venus* continues to shine brilliantly high in the north-western evening sky all month. *It will be 0.3˚ south of the Pleiades (M45) on the 3rd* (see chart at top of page 7). It reaches its maximum visual magnitude, -4.7, on the 27th.
- *Mars* is in south-east morning sky, pulling away from Saturn and Jupiter, in Capricornus.
- *Jupiter* is in Sagittarius, in the south-east, in the overnight/morning sky. It comes to within 5˚ of Saturn by month end.
- *Saturn* is also in the south-east part of the morning sky in Capricornus, just to the left of Jupiter.
- *Uranus* becomes lost in the Sun's glare and is not observable this month.
- *Neptune* starts to emerge in morning twilight, but is still too near the Sun's glare until month end.

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The Sky This Month for April 2020 (continued)

left: Venus beside The Pleiades star cluster (M45), on the evening of April 3, 2020.

More information on the Venus-Pleiades conjunction is on EarthSky.org's website HERE.

Diagram generated, using Sellarium.

bottom: Diagram of Radiant of Lyrids Meteor Shower courtesy of EarthSky.org

The Lyrids Meteor Shower

The Lyrids meteor shower peaks on April 22nd, right around the time of the New Moon.

This will be a favourable meteor shower, given that the radiant will be up in the sky most of the night.

As with all meteor showers, it is best to find a location away from city lights to see more meteors.

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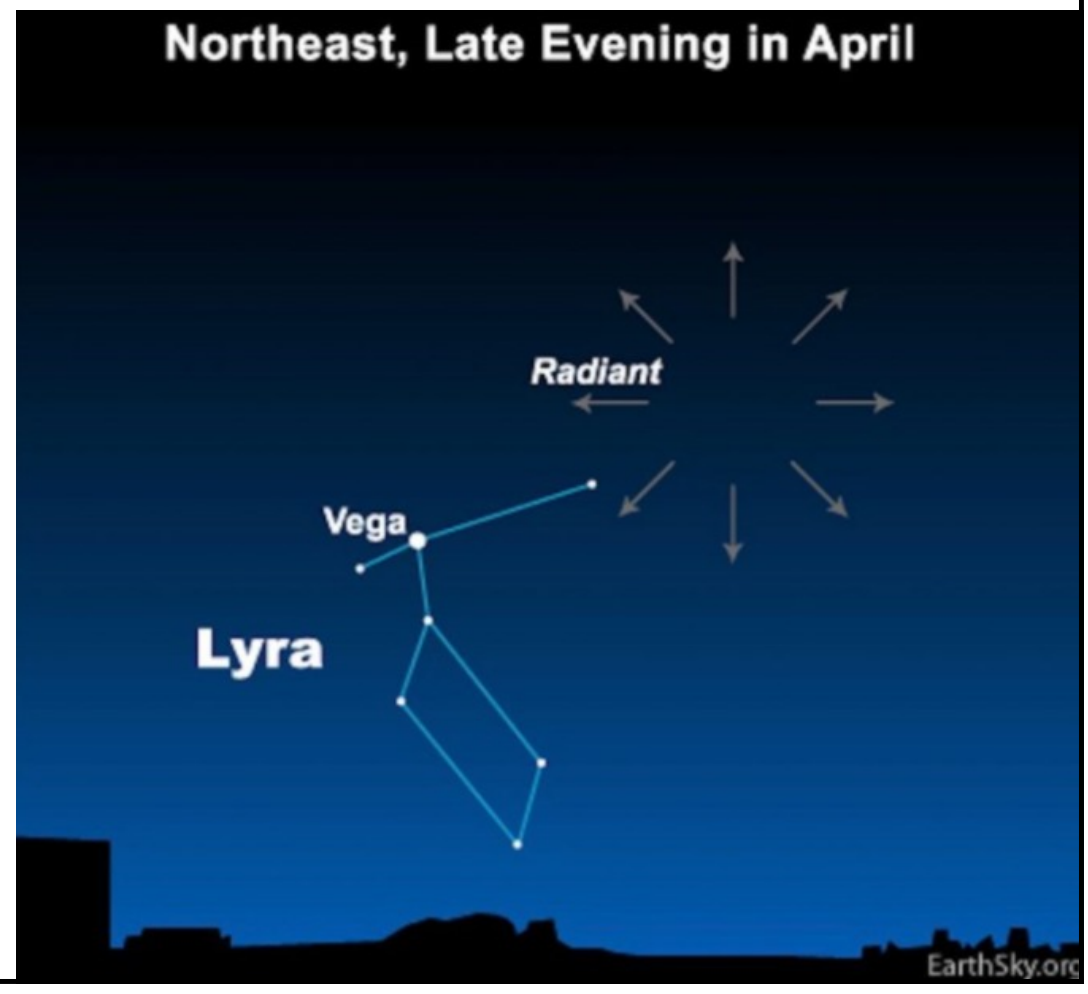


The Sky This Month for April 2020 (continued)

Comets

Last month, I mentioned Comet *C/2017 T2 PANSTARRS*, which will be at about 8th magnitude this month.

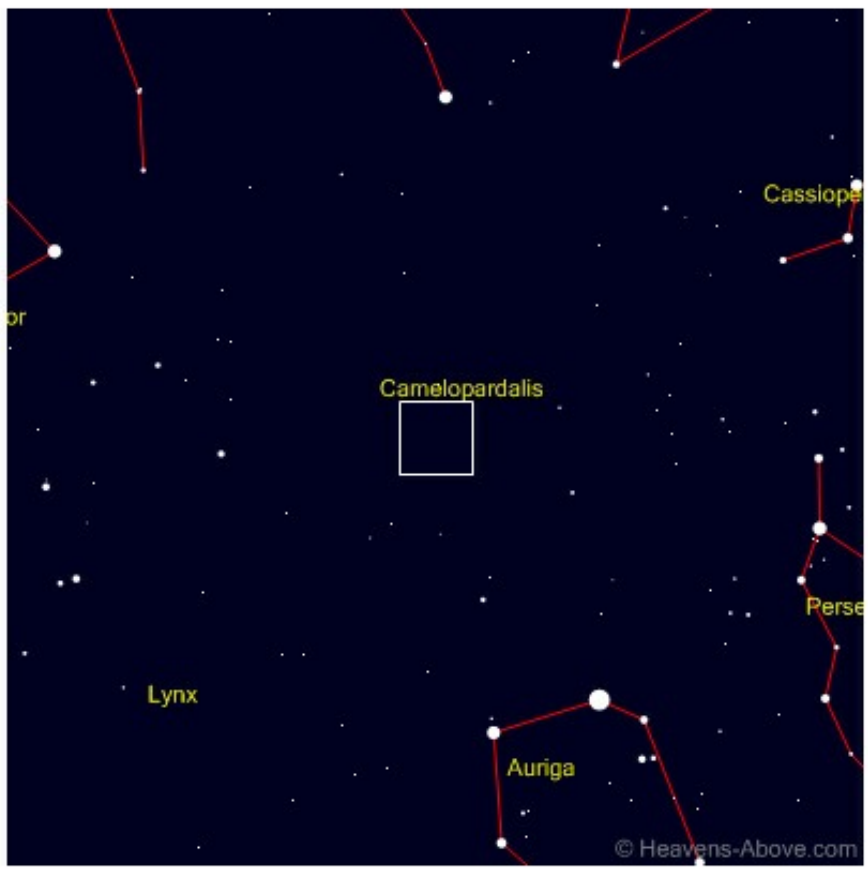
But rapidly brightening in the north circumpolar sky is Comet *C/2019 Y4 ATLAS*. At time of writing, this comet was at about magnitude 7.5, and is should get to about magnitude 7 the first weekend of April. If it keeps brightening as expected, it should be visible in binoculars by month end, at around magnitude 5.

C/2019 Y4 starts the month off the upper right of the Big Dipper, and marches through the faint constellation Camelopardalis throughout the month towards Perseus, between the stars Capella and Polaris.

Here are finder charts generated from the Heavens Above website for *C/2019 Y4 ATLAS* for April 15.

Comet C/2019 Y4 ATLAS

Year 2020 Month April Day 15 Time 22:00:00 Update Reset to now



Coarse finder chart
(Field of view: 60°, Max. star mag.: 5)

Fine finder chart
(Field of view: 5°, Max. star mag.: 10)

See more information about C/2019 Y4 at the EarthSky.org website:

https://earthsky.org/space/how-to-see-bright-comet-c-2019-y4-atlas

You can also keep track of comets currently in the sky at these very useful websites:

Weekly Information about Bright Comets: http://www.aerith.net/comet/weekly/current.html

Heavens Above's Comet Page: https://www.heavens-above.com/Comets.aspx

Clear Skies, and stay safe, everyone.

When Things are Looking Down…Look UP!! by Jo Ann Salci

We have all had to make adjustments to our lives over the past few weeks. Even our Astronomy lives…no meetings and gatherings can reduce our exposure to not only the COVID 19 virus, but to some of our beloved activities…especially sharing time together learning about astronomical topics.

Our beloved Canadian Astronaut, Chris Hadfield, gives us some advice in his video message: "How to survive self-isolation, according to an astronaut" "Understand the risk; What's your mission?; What are your constraints; Take action." Watch his quick, 2-minute inspiring message!

HAA members have "Taken Action" in different ways. Here are a few:

The International Space Station (ISS): Did you know that you can sign up for email alerts notifying you when the ISS will be flying overhead in your area?

"Station sighting opportunities from 4,600 locations around the world are identified twice a week at NASA's space station Mission Control Center at the Johnson Space Center in Texas. The Spot the Station service will send out alerts for only the best sighting opportunities, when the space station is relatively high in the night sky and makes a long pass overhead, NASA officials said. This will be anywhere from once or twice a week to once or twice a month, depending on the space station's orbit," NASA officials explained. "Don't worry if there are big gaps in between sightings!"

You can sign up for NASA's Spot the Station alerts here: http://spotthestation.nasa.gov/

What do you think the astronauts on the ISS were doing last week, while we were adjusting to a new normal? Read this CNN article. It's pretty clear from their vantage point that we are all in this together! And finally, what about the 2 Russian and 1 US astronaut scheduled to fly to the ISS on April 9th? Read this National Post article to see what they need to consider…they are much more used to quarantines and self-isolation than we are!

Planetary Music: Music is good for the soul. Especially music that has to do with space! Listen to Gustav Holst's "The Planets". Also known as Op. 32, Gustav wrote this music somewhere between 1914-1916…long before the Star Trek and Star Wars soundtracks were written. This video not only shows you the orchestra performing this dramatic music for 1 hour, but also shows images of the planets in the background. What is your favourite planet?

Exploring in-depth resources:
https://ssd.jpl.nasa.gov/horizons.cgi#results
HORIZONS Web-Interface - NASA

This tool provides a web-based limited interface to JPL's HORIZONS system which can be used to generate ephemerides for solar-system bodies. Full access to HORIZONS features is available via the primary telnet interface. HORIZONS system news shows recent changes and improvements. A web-interface tutorial is available to assist new users.

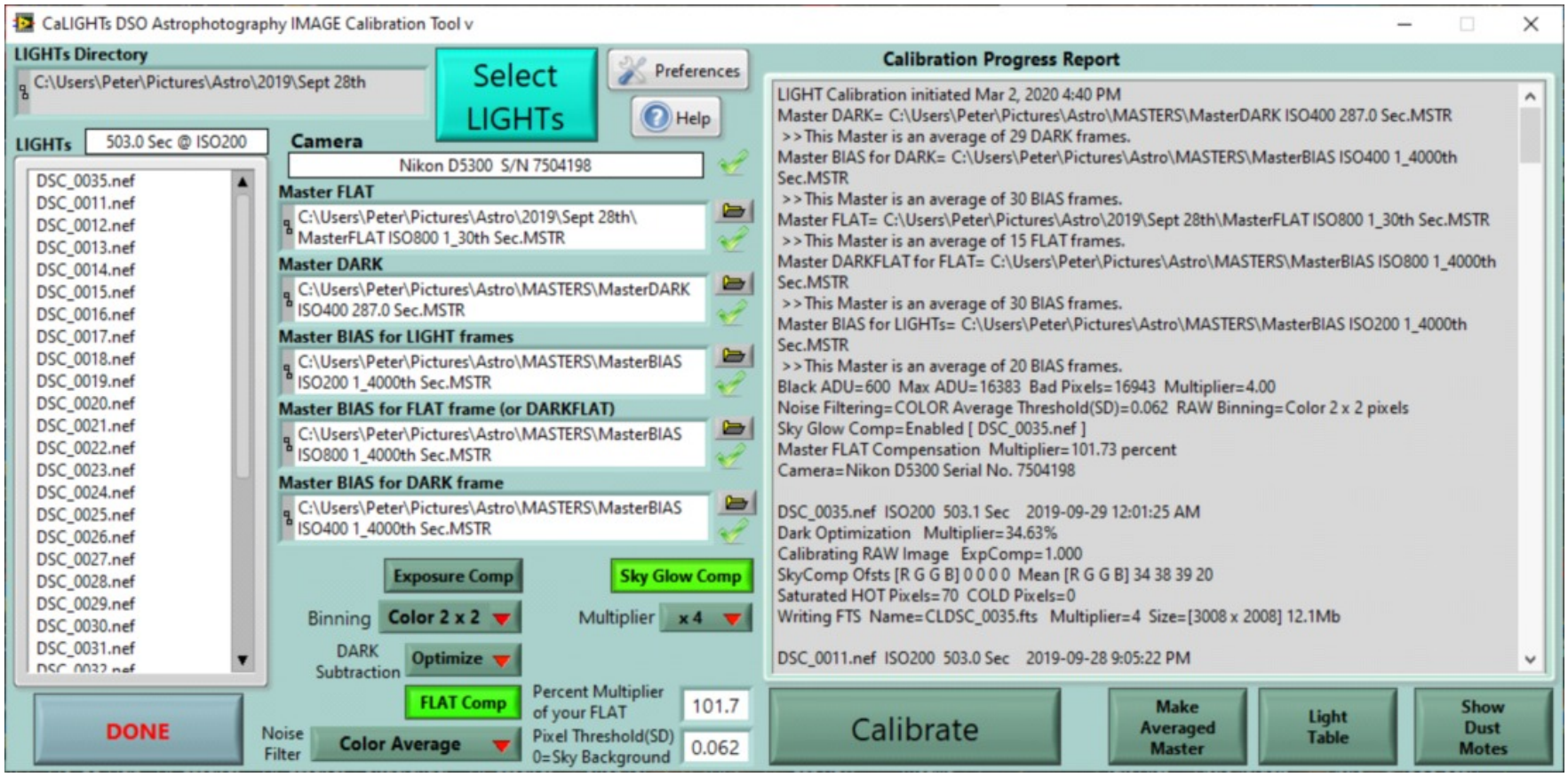
ssd.jpl.nasa.gov

Creating a web-learning platform: Our HAA webmaster, Christopher Strejch, has added content onto the HAA website for children of all ages: Astronomy and STEM themed Activities for kids. Check out today's activity and have fun!

So, whatever it is that inspires you, from music, to watching the ISS pass over-head, to doing STEM activities, or doing in-depth research, determine what your mission is and take action! Looking forward to seeing everyone soon!

Beta Testers Wanted by Peter Wolsley

I have written a Deep Sky Object astrophotography image calibration program which I have been using for the past few years. Over the last few months I have prepared the program for sale and now I need some fellow astrophotographers (DSLR and astrocam) to help me test my program. I hope to sell my program for roughly $25 and beta testers who contribute to this effort will not have to pay.



I call my program *CaLIGHTs*. Its sole purpose is to calibrate LIGHT frames (i.e. astrophotography photos). My program uses the traditional approach of preparing DARK, BIAS, FLAT and DARKFLAT master frames and then using them to account for a host of noise issues common to all cameras. I have talked to numerous beginner astrophotographers who have tried to use DARKs, BIAS and FLATs and found they couldn't make this process work for them. My goal is to simplify the process of generating master frames and give beginners a calibration technique that is easy to use.

One of the main features of my program is that it avoids the need to generate a library of master DARK frames for each ISO/GAIN, Exposure and Temperature. The user generates one master DARK frame and, via my DARK frame optimization algorithm, they can use this master DARK frame for all of their astrophotos.

As an example…I generated one master DARK frame last winter which was generated using 29 DARK frames taken at ISO400, 280 second exposures and room temperature. My camera is a Ha modded Nikon D5300 DSLR. During this past year I took hundreds of astrophotos typically at ISO200 and 400 to 500 second exposures. All of them were calibrated using this one master DARK frame. The optimization automatically decides how to apply the master DARK frame to optimally eliminate the dark current effects in my astrophotos. I never see the typical "walking noise" effect on my digitally developed images even though I know I have differential flexure in my set-up. This DARK optimization also allows me to avoid using "Dither" while autoguiding. This greatly simplifies my techniques for guiding and provides more time each night to acquire astrophotos. Some additional features of my program are:

- Automatic detection and correction of HOT/COLD pixels based upon your master DARK and BIAS frames.
- The ability to vary the strength of your master FLAT. This is not so important when using DSLRs but this comes in handy when using an astrocam and DARKFLATs are not available or prepared correctly.

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Beta Testers Wanted (continued)

- Sky Glow compensation. This can adjust the level of the sky background for all of your astrophotos to compensate for changes in sky brightness caused by twilight, moonglow or artificial lighting. This allows the Kappa-Sigma image stacking algorithms available in programs like Deep Sky Stacker (DSS) to be more effective in reducing noise. This method does not alter the inherent noise profile of your camera which the maker of Startools has identified as a requirement for proper noise tracking during image digital development.
- All calculations are perform using RAW data. My program uses LibRaw v0.19.5 for extracting the raw pixel data from your DSLR RAW files. No debayering of your RAW data takes place in my program. LibRaw can process a huge variety of DSLRs with main exception being the mirrorless CANON cameras that create CR3 formatting RAW files. I expect this issue to be resolved later this year. Please use this link to see the full list of supported cameras.

https://www.libraw.org/supported-cameras

- CaLIGHTs also reads FITS images and TIFF images so it can calibrate astrocam images.
- CaLIGHTs generates 16 bit FITS calibrated image files which are compatible with most astronomy programs. These FITS files are RAW files which means that the data has not been debayered. Programs such as Deep Sky Stacker have several debayer algorithms that can easily debayer 16b fits files.
- CaLIGHTs also incorporates a multiplier factor so that the user can access the full resolution provided by a 16 bit range of values. A 14 bit RAW image combined with an x4 multiplier yields a 16 bit FITS calibrated image file with an effective resolution of ¼ pixel. This multiplier is only available for DSLRs because astrocams have already multiplied their data in the vendor's driver.
- RAW color and mono binning of your data. RAW color binning offers superior noise reduction to traditional RGB binning. Binning of astrophotos is becoming far more common now because of the very high megapixel cameras available in the market. These high megapixel cameras typically result in significant oversampling of astrophotos. RAW binning allows these users to address this oversampling issue while accessing superior noise reduction. CaLIGHTs has both color and mono binning with binning ratios as high as 5 x 5.
- CaLIGHTs includes an EXPComp feature which allows users to calibrate images that may have been taken at different exposure times. The resulting calibrated image will be adjusted so that the image appears to be taken at the same exposure as the other images being calibrated.
- RAW filtering aimed at reducing noise in the dimmest features of astrophotos is available. The filter uses a user specified threshold value to determine what dim areas are filtered. This hybrid Median/Average filter can dramatically reduce colour noise in the sky background. This does alter the noise profile of your data, which is frowned upon by the creator of Startools, but it gives you options. Mono and color noise filtering is available in four strengths.
- CaLIGHTs has a "Light Table" feature where your entire computer screen can be utilized as a light table. I find this ideal for taking FLAT frames. The brightness of each RGB colour channel can be adjusted and will be remembered.
- There is also a "Dust Mote" viewer which can be used to call up a FLAT frame image to view where any dust motes are located.

To become a beta tester please send me an E-mail.

Peter Wolsley
Quilting Mouse Technologies

qmtinfo 'AT' quickclic.net

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.org to find local clubs, events, and more!

Hubble at 30: Three Decades of Cosmic Discovery

By David Prosper

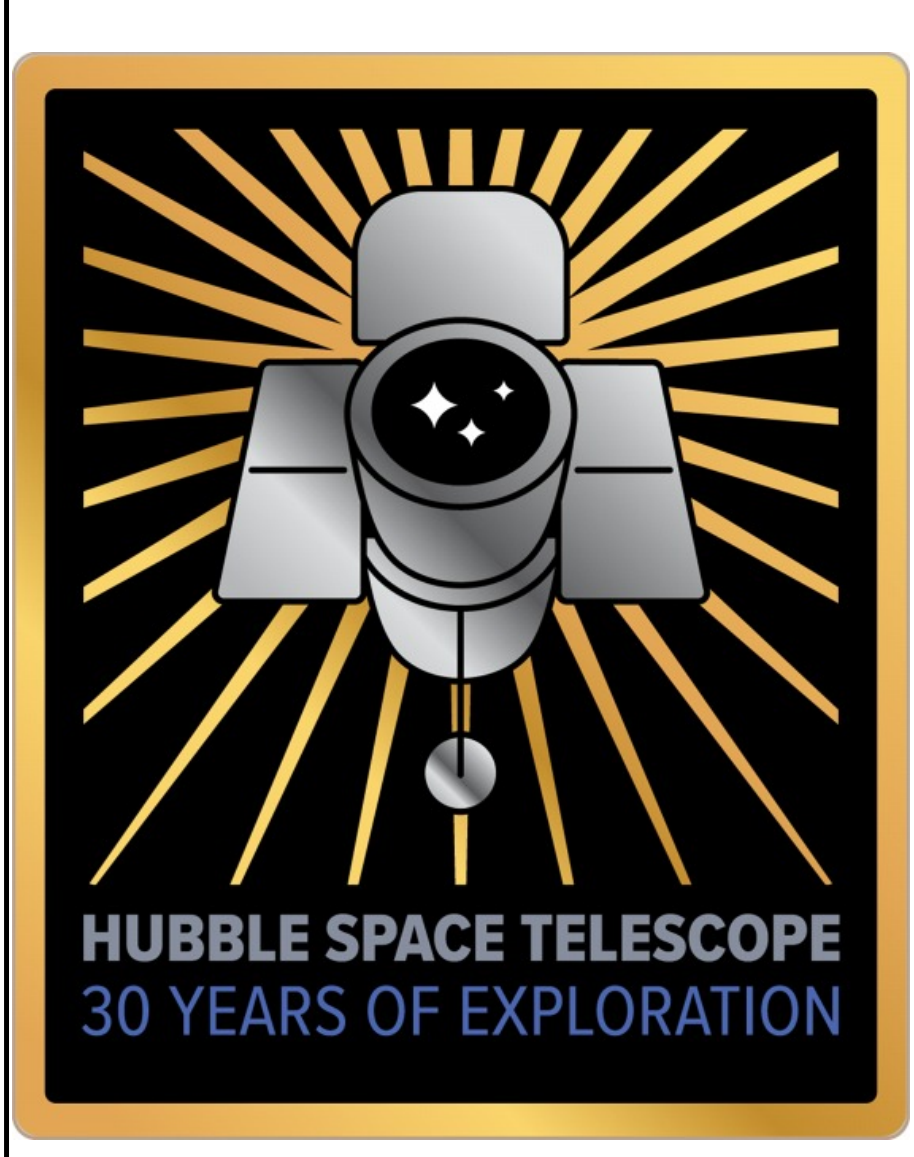

Image Credit: NASA

The **Hubble Space Telescope** celebrates its 30th birthday in orbit around Earth this month! It's hard to believe how much this telescope has changed the face of astronomy in just three decades. It had a rough start -- an 8-foot mirror just slightly out of focus in the most famous case of spherical aberration of all time. But subsequent repairs and upgrades by space shuttle astronauts made Hubble a symbol of the ingenuity of human spaceflight and one of the most important scientific instruments ever created. Beginning as a twinkle in the eye of the late Nancy Grace Roman, the Hubble Space Telescope's work over the past thirty years changed the way we view the universe, and more is yet to come!

We've all seen the amazing images created by Hubble and its team of scientists, but have you seen Hubble yourself? You actually can! Hubble's orbit – around 330 miles overhead -- is close enough to Earth that you can see it at night. The best times are within an hour after sunset or before sunrise, when its solar panels are angled best to reflect the light of the Sun back down to Earth. You can't see the structure of the telescope, but you can identify it as a bright star-like point, moving silently across the night sky. It's not as bright as the Space Station, which is much larger and whose orbit is closer to

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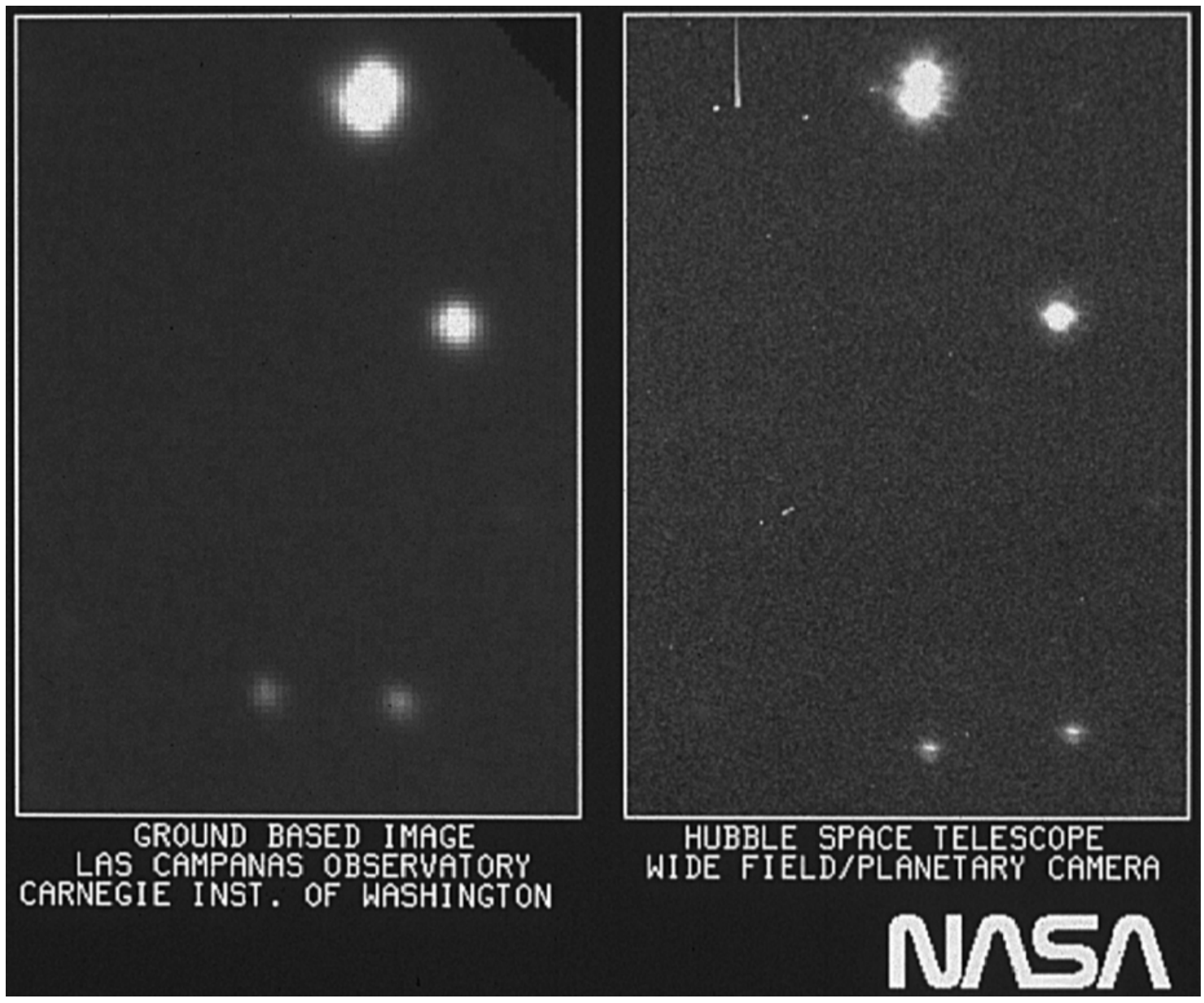
Earth (about 220 miles), but it's still very noticeable as a single steady dot of light, speeding across the sky. Hubble's orbit brings it directly overhead for observers located near tropical latitudes; observers further north and south can see it closer to the horizon. You can find sighting opportunities using satellite tracking apps for your smartphone or tablet, and dedicated satellite tracking websites. These resources can also help you identify other satellites that you may see passing overhead during your stargazing sessions.

NASA has a dedicated site for Hubble's 30th's anniversary at bit.ly/NASAHubble30. The Night Sky Network's "Why Do We Put Telescopes in Space?" activity can help you and your audiences discover why we launch telescopes into orbit, high above the interference of Earth's atmosphere, at bit.ly/TelescopesInSpace. Amateur astronomers may especially enjoy Hubble's images of the beautiful objects found in both the Caldwell and Messier catalogs, at bit.ly/HubbleCaldwell and bit.ly/HubbleMessier. As we celebrate Hubble's legacy, we look forward to the future, as there is another telescope ramping up that promises to further revolutionize our understanding of the early universe: the James Webb Space Telescope!

Discover more about the history and future of Hubble and space telescopes at nasa.gov.



Hubble's "first light" image. Even with the not-yet-corrected imperfections in its mirror, its images were generally sharper compared to photos taken by ground-based telescopes at the time.
Image Credit: NASA

Eye Candy the Members' Image Gallery

above: **The Moon, Mars, Jupiter, and Saturn** on the morning of **March 18, 2020**

left: **Close-up of the Moon, with Jupiter and Mars.** Notice some of Jupiter's moons are visible.

John Gauvreau (both)

Eye Candy the Members' Image Gallery — Humour Sub-section

left — **"Haircut Needed!"**
The Moon's "Corona"
by **Jo Ann Salci**

lower left — **The Moon's "Corona"**
by **John Gauvreau**

lower right — **Venus "Pillar"**
by **John Gauvreau**

For Sale

Telescope & Power Tank

Brand new *Meade ETX125 Observer Telescope* including *Meade Autostar Hand Controller*, and *Celestron Power Tank - 7aH - 12V Power Supply* with spot light.

I joined the HAA about 3 years ago. Just before that I had given my 45+ year-old 4" Tasco to my half-brother who lives in a dark sky area NW of Huntsville, but I missed the old scope, so almost exactly a year ago on March 19, 2019, I purchased the above-noted Meade ETX 125 & the power tank from KW Telescope in Kitchener for $1151.47.

I soon realized that the new instruments exceeded my capabilities at my venerable current age, so I've decided to sell them for $950.00 total.

Shannon Cameron (who operates KW Telescope) has informed me that the Meade ETX125 is the most popular telescope in her store. I only used this telescope once (without any of the electronics) for less than an hour to show my grandkids the Moon and Jupiter with its 4 Galilean moons. A fantastic experience for me and them!

Once you've got it up and running, I wouldn't mind a peek thru it to see what I'm missing!

Thanks!

Jim Rose - Guelph - (519) 821-4333

Price $950.00 total.

Product Specifications

- *Optical Tube Design:* Maksutov-Cassagrain
- *Aperture:* 127mm (5 inches)
- *Focal Length:* 1900mm f/15
- *Mount Type:* Computerized Go-To
- Focuser: Internal
- Optical Cowling: Multi-coated
- Eyepieces: Two (2) 1.25” Super Plossl 9.7mm & 25mm
- Tripod: Adjustable height stainless steel with accessory tray; built-in tilt plate for EQ alignment.
- Software: AutoStar Suite DVD
- Batteries: Requires 8 AA batteries (user supplied)

William J. McCallion Planetarium

McMASTER UNIVERSITY, HAMILTON, ONTARIO

- Public shows every Wednesday (7:00pm)
- Public transit available directly to McMaster campus
- Tickets $7 per person; private group bookings $150
- Different shows every week
- Upcoming shows include:

Shows are suspended until, at least, the end of April.

- For more details, visit
  www.physics.mcmaster.ca/planetarium

UPCOMING EVENTS

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

Stay safe everyone, practice social distancing, and wash those hands!

2019-2020 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 Dee Rowan Gary Sutton Melissa Whitman Mike Jefferson Steve Germann Sue MacLachlan

Check out the H.A.A. **Website**

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Observing site for the HAA provided with the generous support of the
Binbrook Conservation Area
Come observing with the HAA and see what a great location this is for stargazing, a family day or an out-door function.
Please consider purchasing a season's pass for $79 to help support the park.
http://www.npca.ca/conservation-areas/binbrook/
905-692-3228

The Harvey Garden HAA Portable Library

Contact Information

E-mail: library@amateurastronomy.org