



Event Horizon

Volume 24, Number 7
May 2017



From The Editor

With May arriving, the temperature outside is generally getting more comfortable for outdoor astronomy activities. I just wish the rain would stop!

Enjoy reading this E.H. on those cloudy nights!

Bob Christmas, Editor

editor 'AT'
amateurastronomy.org



Chair's Report by Bernie Venasse

Happenings ...

On March 31, Ann Tekatch, Denise White and I were judging entries at the Bay Area Science and Engineering Fair being held at Mohawk College. We had the task of deciding the recipient of our contributed prize for the best astronomy related project. Our trio had a very uplifting experience last year speaking with these scientists of tomorrow....

'Best project demonstrating an understanding of a topic related to astronomy or physics'.

With judging day being March 31st, and there being 400 or so entrants in the fair, we each were fortunate to receive abstracts of the entrants via eMail on Mar 20.... This gave us some time to individually look at the abstracts and select our potential favorites to examine.

On judging day, we met at Mohawk College in the 'Arnie' for a supplied breakfast and a chance to compare our notes. Having sated our appetites and

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Chair’s Report (continued)

compared our project selections we proceeded to the gymnasium to review the projects.
Two hours later we were having lunch and discussing our findings. We narrowed down the candidate projects to three potential winners.
While we were in the auditorium checking out the displays, the students were in the theatre being entertained by - amongst others- our very own John Gauvreau. This was his fifth year making a presentation to the students at BASEF and was very well received.
After lunch we proceeded as a group to interview each of the selected presenters, asking questions and challenging some of their knowledge all the while encouraging them onward. We met back at the Arnie to discuss the results of the interviews, declared a winner, and called it a day.
On Tuesday April 4th, I had the honour and privilege to present the James A. Winger Award to Miss *Jessica Freyke*, a student at Oakville Christian School, for her project ‘*Black Holes: Not Black, Not Holes. What Are They?*’

April 2017 Scope Clinic....

The Spring event was held on April 22 in the Spectator Auditorium. There were plentiful displays of equipment and reference materials displayed by attending members. Matthew had his rebuilt telescopes on hand and I had my 14” on display as well as a few interesting drawings and sketches. Our BASEF winner, Jessica Freyke was in attendance and displaying her prize-winning project.

HAA Public Outreach at Bayfront Park, April 29

The day started as a cloudy, damp, chilly, foreboding day that did not hold any promise of stargazing. Fortunately, Mother Nature was in a generous mood and caused the clouds to part as the sun set. Membership attendance was on the light side with members thinking that the event would be cancelled but we were able to attend to the queries of the attending public. Many pictures were taken with cellphones and the odd digital camera. Our last visitors were a trio of grade 12 students from Saltfleet School who are considering careers in astronomy related fields. Glad we were there to have the opportunity to speak with them.
Our next Outreach event is May 27 at McQuesten Park.

Volunteers needed for...

Perseid Meteor Shower event at Binbrook Conservation Area, August 12/13, 2017

<i>Position</i>	<i>Requires</i>
Main Gatehouse	2 persons to greet visitors, do a head count, and distribute any handouts.
Traffic directors	2-4 persons to direct traffic to parking areas.
Event Guides	2 persons to assist guests with questions about where to go.
Telescope Operators	5 - 10 with telescopes to do ‘sidewalk astronomy’ near the observing area.

Hamilton Amateur Astronomers General Meeting for May 12, 2017

Notice that we are back to the second Friday of the month....
Our scheduled speaker this month is *Wayne Parker*, visiting us from Skypod. His presentation will focus on the SkyShed Observatory system.

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Masthead Photo: “Farewell to Winter” – the setting Orion, by Everett Cairns.

Chair's Report (continued)

Place and Time

We'll be meeting at The Hamilton Spectator Building located at 44 Frid St, near the junction of Highway 403 and Main St West in Hamilton. Starting time is at 7:30pm. Admission is free and everyone is welcome!

Food Share Donations

Donations of non-perishable food for the Hamilton Food Share program will be collected at this meeting. Please drop off any items at the drop-box located near the entrance of the auditorium. All donations gratefully accepted and thanks to your generosity we've collected thousands of pounds of food since we began. Let's keep up the great work as the need continues.

Door Prizes

There will be a draw for door prizes at the meeting and a free door prize ticket to all who arrive before the 7:30 start time!

Upcoming Events...

HAA Public Outreach event will be held at McQuesten Park the evening of May 27. This is a scant 2 days after the New Moon so there should be a short-lived setting crescent of the moon... about 7% illumination. Jupiter will be showing his 4 moons and a nice shadow transit too.

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:

secretary '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.



The April 2017 General Meeting of the HAA by Matthew Mannering

Jim let everyone know that the last Astro101 class was scheduled for April 20th.

Bernie then talked about BASEF. Ann, Denise and Bernie represented the club as judges for the best Astronomy/Physics project. The James A. Winger award went to *Jessica Freyke* (grade 7/8) for her project titled "Black holes, what are they?". Jessica brought her project to the scope clinic on April 22nd.

Bernie called for volunteers for the Perseids picnic and public night at Binbrook. He also asked if anyone was interested in forming a solar eclipse group for the upcoming eclipse in August.

Our guest speaker this month was *Pauline Barmby* whose talk was titled '*Astroinformatics; big data of the universe*'. This is a copy of Pauline's bio from our website. Pauline Barmby is an associate professor in Western's Department of Physics & Astronomy and associate dean (graduate and postdoctoral studies) in Western's Faculty of Science. She received her BSc in Physics and Astronomy from UBC (1995) and her PhD in Astronomy from Harvard University (2001). Barmby's research uses telescopes all over the world and in space to capture detailed images of nearby galaxies to determine how their stars, gas, dust, and black holes affect each other. She is interested in the use of computer data-mining techniques and community-developed software to facilitate knowledge extraction from astronomical data. She received the Faculty of Science's Florence Bucke Prize in 2014. Her non-astronomical interests include knitting, curling, and running.

Any errors in the following synopsis of Pauline's presentation are mine.

We have been measuring and collecting astronomical data for a very long time. Ptolomys' Almagest is a good example. For most of history the data has been saved in very big books. A large volume might contain a half million pieces of information. By today's standards this would be considered low density storage.

Photographic glass plates allowed long term storage of much larger amounts of information. Astrometric data was processed by human computers, namely Pickering's harem at Harvard.

Computers can store massive amounts of data and Astrophysicists spend lots of time writing code to manipulate the data. Scientists use theories to try and replicate the observable universe with a combination of actual and simulated data.

On the largest scale, the simulations try to recreate the cosmos as we see it now. Initial parameters are entered and time is allowed to move forward at a vastly accelerated pace.

On a smaller scale the simulations can try to replicate the observed interactions between galaxies.

Lastly, scientists may want to simulate events that happen really fast. A good example would be a supernova explosion. They can alter the initial conditions to see different outcomes. The simulation can be slowed down, run backwards or forwards or watched from a different point of view.

Pauline considers herself to be an observational astrophysicist. Meaning that she looks at CCD images (which are really grids of numbers in the computer) and tries to create models to match reality. The atmosphere blocks some wavelengths so images are sourced from telescopes in space and on the Earth. Normally the images are recorded at individual wavelengths from U.V. to Infrared and then stacked to create a three dimensional data cube. Each wavelength indicates a different physical compound within the target.

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The April 2017 General Meeting of the HAA (continued)

Massive catalogues now exist due to advances in sensor size and the speed at which we can acquire and store information. Concurrently, our ability to retrieve and analyze huge amounts of data has improved with advances in computer technology. As an example the *Large Synoptic Survey Telescope* is expected to generate 15 terabytes per night or 60 petabytes (60 million gigabytes) in ten years.

Data and code is shared between scientists all around the world. *AstroPi* is a version of Python created especially for astrophysics.

Lastly, Pauline mentioned that every Saturday from May through August the University of Western Ontario has public viewing. For more information go to cronyn.uwo.ca.

Steve presented 'The Sky This Month' after the break.

- He presented my pictures of Venus just a few days before inferior conjunction and of Mercury low in the sky. I mentioned that I had used the photographer's ephemeris on the web to find a good viewing spot.
- The International Meteor Organization (imo.net) tracks fireballs and now allows you to report them.
- **Comet V2 Johnson** is in the general area of Hercules. While in the area, have a look at **M13** and see if you can spot the 'propeller'.
- You can use Heavens Above to generate a top view of the solar system. The location of the planets in the diagram lets you know if and when they are visible. Use this to try and see all eight planets in one night.

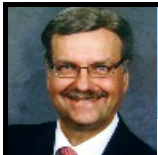
Andy Blanchard gave a very short presentation regarding CAPs, the Canadian Astrophotography School. This will take place in Milton on the weekend of May 6/7. Details are online at hamiltonrasc.ca/CAPS/. HAA members would be eligible for a 25% discount. The two day course runs from 9:30am to 4:00pm and includes lunch. You must provide a Windows laptop and have a valid copy of PixInsight. Data sets will be provided at the workshop.



Treasurer's Report by Ann Tekatch

Treasurer's Report for April 2017 (Unaudited)

Opening balance:	\$8,423.81
<u>Revenue:</u>	
Memberships:	\$160.00
50/50 Draw:	\$52.00
<u>Expenses:</u>	
Speaker's Honorarium:	\$50.00
Closing Balance:	\$8,585.81



The Sky This Month for May 2017 by Steve Germann

Now that the season of Spring is firmly established, it's safe again to venture out for night-time astronomy, without fear of frostbite. That makes it possible to observe phenomena that in the winter you might have felt comforted that someone else observed it.

For instance, double shadow transits of Jupiter. Jupiter's 4 large moons are never on the same side of the planet, so you could never get a quadruple transit, (visually, that is see below, there's a 5th moon out of sync with the other 4) but double transits are common and triple transits are rare. They take about an hour depending...

Here is a run-of-the-mill 2009 single transit of Io simulated using graphics software:

https://upload.wikimedia.org/wikipedia/commons/f/f8/Jupiter-io-transit_feb_10_2009.gif

Unfortunately, the animated version cannot be embedded in a pdf.

This month, we have the opportunity to observe several such transits, but the one most favourably timed will be on the Thursday evening the night before our meeting. At 1:59 AM UT (that's 10 PM EDT) there will be a double transit.

One must be careful when doing Google searches for shadow transits, before clicking promising titles, since they are also very useful for Astrology and there will be some distraction.

When Jupiter is near opposition, the moons and their shadows and the sun and the earth all are in a line, and it is likely that the moons of Jupiter are near or in front of the planet during the shadow transit.

However, when Jupiter is not near opposition, the moons can be offset significantly (in terms of apparent Jupiter diameters, since their orbits are many times Jupiter's radius) and still cast their shadows on an apparently fully illuminated planetary disk.

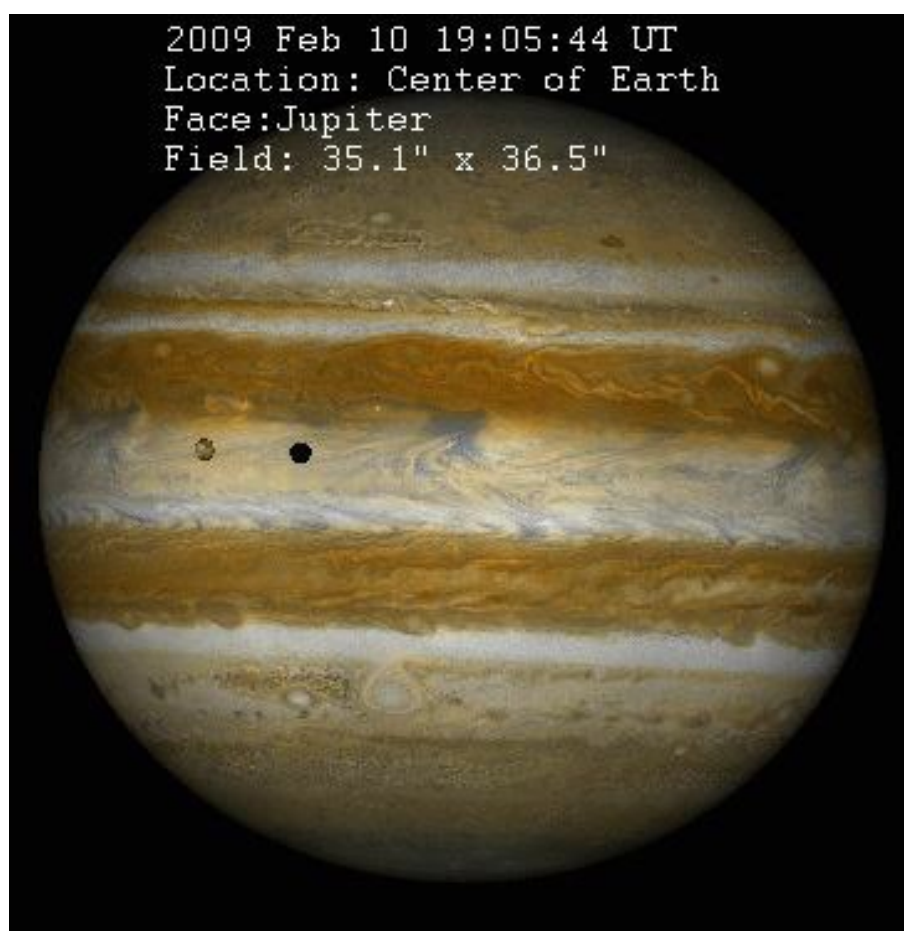
You probably know that Jupiter has a lot of moons... 67 the last time I checked, but did you know that Jupiter V, also called Amalthea, was discovered by an astronomer using visual means, not photography? The feat was achieved by Edward Barnard, whose history is worth a read at...:

https://en.wikipedia.org/wiki/Edward_Emerson_Barnard

...using a 36 inch refractor (not a reflector):

<https://www.ucolick.org/public/telescopes/36-inch.html>

If there was ever reason for aperture fever... that's it!



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The Sky This Month (continued)

He was the first person to discover a Moon of Jupiter by visual observation since Galileo.

I cannot say that I recall seeing a refractor with a diameter more than 7 inches, although I recall a 45 cm diameter telephoto lens for a camera once. Try a Google of... Zeiss Apo Sonnar T* 1700 mm F4 lens and see for yourself!

My guess is that a hint of Amalthea's shadow is present in many images of Jupiter done with short exposures. It should be even easier to see in videos as it slowly moves. Even if it's only a fraction of a pixel in size, subtracting frames might show it.

Amalthea's size is about 146 kilometers, (the 250 km length of it is oriented towards Jupiter so it won't cast shadows...) and it's orbital speed is 26 km/s so an exposure would have to be significantly shorter than 6 seconds to have a chance to see the black spec on Jupiter due to Amalthea's shadow. From our distance, those 146 km will be 1 about one part in 1000 of Jupiter's disk, so you would need magnification large enough to show Jupiter at megapixel resolution to see it.

Here's the wiki page with a wealth of information about the 5th moon of Jupiter (apparent size viewed from the cloudtops, 8 arc minutes, it's very close to Jupiter) that can produce a solar eclipse at the cloud-tops of Jupiter...

[https://en.wikipedia.org/wiki/Amalthea_\(moon\)](https://en.wikipedia.org/wiki/Amalthea_(moon))

The escape velocity from Amalthea is only about 1 meter per second, near its pointed ends, and dust that escapes from it is still in orbit around Jupiter, and rather close. The gossamer ring is anchored and replenished by Amalthea.

We don't contend with huge refractors from Hamilton near sea level, but I would be interested if any of our members have actually (intentionally or not) photographed Amalthea or one of its frequent shadow transits. It orbits Jupiter in just a couple of minutes less than 12 hours, so there should be 2 such transits per day, every day, and rare cases (once per 2-3 years in any given timezone) where parts of 3 transits happen in a single day, but one of them would be in broad daylight.

Astronomy Day

The first quarter moon near the beginning of May is Astronomy Day. This year it has passed, on April 29th. The next one will be on September 30th. Were you there? Please share your stories at our May meeting!

Astrophysics wrap-up

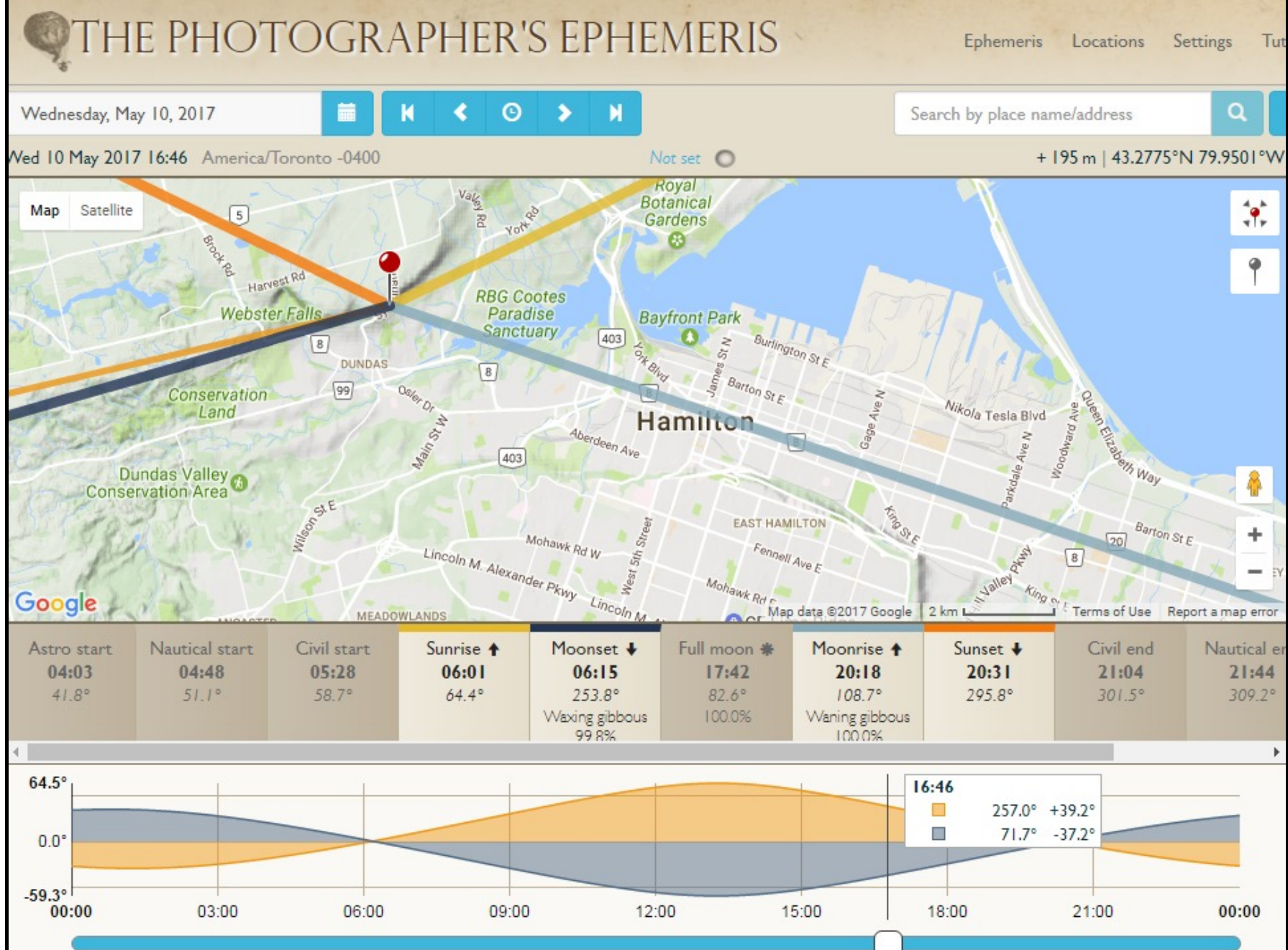
Our Astrophysics special interest group met at Doug's place last month, and we shared interesting information about spectroscopy. There are several professional quality spectrographs within reach of enthusiastic amateur astronomers, and we learned about spectroscopy courses held in France on a regular basis.

Some spectrographs have a fibre optic input, and keep the instrument in a temperature controller room for best results. A measure of a spectrograph's ability is the number of spectral lines that can be discerned. There are catalogs of spectral lines with a million entries!

Our next astrophysics special interest group meeting will be one week after our regular May general meeting. Contact the observing director if you would like to attend.

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The Sky This Month (continued)



Moonrise

In the northern hemisphere at our latitude, in Summer, the moon transits low in the sky and the sun transits high in the sky.

Full Moon will rise this month on May 10th, at 20:18 and will be over land if viewed from within Hamilton. See the above moonrise-moonset ephemeris map. Probably better to go to Burlington beach for this one. One of the interesting things about this Moonrise is that it is so southerly that we do not see the moon rising over Lake Ontario. For instance, from the location of last month's recommended vantage point, the moon will rise above Main Street, possibly coming in line with Jackson Square or other downtown towers. Note, however, that although it is nominally rising from that direction, it does not rise straight up. It will move at an angle to the west and rapidly not be in the direction of Hamilton's main streets anymore. This view might position the moon well for a mirage, where you will see half a moon apparently above the horizon.

Librations

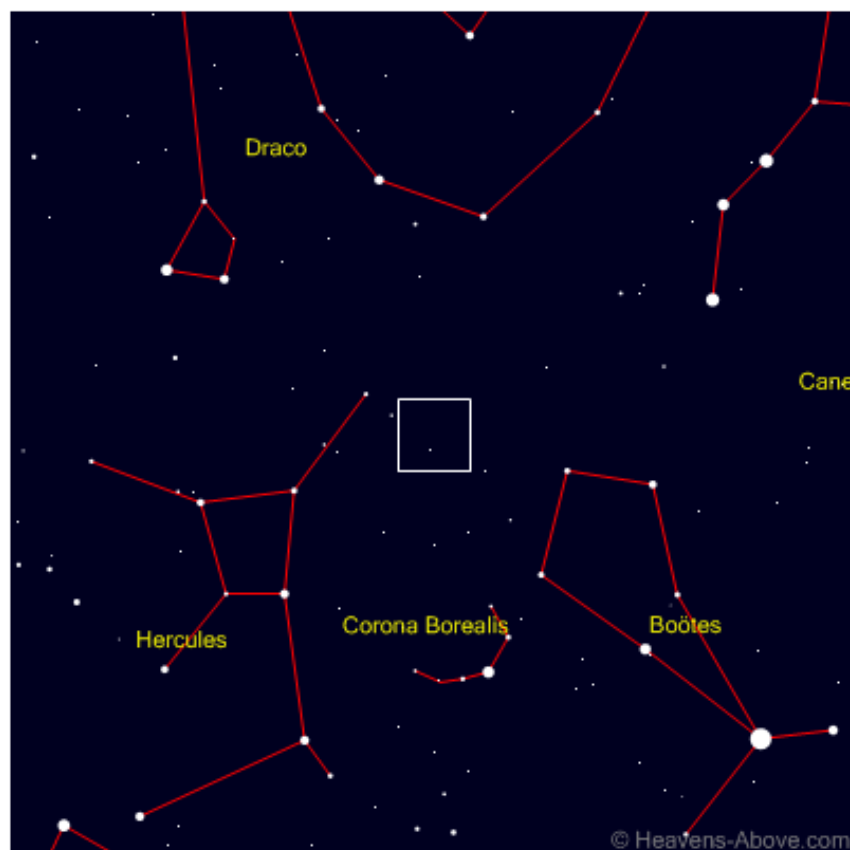
Near the time of Full Moon, you will have the best view of its far side near the Moon's south pole.

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The Sky This Month (continued)

Comet C/2015 V2 Johnson

Year Month Day Time



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



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

The Comets

Comet C/2015 V2 Johnson is high in the sky, and at magnitude 7.5, is in easy reach of your telescope. It's near Hercules, as seen in the above finder charts.

The Asteroids

Asteroid **6 Hebe** is near Sagittarius this summer.

At magnitude 10, it's a target for a 3 inch scope or larger. It's well positioned to be in view all summer. For instance, I compare the 2 coarse finder charts for May 1 and August 31 (*see top of page 10*).

Hebe will move about 20 degrees in about 4 months, or about 1/6 of a degree per day. That's about one arcsecond per 2.4 minutes. The background star field behind Hebe is in the direction of the Milky Way, and you will easily see motion in a half hour compared to the rich background stars, in a 12 inch or larger telescope.

Eclipse Preparations

There will be 14 vehicles taking members to the eclipse track this summer. We have commenced final preparations, and I will be sending a checklist to the eclipse chasers.

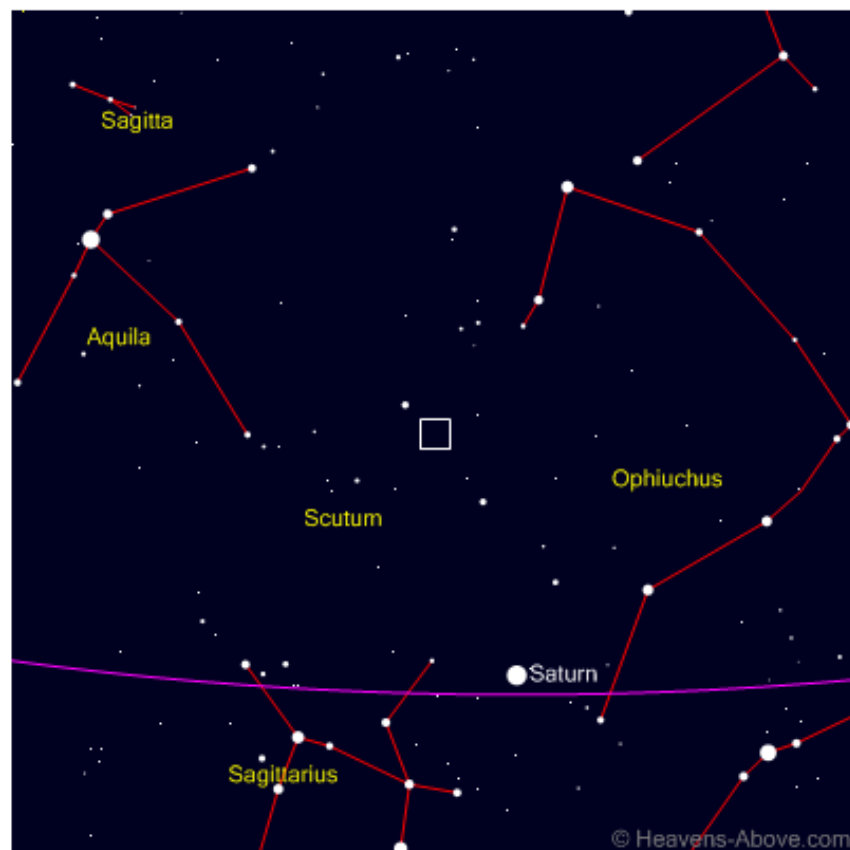
What to do with eclipse glasses — We will soon receive our club's order of eclipse glasses, and will have some to distribute at the upcoming June meeting. With luck, they will be available for the May meeting too. Bring your friends so that you can each get your own eclipse glasses at the meeting.

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The Sky This Month (continued)

Asteroid 6 Hebe

Year Month Day Time



Coarse finder chart
(Field of view=60°, Limiting magnitude=5)

Year Month Day Time



Coarse finder chart
(Field of view=60°, Limiting magnitude=5)

They are useful during the partial stages of the eclipse. (Which for those not travelling, is all you will see from Hamilton). Plan to spend some time on August 21 watching the moon make first contact and take a bite out of the Sun's disk.

Meteor Showers

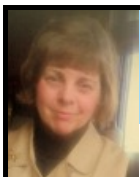
The *Eta Aquarids* meteor shower peaks on May 5th at 10 PM EDT, but it's a very wide shower, 2 days on each side of the peak. This shower has a Zenithal Hourly rate of 60 and the radiant above the horizon after 3 am. With a speed of particles faster than the Perseids, each particle will have 20 percent more energy for its mass. That said, these are on average smaller particles, and the moon is 79 percent illuminated in the evening. So...

By 4:20 am, however, the Moon will have set, and the radiant will be above the horizon, so the early morning of May 6 will give you unhindered views of this shower. Now that's it's May, it's not so cold anymore.

The long range forecast (never accurate) calls for rain. Lots on Friday, less on Saturday. However, for Meteor showers, dew on optics is not an issue. Here is one case where you get a bonus for the weatherman being wrong. Sounds like a one-sided bet to me.

I will conclude with the astronomer's favourite signature line...

Clear Skies!



A Quebec Star: The Ball House by Denise White

Early adventurers, such as John Cabot who discovered Newfoundland in 1497, and Jacques Cartier, who in 1534 navigated the St. Lawrence River, relied on astronomical observations to guide them in their exploration of new landmasses and waterways. By the 17th century, the seeds of Canadian astronomy gained a foothold in the country when Arctic explorers and intrepid French missionaries began to report astronomical observations.

Recorded as early as 1612 by English navigator, William Baffin, with more noted by French Jesuits, in 1618 and 1632, new world astronomical observations --- scattered as they were --- slowly gathered momentum. This early Canadian astronomy momentum solidified mainly with the expansion of colonial settlements found in Eastern provinces such as Quebec, Nova Scotia and New Brunswick. It was in these provinces that pre-confederation Canadians built their first observatories. The list of pioneering observatories currently recognized include the marquis de Chabert's observatory in Louisbourg, Nova Scotia (1750-1751); Joseph Fredrick Wallet DesBarres' observatory in Castle Frederick Nova Scotia (1765); Toronto Magnetic Observatory (1840); The Ball House, Quebec (1850), and the William Brydone Jack Observatory in Fredericton, New Brunswick (1851).

The Ball House was of particular interest to us since we had access to it on a holiday venture. It was one of the first observatories erected in Canada with a time ball, and its footprint can be found at the Citadel in Quebec City. The tall two-storey stone building, known also as the Former Observatory and Ball Tower or as Building 20, was constructed in 1850 where it was placed on the meridian for observation and time-keeping purposes. It mainly functioned to support marine navigation. The Quebec Observatory added an equatorial telescope in 1864, and then ten years later, it was moved to farmland located on the Plains of Abraham where a successor was built. Edward David Ashe, was hired as the first Director of the Quebec Observatory and he carried out his duties from 1850 to 1883. His pioneer longitudinal and solar photography work all contributed to the development of astronomy in Canada. Neither the original Ball House nor its replacement survives today.

(Continued on [page 12](#))



Credits:

https://en.wikipedia.org/wiki/Citadelle_of_Quebec

and

https://commons.wikimedia.org/wiki/File:Building_20.jpg



A Quebec Star: The Ball House (continued)



Quebec's Astronomical Observatory on the Plains of Abraham in 1936
Credit: National Battlefields Commission Archives

Sources:

<http://www.thecanadianencyclopedia.ca/en/article/astronomy/>

<http://www.virtualmuseum.ca/edu/ViewLoitDa.do;jsessionid=536BA174BE2BC2F9D0A2D07FB6AB8D92?method=preview&lang=EN&id=20080>

<http://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=3343&pid=0>



**This article is provided
by NASA Space Place.**

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NOAA's Joint Polar Satellite System (JPSS) to monitor Earth as never before

By Ethan Siegel

Later this year, an ambitious new Earth-monitoring satellite will launch into a polar orbit around our planet. The new satellite—called JPSS-1—is a collaboration between NASA and NOAA. It is part of a mission called the Joint Polar Satellite System, or JPSS.

At a destination altitude of only 824 km, it will complete an orbit around Earth in just 101 minutes, collecting extraordinarily high-resolution imagery of our surface, oceans and atmosphere. It will obtain full-planet coverage every 12 hours using five separate, independent instruments. This approach enables near-continuous monitoring of a huge variety of weather and climate phenomena.

JPSS-1 will improve the prediction of severe weather events and will help advance early warning systems. It will also be indispensable for long-term climate monitoring, as it will track global rainfall, drought conditions and ocean properties.

The five independent instruments on board are the main assets of this mission:

- The Cross-track Infrared Sounder (CrIS) will detail the atmosphere's 3D structure, measuring water vapor and temperature in over 1,000 infrared spectral channels. It will enable accurate weather forecasting up to seven days in advance of any major weather events.
- The Advanced Technology Microwave Sounder (ATMS) adds 22 microwave channels to CrIS's measurements, improving temperature and moisture readings.
- Taking visible and infrared images of Earth's surface at 750 meter resolution, the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument will enable monitoring of weather

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NASA's Space Place (continued)

patterns, fires, sea temperatures, light pollution, and ocean color observations at unprecedented resolutions.

- The Ozone Mapping and Profiler Suite (OMPS) will measure how ozone concentration varies with altitude and in time over every location on Earth's surface. This can help us understand how UV light penetrates the various layers of Earth's atmosphere.
- The Clouds and the Earth's Radiant System (CERES) instrument will quantify the effect of clouds on Earth's energy balance, measuring solar reflectance and Earth's radiance. It will greatly reduce one of the largest sources of uncertainty in climate modeling.

The information from this satellite will be important for emergency responders, airline pilots, cargo ships, farmers and coastal residents, and many others. Long and short term weather monitoring will be greatly enhanced by JPSS-1 and the rest of the upcoming satellites in the JPSS system.

Want to teach kids about polar and geostationary orbits? Go to the NASA Space Place:

<https://spaceplace.nasa.gov/geo-orbits/>



Caption: Ball and Raytheon technicians integrate the VIIRS Optical and Electrical Modules onto the JPSS-1 spacecraft in 2015. The spacecraft will be ready for launch later this year. Image Credit: Ball Aerospace & Technologies Corp.

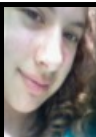


Venus and the thin crescent Moon, on Sept. 10, 2010, by Everett Cairns



© Sylvie Gionet
Waning Gibbous Moon
4/12/17

Waning Gibbous Moon, on April 12, 2017, by Sylvie Gionet



"What does 'NGC' stand for?"

"Not Gonna C 'em."

2017 Calendar of Events

- May 12 – Regular meeting at the Spectator Building
- May 27 – Outreach at McQuesten Park
- June 9 – Regular meeting at the Spectator Building
- June 24 – Outreach at Lakeland Park ... mostly Solar observing
- July 29 – Outreach at McQuesten Park ... mostly Solar observing
- August 12 – Club Picnic and public Perseid Event at Binbrook Park
- August 21 – Outreach at McQuesten park for Solar Eclipse... for those not going south for the event.
- September 8 – Regular meeting at the Spectator Building
- September 30 – Outreach at Bayfront Park... Astronomy Day
- October 13 – Annual General Meeting at the Spectator Building
- October 21 – Outreach at Grimsby Niagara Gateway Tourism Centre
- November 10 – Regular meeting at the Spectator Building
- November 18 – Scope Clinic/ Open House at the Spectator Building
- December 8 – Regular meeting at the Spectator Building



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:
 - **May 3: Introductory Astronomy for Kids — Solar System**
 - **May 10: Life in the Universe**
 - **May 17: Star Wars: The Science Awakens**
 - **May 24: Reflection in the Planetarium**
 - **May 31: Matters of Size**
- For more details, visit
www.physics.mcmaster.ca/planetarium

UPCOMING EVENTS

May 12, 2017 - 7:30 pm – *HAA Meeting* at the Hamilton Spectator Auditorium. Our featured speaker will be **Wayne Parker** of SkyShed Observatories.

May 27, 2017 - 8:00 pm - 11:00 pm – *Public Stargazing Night* at McQuesten Park, 1199 Upper Wentworth St, Hamilton, ON.

June 9, 2017 - 7:30 pm – *HAA Meeting* at the Hamilton Spectator Auditorium.

2016-2017 Council

Check out the H.A.A. Website

www.amateurastronomy.org

Chair	Bernie Venasse
Second Chair	Mike Jefferson
Treasurer	Ann Tekatch
Webmaster	David Tym
Membership Director	Leslie Webb
Observing Director	Steve Germann
Education Director	John Gauvreau
Event Horizon Editor	Bob Christmas
Recorder	Matthew Mannering
Secretary	Jim Wamsley
Publicity Director	Mario Carr
Councillors at Large	Denise White Brenda Frederick Kevin Salwach Sue MacLachlan

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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 outdoor function.

Please consider purchasing a season's pass for \$79 to help support the park.

<http://www.npca.ca/conservation-areas/binbrook/>
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