# Event Horizon

Volume 24, Number 5
March 2017

Hamilton Amateur Astronomers

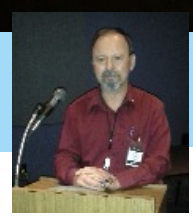
## From The Editor

The Spring Equinox approaches, and baseball Spring Training is under way, which all means warmer weather is coming.

Enjoy this month's E.H., and keep your contributions coming.

Clear Skies!

*Bob Christmas, Editor*
*editor 'AT' amateurastronomy.org*



## Chair's Report by Bernie Venasse

Our first outreach session of 2017 is scheduled for March 4th at the Grimsby Welcome Centre. There is usually a good turnout of members with telescopes and other apparatus that will entertain, educate, and enthrall the passing public. Join us there and experience the ooo's and ahhh's of first-time viewers.

Our guest speaker for March is Dr. Parshati Patel from the University of Western Ontario. Her topic: The Tale of Disks around Massive Stars. Massive stars, young or old, are interesting celestial objects with fascinating mysteries. In this talk, we will explore some of the mysteries of the disks around massive stars and how their formation, dissipation and structure affect our understanding of not only the planet formation but also the star formation process.

Astronomy 101 has been well attended and is meeting at Jim's. The next sessions are scheduled for March 2nd and 16th.

## IN THIS ISSUE:

## 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*

## 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.

**Masthead Photo:** *The Orion Nebula (M42 & M43), by Jim Wamsley.*

Taken February 19, 2017 from Dundas, Ontario. Single 20-second snapshot at ISO 3200.

# Announcement of Opportunity

**Application deadline: April 10, 2017**

This year, the Canadian Space Agency (CSA) will be awarding grants to students wanting to attend the International Astronautical Congress (IAC). IAC is organized by the International Astronautical Federation (IAF), the International Academy of Astronautics (IAA), and the International Institute of Space Law (IISL). It is the largest space-related conference world-wide and selects an average of 1000 scientific papers every year. The upcoming IAC will be held September 25-29, 2017 in Adelaide, Australia.

This international Congress is billed as an excellent gathering point for all specialists in space sector. For students, it is an opportunity to forge valuable links with professionals and other students from all over the world who share their interests. Throughout the Congress, students will have a chance to discuss with professionals, learn from their expertise and listen to their vision of the future of space exploration. Students are full participants in the Congress, lending its workshops and plenary sessions a new energy and outlook that are greatly appreciated.

The IAC draws mainly students specializing in space-related disciplines. In recent years, however, many students from outside these disciplines, though in associated fields (e.g.: engineering, law, medicine), have taken part. For many students, the IAC is a motivating event inspiring them to pursue their studies in space-related disciplines and set their career goals accordingly.

The CSA intends to support a new group of students to give them the opportunity afforded by the Congress to learn more about the future of the great space adventure and participate during the IAC 2017 in specific activities organized by the CSA and other space agencies through the International Space Education Board (ISEB).

As part of its commitment to helping train the rising generation of space professionals, the CSA is inviting university students (undergraduate, master and doctoral) to apply. It is therefore our great pleasure to invite you to the 68th IAC on the theme of "Unlocking imagination, fostering innovation and strengthening security".

In addition, once selected for a grant, recipients will be offered the opportunity to participate in the Space Generation Congress (SGC) which will be held September 21-23, 2017, a few days before IAC 2017. SGC is the annual meeting of the Space Generation Advisory Council, which is a non-profit organisation developing networks amongst university students and young space professionals and, being in support of the United Nations Programme on Space Applications.

The eligibility criteria, the application process and the selection criteria are outlined hereinafter.

More information at http://asc-csa.gc.ca/eng/ao/2017-iac.asp

# The February 2017 General Meeting of the HAA by Matthew Mannering

*Bernie Venasse* mentioned that the IAF (International Astronautical Federation) *[see previous page]* would be providing grants for students to attend the International Astronautical Congress this September in Adelaide Australia. These grants are for adult students and cover all expenses. To quote from the website:

> *"You are a student or a young professional between the ages of 21 and 35 with space-related career interests and would love to participate in IAC2017 in Adelaide, Australia?"*

*John Gauvreau* announced that the second session of Astro101 would take place on Feb. 16th. John stressed that people should come to the event even if they missed the first session.

John then introduced our guest speaker *Barry Sherman*. John and Barry met at the Hamilton RASC back when John was a teenager. Barry knows gear and optics and has ground three mirrors and refurbished scopes. John told us a story of the time he, Grant and Barry thought they had found a supernova in M101.

Barry's talk was about chromatic aberration.

Basic refractors come with a primary consisting of two lenses, one crown glass and the other flint. The two lenses have different refractive indexes which attempts to minimize chromatic aberrations. However different colors of light will still come to focus at slightly different distances from the primary lens. In fact you need a scope with an F-ratio of F15 to get rid of most of the false color. If the scope you are using has lots of false color (often called purple fringing) you can mask the primary down to a smaller opening thereby increasing the F-ratio. Purple fringing can also be reduced with the use of a filter at the eyepiece.

ED (Extra Low Dispersion) apochromatic scopes use optical grade Fluoride coatings to vastly decrease any false color. Coatings for lenses increase light throughput and reduce scatter. Refractors are capable of very high contrast due to the lack of a central obstruction such as in Newtonians. Barry prefers 1.25" prism diagonals over 2" Di-Electric diagonals. He believes that the prism provides a higher contrast image when using a diagonal. There are a lot of good lenses out there in junk scopes. A lot of the older 60mm refractors had Japanese primary lenses which were of very good quality. However the construction of the scope and mount was often shoddy.

At the end of Barry's talk, Bernie asked for ideas relating to the operation of the club. A suggestion was made to create an article for the Spectator which would talk about the 2017 eclipse and the intrepid group heading down to Missouri. Another suggestion was to give talks leading up to eclipse that described what it would be like and how to photograph it. A last suggestion was to get a group together to make a field trip to KW Telescope.

Lastly, *Steve Germann* presented 'The Sky This Month'.

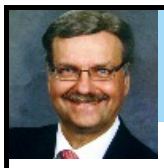
Vesta is at magnitude 6.7 and an easy catch with binoculars in the constellation of Gemini. Use the Heavens Above website to generate a chart and zoom in to a five degree field of view to match the view through binoculars. Bernie tracked Vesta for five hours last week and sketched its movement against background stars. *[Bernie's sketch appears on page 20 of last month's Event Horizon.]*

Steve gave a short talk about *StarTools*, which is a software package used to process astro-images. He asked for list of names of people interested in purchasing a copy at a group discount.

Comet 45p is at magnitude 7 in Hercules just before dawn.

Steve would like to create a Special Interest group dedicated to photographing events such as moon rise.

Bernie mentioned the public night scheduled for March 4th in Grimsby and then closed the meeting.



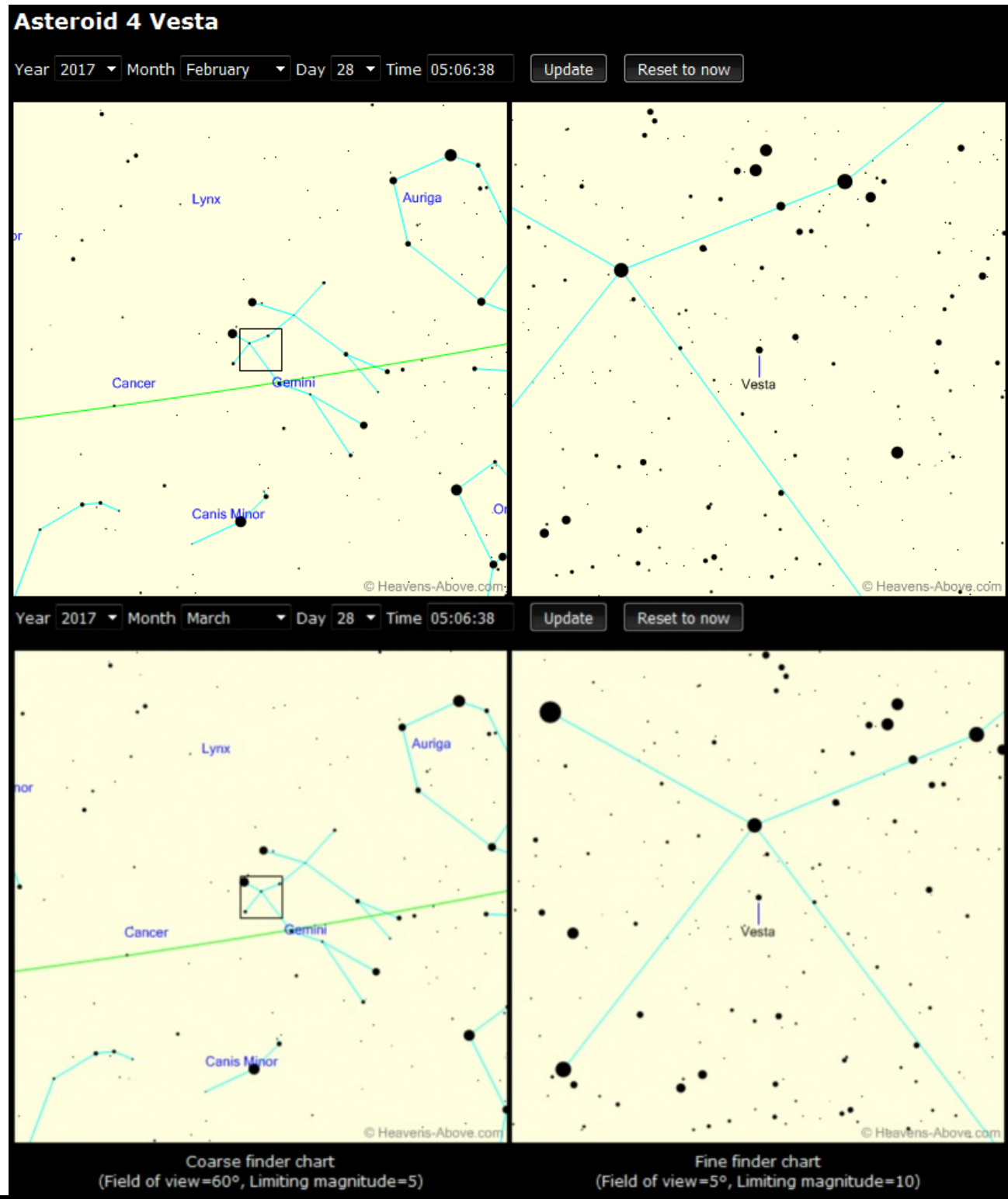
# The Sky This Month for March 2017 by Steve Germann

## What's that in the sky

***Venus*** continues to impress us with its brightness starting high in the western sky each evening. It has passed its peak brightness for the year but will still be startling this month. There is a rare chance to see Venus, near the 25th of March, in both morning AND evening twilight, since Venus will actually be about 8 degrees North of the Sun when it passes through inferior conjunction. In the northern hemisphere, it will be above the horizon when the Sun is set, and above before the Sun rises too. Take advantage of this rare treat for the eyes. Notice the crescent shape of Venus if you use binoculars. You will need to observe from a place with a clear view of the east or west horizon, respectively.

## Minor Planet of the month

***Vesta*** still outshines all the other minor planets this month, at about mag 7.1, and it does not move very far during the month, staying near the heart of Gemini. In these 2 images you see the total distance covered by Vesta this month is short, mostly because it is stationary on March 7. *(Continued on page 6)*



## The Sky This Month (continued)

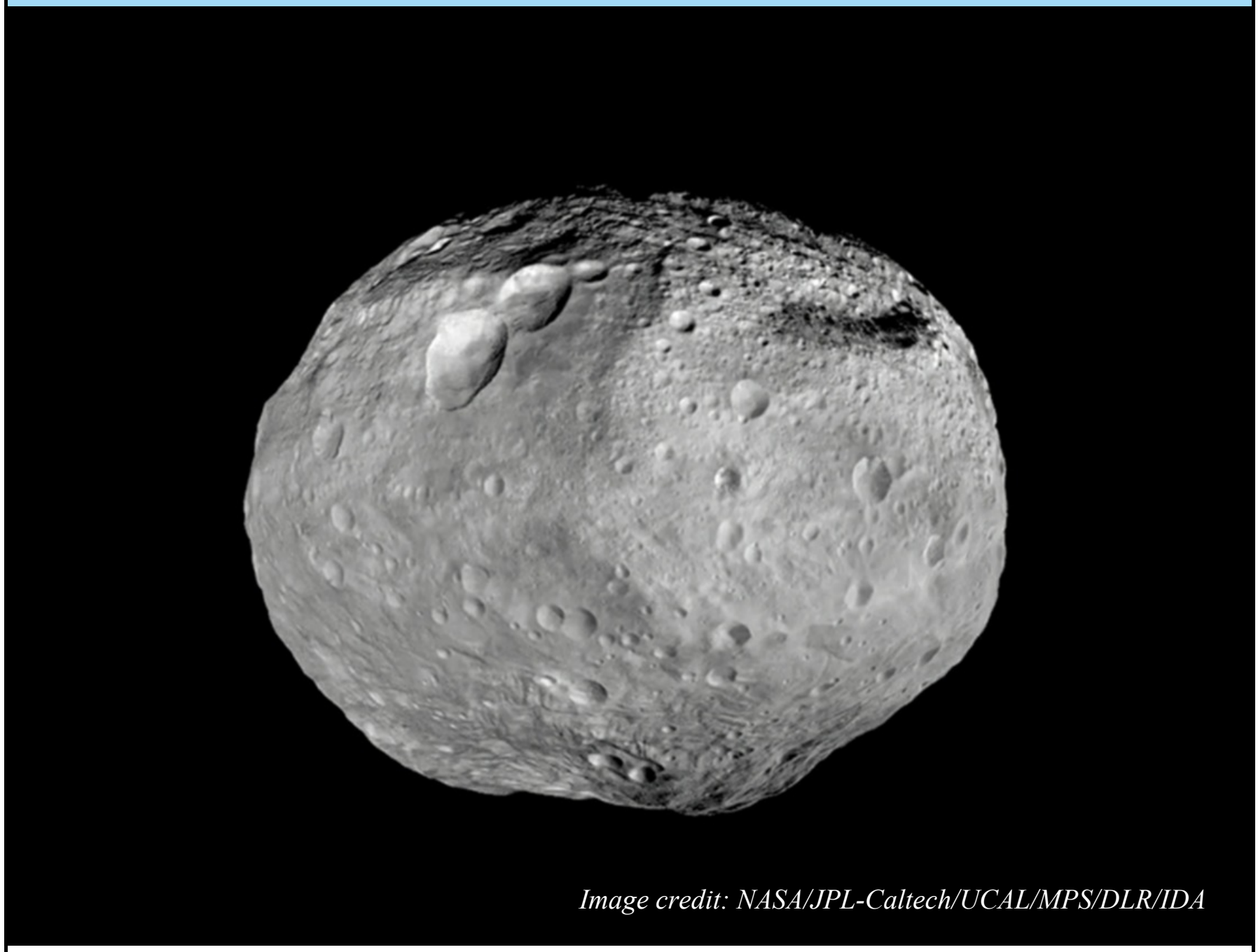


*Image credit: NASA/JPL-Caltech/UCAL/MPS/DLR/IDA*

For a detailed shot of Vesta, you can see that it's got some pretty big craters. The link below also shows many articles about the space probe, Dawn, which visited Vesta in 2011 and 2012:

https://www.nasa.gov/mission_pages/dawn/multimedia/pia15678.html

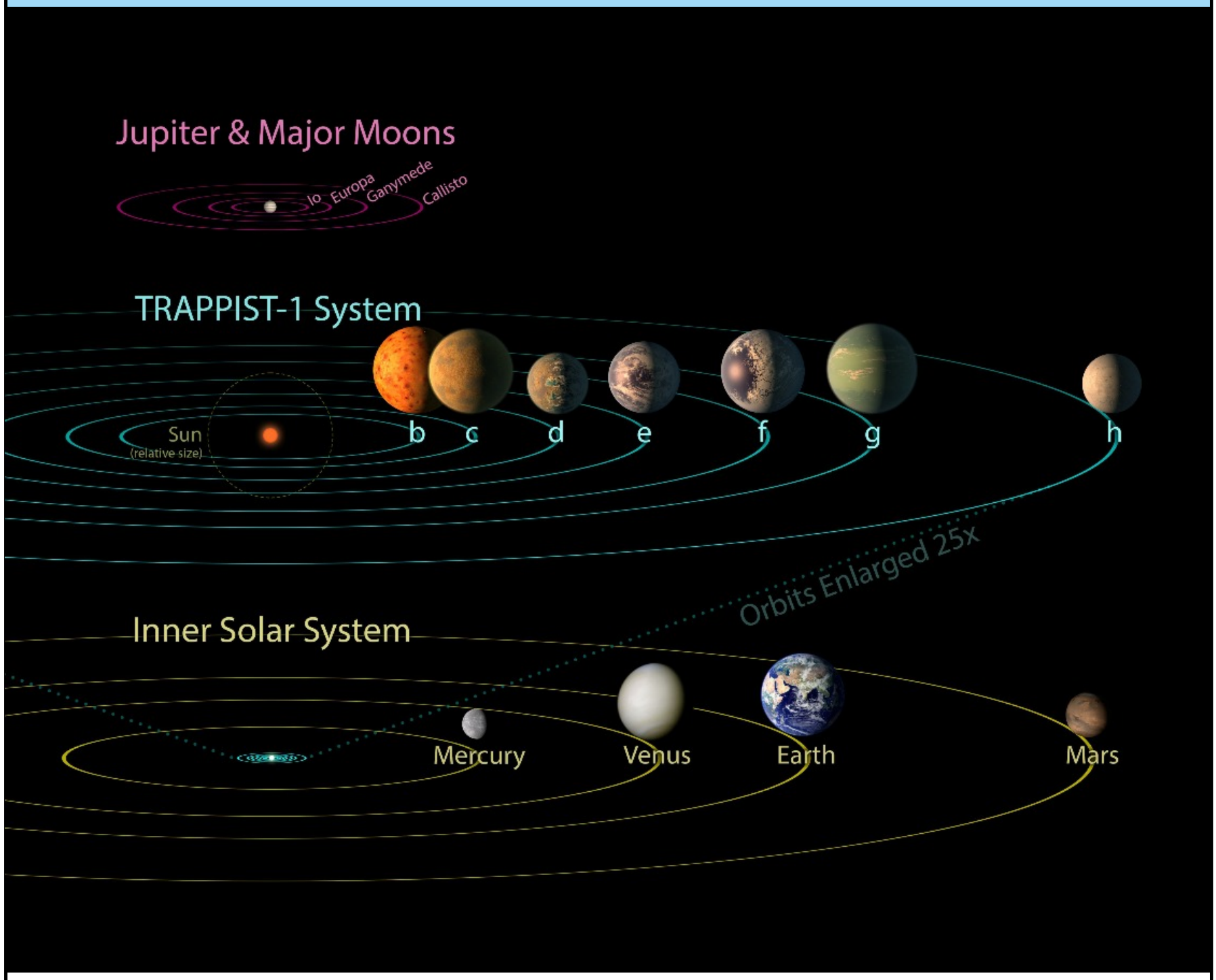
As always, you can obtain a free chart for your date and time of observing from heavens-above.com. For asteroid charts, you don't even need a login.

## Space news

A busy solar system, discovered over the last couple of years, was announced recently, and is just 40 light years away. These 7 planets, so close to a star, will have significant tidal heating and will eventually settle into a locked in orbit like Pluto and Charon or the Earth's Moon. They are approximately 5 million miles from their star, or closer.

*(Continued on page 7)*

## The Sky This Month (continued)




Here's a graphic showing the relative size of this solar system. The key detail is that the red dwarf star is much smaller than the Sun, and much cooler, so that it won't roast the planets.

All we really know is that the planets are eclipsing their star. However, that does not stop an artist from imagining colourful appearances. The sizes, though, are at least representative of what's been detected.

The interesting thing is how close the planets are to the star. In this graphic, you see the entire system sits well within the size of the orbit of Mercury, and the longest 'year' is only 20 days.

Red dwarfs last a long time. Like a trillion years... because their hydrogen and helium get stirred through the entire star, and they can burn most of their hydrogen to helium eventually. But they have violent outbursts and flares for at least a billion years until they settle down. Those flares would kill any life on those planets right now, and probably for the next 500 million years or so. The estimated age of the star is only 500 million years... so it's not safe to visit yet. We will keep looking.

By comparison, our Sun has a core of burning hydrogen and will burn stably for another 5 billion years, but only the hydrogen in the core will get burned. The vast majority of our Sun's hydrogen will be ejected back into space after the Sun turns into a red giant.

*(Continued on page 8)*

# The Sky This Month (continued)

## Notable astronomical conjunctions

This month you have a chance to observe ***Mercury*** in the evening sky. It will be up, along the line of the ecliptic after the Sun sets, starting about March 23rd and continuing for a few weeks… Not every observer has seen Mercury (and known it) and here's your chance to get it totally under control.

The New Moon this month is near March 28, and that means it's a good time to attempt the ***Messier Marathon***. The Messier objects are not evenly distributed in the sky, and there's a part of the sky where there are none of them. When the Sun is in that region, it means the Sun is far enough from the actual Messier objects that they all can be seen on one night. It was only about 50 years ago that it was realized that by observing from dusk to dawn, you could see significantly more than the half of the sky opposite the sun from the Earth. In fact you can see about 90 percent of the northern sky (and annually visible fraction of the southern sky) on a single night. The Messier Marathon is, however, easier to achieve when observing from altitude and from a more southerly location like Arizona, but for those in Ontario, it is still possible to view more than a hundred. To play fair, you are supposed to star-hop to the objects, but you can also use manual setting circles, which work wonders, or a Goto Scope, and have some fun.

Contact me if you are interested in doing an all-nighter at Binbrook Conservation Area, or even a part-nighter. I am sure on the weekend near the New Moon, we will have an observing session there. Likely Saturday April 1st. The new moon is not much of an interference with the deep sky at 3 days old, and it will set early.

## Coming events and field trips

This weekend, there are 2 events to interest you. The Public Outreach at the Gateway Tourism Centre at Casablanca road, from about 7-10 pm on March 4th, and just a few hours following that, the grazing occultation of Aldebaran against the dark limb of the Moon.

In that regard, some members are planning an expedition to observe the graze, and if you would like to be included, you will need to embark about 9 PM on Saturday to an area in *northern Mississauga* (to be announced) for the setup and observations.

Contact me *observing 'at' amateurastronomy.org* to be included in the plans.

# Treasurer's Report by Ann Tekatch

Treasurer's Report for February 2017

| | |
|---|---|
| Opening balance: | $8,181.81 |
| <u>Revenue:</u> | |
| 50/50 Draw: | $36.00 |
| Memberships: | $50.00 |
| Calendar Sales: | $30.00 |
| <u>Expenses:</u> | NIL |
| Closing Balance: | $8,297.81 |

## NASA's Space Place


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

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.
Visit spaceplace.nasa.gov to explore space and Earth science!

# Solar Eclipse Provides Coronal Glimpse

By Marcus Woo

On August 21, 2017, North Americans will enjoy a rare treat: The first total solar eclipse visible from the continent since 1979. The sky will darken and the temperature will drop, in one of the most dramatic cosmic events on Earth. It could be a once-in-a-lifetime show indeed. But it will also be an opportunity to do some science.

Only during an eclipse, when the moon blocks the light from the sun's surface, does the sun's corona fully reveal itself. The corona is the hot and wispy atmosphere of the sun, extending far beyond the solar disk. But it's relatively dim, merely as bright as the full moon at night. The glaring sun, about a million times brighter, renders the corona invisible.

"The beauty of eclipse observations is that they are, at present, the only opportunity where one can observe the corona [in visible light] starting from the solar surface out to several solar radii," says Shadia Habbal, an astronomer at the University of Hawaii. To study the corona, she's traveled the world having experienced 14 total eclipses (she missed only five due to weather). This summer, she and her team will set up identical imaging systems and spectrometers at five locations along the path of totality, collecting data that's normally impossible to get.

Ground-based coronagraphs, instruments designed to study the corona by blocking the sun, can't view the full extent of the corona. Solar space-based telescopes don't have the spectrographs needed to measure how the temperatures vary throughout the corona. These temperature variations show how the sun's chemical composition is distributed—crucial information for solving one of long-standing mysteries about the corona: how it gets so hot.

While the sun's surface is ~9980 Farenheit (~5800 Kelvin), the corona can reach several millions of degrees Farenheit. Researchers have proposed many explanations involving magneto-acoustic waves and the dissipation of magnetic fields, but none can account for the wide-ranging temperature distribution in the corona, Habbal says.

*(Continued on page 10)*

You too can contribute to science through one of several citizen science projects. For example, you can also help study the corona through the Citizen CATE experiment; help produce a high definition, time-expanded video of the eclipse; use your ham radio to probe how an eclipse affects the propagation of radio waves in the ionosphere; or even observe how wildlife responds to such a unique event.

Otherwise, Habbal still encourages everyone to experience the eclipse. Never look directly at the sun, of course (find more safety guidelines here: https://eclipse2017.nasa.gov/safety). But during the approximately 2.5 minutes of totality, you may remove your safety glasses and watch the eclipse directly—only then can you see the glorious corona. So enjoy the show. The next one visible from North America won't be until 2024.

For more information about the upcoming eclipse, please see:

**NASA Eclipse citizen science page**
https://eclipse2017.nasa.gov/citizen-science

**NASA Eclipse safety guidelines**
https://eclipse2017.nasa.gov/safety

Want to teach kids about eclipses? Go to the NASA Space Place and see our article on solar and lunar eclipses! http://spaceplace.nasa.gov/eclipses/

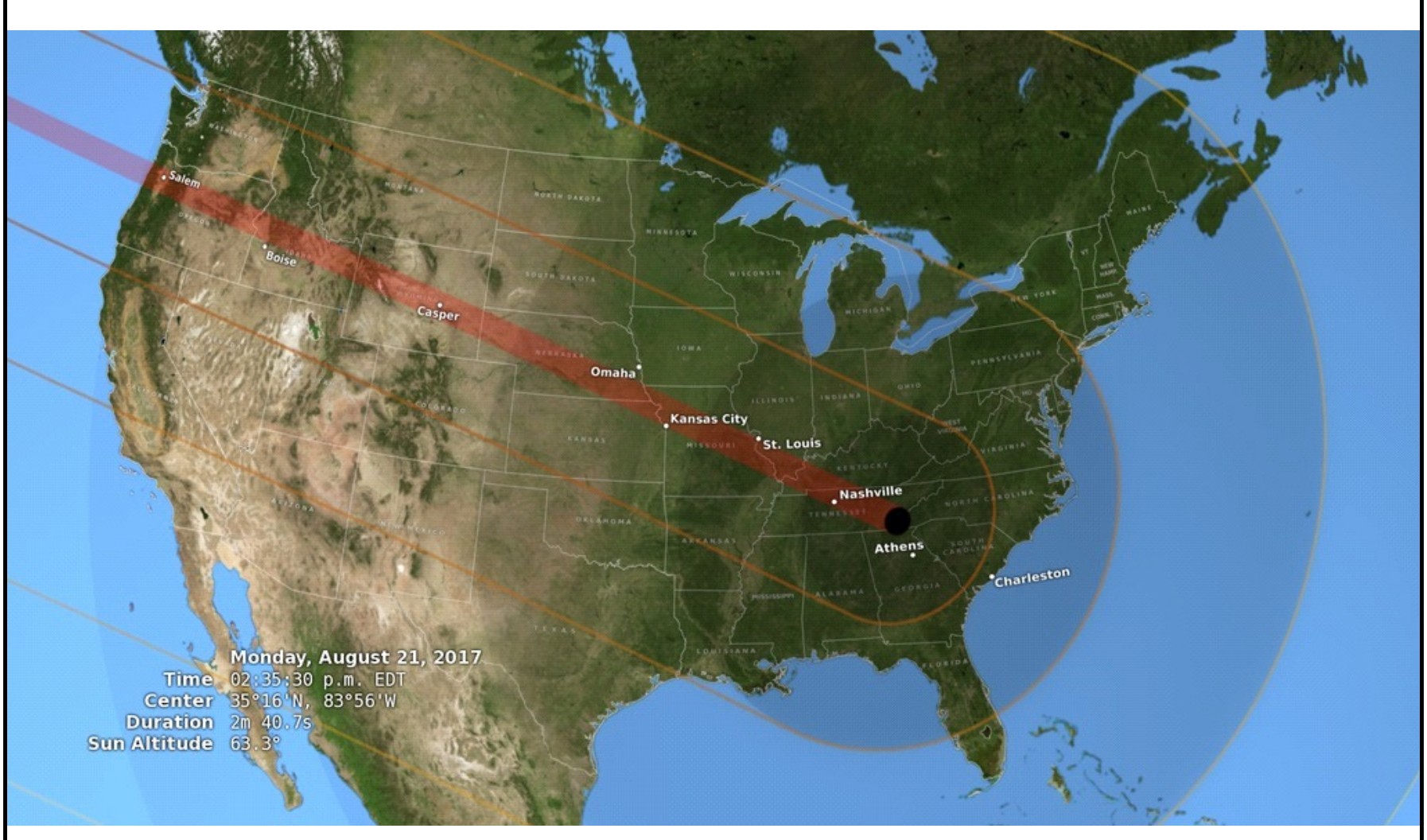



*Illustration showing the United States during the total solar eclipse of August 21, 2017, with the umbra (black oval), penumbra (concentric shaded ovals), and path of totality (red) through or very near several major cities. Credit: Goddard Science Visualization Studio, NASA*

# The Penumbral Lunar Eclipse from Cancun by Peter Wolsley

I took up the challenge of photographing the penumbral lunar eclipse that occurred on Feb 10th, 2017. I was lucky enough to be on vacation in Cancun, Mexico but unprepared because I only had my point-and-shoot camera.

Regardless, I managed to play with the camera's settings and found that it has a burst shutter mode that takes pictures as long as the shutter release button is pressed. I also found that if I chose the smallest file size (640 x 480) that the camera would allow me to use a 25x digital zoom. I decided that I would take a series of photos every 15 minutes. I had hoped that Registax would allow me to stack each series and improve the picture quality. Registax is a free program available on the Internet which Is specifically designed for planetary imaging. It is typically used to extract individual frames from videos and then use sophisticated algorithms to stack the frames together to yield a high quality master image. Registax can also be used with a series of still photos.

To take the pictures I first found a location that was clear of trees and then found a hard surface to prop up the camera from. I then cranked up the zoom to 25x. When I got the moon centred in the camera's field of view I pressed the shutter and for the next few seconds I watched the viewfinder while I gently moved the camera to keep the moon more, or less, centred. I also had to changed the exposure setting of the camera so that it took photos that were underexposed by two stops otherwise the images were washed out.

This method of obtaining the photos worked well for the initial 15 minute sessions. For the last two sessions the camera decided to cancel the two stop underexposure…operator error.

When I got back to Canada…brrrr…I fired up Registax and tried to stack the photos. Unfortunately Registax assumes that you have a very steady hand. The moon's position in the photos jumped around far too much for Registax to understand. Luckily, I am a programmer so I wrote a program that would use a centroid calculation to figure out where the moon was located in each photo. Then, the program would shift the position of the moon so that it was dead centre of each photo. Registax had no problem stacking the modified photos. For each master photo I estimate I had 10 to 20 original photos. An individual JPG photo was typically taken with the following settings. [F-stop f/5.8, Exposure 1/320th sec, ISO 200, Exposure bias -2 steps]

I also went to the timeanddate.com website where they had a great simulation of the penumbral lunar eclipse. I configured the simulation for Cancun and for the times of each of my series of photos. I took screen captures of the results and they appear below each of the photos *[see page 12]*.

I believe my photos show the edge of the earth's Umbra for the first four series. The underexposure setting was unfortunately changed for the last two series. Initially, I didn't see any evidence of the Earth's Penumbral shadow. Then I remembered that I had also taken photos the previous night while trying to figure out what settings to use. I included this addition photo because there is no shadow cast by the Earth. While it is very subjective, I think I can see a slightly darker top left corner of the moon when the two images are compared.

I also noticed that the location of the umbral shadow on my images did not agree with the moon's surface features displayed on the timeanddate.com simulation. I made the assumption that the simulation was wrong in this respect. I was able to use Registax to rotate the moon's face so that the orientation of the umbral shadow agreed with the intent of the timeanddate.com simulation.

***See Peter's Penumbral Lunar Eclipse Collage at top of Page 12.***

## **Eye Candy** the Members' Image Gallery


**Penumbral Lunar Eclipse, February 10, 2017 from Cancun, Mexico,** by **Peter Wolsley**
See Peter's article on his trip and the eclipse on page 11.

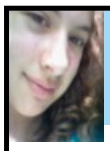
**Venus, February 19, 2017,** by **John Gauvreau**
Yes, this is the crescent *Venus!*

**Waning Gibbous Moon of February 13, 2017,**
by **Sylvie Gionet**

**The Snow Moon,** by **Sylvie Gionet**

## **Eye Candy** (continued)

**H.A.A. member Les Webb's** new **iOptron Mak150** sees first light in his backyard observatory.

## Cartoon Corner by Alexandra Tekatch

### The Effect of Climate Change on Winter Observing in Hamilton

**Before Climate Change - Cold & Cloudy**

**After Climate Change - Warm & Cloudy**

# 2017 Calendar of Events

March 4 — Outreach at Grimsby Niagara Gateway Tourism Centre

March 10 — Regular meeting at the Spectator Building

March 25 — Messier / Caldwell event at Binbrook Park

April 7 — Regular meeting at the Spectator Building. Note that this is the FIRST Friday of the month

April 22 — Scope Clinic/ Open House at the Spectator Building

April 29 — Outreach at Bayfront Park… Astronomy Day

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

*Photo Credit:*

*Jim Wamsley (both)*

# 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:**

  - **Mar 1: Introductory Astronomy for Kids — Solar System**
  - **Mar 8: Exploring the Red Planet**
  - **Mar 15: A Quarter Century of the Hubble Space Telescope and Beyond**
  - **Mar 22: Reflection in the Planetarium**
  - **Mar 29: The Invisible Universe**

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

# UPCOMING EVENTS

**March 4, 2017** - 7:30 pm - 11:00 pm — Public Stargazing Night at the Niagara Gateway Tourism Centre, Grimsby, ON.

**March 10, 2017** - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium. Our featured speaker will be **Dr. Parshati Patel** of Western University, and her talk is entitled "The Tale of Disks around Massive Stars".

**April 7, 2017** - 7:30 pm — *HAA Meeting* at the Hamilton Spectator Auditorium. Our featured speaker will be **Dr. Pauline Barmby** of Western University. *NOTE: This is the first Friday of the month.*

## 2016-2017 Council

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|---|---|
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Check out the H.A.A. **Website**
www.amateurastronomy.org

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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/
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HAMILTON AMATEUR ASTRONOMERS