



# Event Horizon

Volume 25, Number 8  
June 2018



## From The Editor

Here's the 2018 "Summer" edition of the E.H., to usher in the warm-weather season.

Have a good summer everyone, and see you in September.

*Bob Christmas,  
Editor*

*editor 'AT'  
amateurastronomy.org*



## Chair's Report by Bernie Venasse

It is amazing how quickly the seasons change from winter to summer. It seems like just yesterday it was winter. The days are now seemingly longer and the nights shorter. Even the shadow of the moon seems longer and darker. Another sure sign that warmer weather is upon us is the arrival of bugs and allergies. Be sure to have your medicines on hand when you venture out into the pollen-swollen air of the early summer nights! Enjoy the summer celestial sights and observing opportunities.

### Perseid event volunteers needed!

Saturday, August 11, 2018 is the date of the event at Binbrook Conservation Area this year. As always, we are in need of your assistance. We require volunteers for the gate, donation acceptance, parking directors, sky guides and more! If you can find it to be generous with your time please contact any member of council.

*(Continued on [page 2](#))*

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## Chair's Report (continued)

### Anniversary Stars and Q

Tickets are still available for the BBQ. Tickets must be purchased in advance and are NOT available at the gate. The park is open to all HAA members and their guests for an evening of stargazing, without charge, for those who wish to partake in the star party but not enjoy the dinner.

### May activities

Matthew Mannering's presentation regarding Astrophotography basics was well received by the 90-100 persons in attendance at our regular meeting on May 11th. There has been a lot of positive feedback. Great job, Matt.

May Public Outreach was offered on May 26 at McQuesten Park in Hamilton. After a day of threatening weather the clouds cleared enough to allow views of Venus, the moon, and Jupiter and his moons. The event was attended by a number of members who brought their scopes and by upwards of 50 guests who had a seemingly endless list of questions. Advice was offered, smiles exchanged and a great number of OMG's were exclaimed by visitors, guests and newbies alike. A job well done, people. Thanks for giving of your time.

### Upcoming Events

On the evening of June 8, 2018, Ron Brecher will be our guest speaking to the topic of Astrophotography processing using Pixinsight. Visit his site at [astrodoc.ca](http://astrodoc.ca).

On June 23, 2018, Public Outreach will be offered at Lakeland park( just north of Hutch's on the Beach). There will be offerings of Solar viewings and daytime Lunar observations. This event is being held in conjunction with many other groups worldwide to celebrate Solar SUNday and the arrival of the Summer Solstice. (Rain date for this event: Sunday, June 24, 2018)

July 21, 2018. There will be offerings of Solar viewings and daytime Lunar observations at McQuesten Park (1199 Upper Wentworth St, Hamilton, ON)

During the overnight of August 11/12 the Public is invited to attend at Binbrook Conservation Area for the Perseid Meteor Shower. This is a free-of-charge event but we will not turn away food or cash donations on behalf of Hamilton Foodshare.

The following night, August 12/13 is the membership and guests only night at Binbrook Conservation Area for the club's night of viewing the Perseid Meteor Shower.

Then, on August 18, 2018, we are offering the Public outreach at Lakeland Park (just north of Hutch's on the Beach).

The Stars and Q BBQ and Star Party will be held on September 8, 2018 at Binbrook Conservation Area. ALL members are welcome to attend the events BUT you MUST have a ticket for the BBQ.

**Masthead Photo:** *Globular Cluster Omega Centauri (NGC 5139), by Leslie Webb.*

Taken May 14, 2018 from Animas, New Mexico, with his Canon DSLR through his 132mm William Optics scope for a 2 minute exposure. His camera was set at ISO 1600. Unprocessed at time of publication.



## 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

...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 Amateur Astronomers 25th Anniversary Celebration Stars & Q

Join us for a BBQ and Star Party to celebrate the Hamilton Amateur Astronomers 25th Anniversary.

After dinner there will be a brief Night Sky Tour followed by an evening of star gazing.

So come prepared.

**Date: Saturday September 8, 2018** (no rain date)

**Location: Binbrook Conservation Area Large Pavilion**

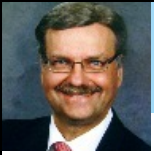
Please bring your own lawn chairs and beverages.

Dinner at 5 pm

**Tickets: \$35.00**

Available through the HAA Website or at the May and June General Meetings.

<https://www.amateurastronomy.org/>



## Mars

This Summer, astronomy should be about all things *Mars*.

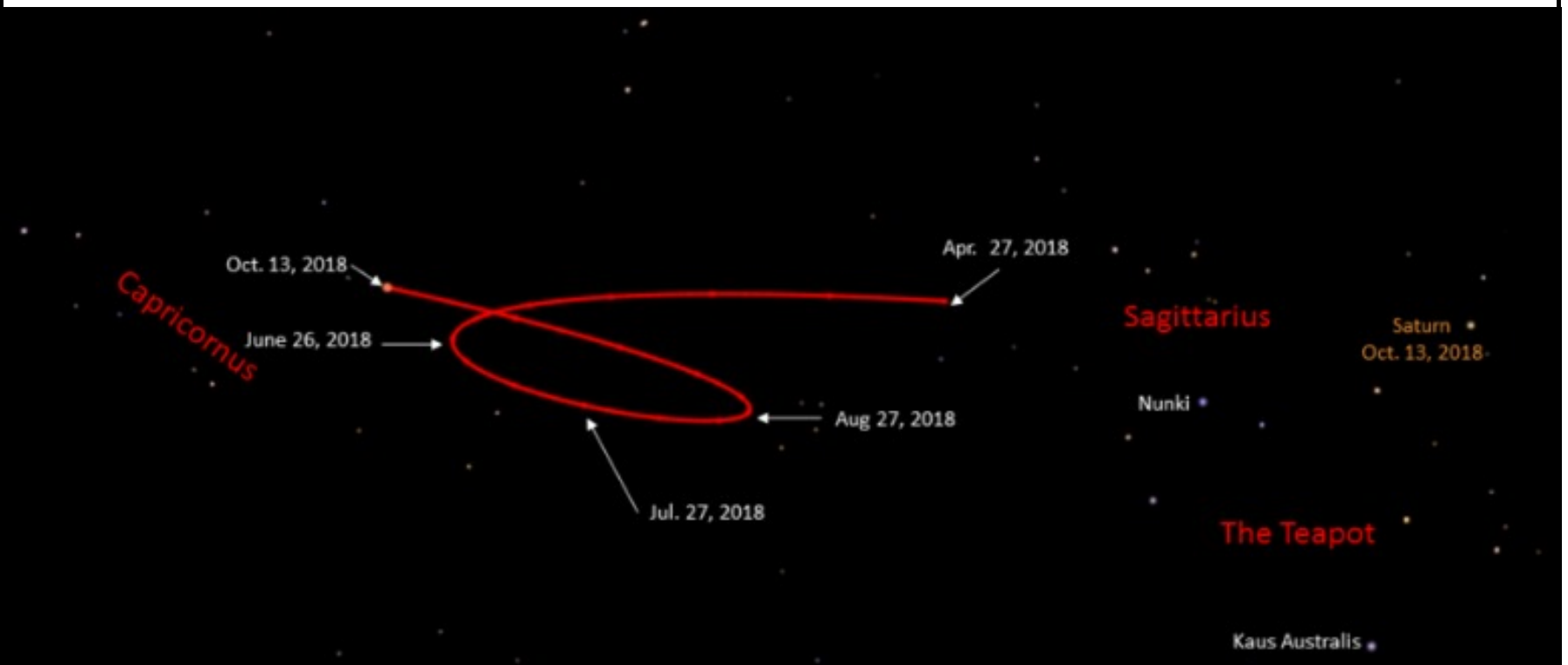
Mars at opposition is the stuff of Internet memes. I am sure you have seen them. Some people don't even forward them anymore. That's good.

It's also the stuff of genuine appreciation for one of our solar systems most interesting planets (besides Earth of course).

Mars will be at its closest to Earth for the next 2 years, and is a good telescopic target all summer.

Mars will move *retrograde*, starting from June 28 and ending on August 28, as we on Spaceship Earth catch up with it, and overtake it. Then it will return to its *prograde* motion against the distant stars, at the end of August.

The time of closest approach is...July 27... but the months before and after are good for viewing, too.



*Retrgrade Motion of Mars in the Sky in 2018, from blog.sivanaspirit.com/Tina Heals*

The orbit of Mars is such that it takes about 2 years 2 months for Earth to catch up with Mars again for another opposition. That means Mars has the longest time between oppositions of any planet in the Solar System, and therefore also the least number of chances for low energy orbital alignment allowing sending space probes, etc to Mars. And... it is 12 years between oppositions of Mars that happen in the Summertime... So, Mars has been waiting for this.

With so much attention focused on Mars these days, it's worth it to take a last look at it while it's still uninhabited.

It won't be too long before that changes, but like the Moon, we won't be able to actually see rockets landed on Mars because they are just too small compared to the whole planet.

*(Continued on [page 6](#))*



## The Sky For Summer 2018 (continued)

Mars has a very thin atmosphere of mostly carbon dioxide, with a little water vapour and argon. The atmosphere does not stop meteors as well as Earth's atmosphere does, but both planets have an atmosphere too thin to burn up the really big (kilometer size) impactors, so the number of really big craters will be about the same, with Earth's craters getting eroded, but not so much for Mars.

If you look around, you will see areas with less craters, which might have been underwater since the late heavy bombardment. Accordingly, Mars has more visible small craters than Earth does, (ie, the 1 km variety). I don't think anyone but Herschel could see craters.

On cloudy nights, you can just peruse the Mars atlas online... here is a link:

<https://www.google.com/mars/>

Missing from this map is a distance scale. It's a Mercator projection, which is part of the problem, as the scale varies all over the map, especially at the poles.

...Or better yet, use <https://mars.nasa.gov/maps/explore-mars-map/fullscreen/> which has a scale bar.

There's a lot of craters. Each one has maybe a million tons of asteroid material in it, some with high fractions of precious metals. So mining opportunities abound....

Likewise on the Moon, but that's another story. With no atmosphere, the Moon's craters tend to splatter farther.

Here's a link for Syrtis Major:

[https://en.wikipedia.org/wiki/Syrtis\\_Major\\_Planum](https://en.wikipedia.org/wiki/Syrtis_Major_Planum)

Syrtis Major makes a dark patch against Mars' otherwise orange disk. Can you sketch it? If you do, note the date and time, equipment and seeing conditions at your location.

As a planet, Mars is bright. It can be viewed from downtown about as well as from the darkest desert. Altitude does help, but not so much darkness. Your eyes will be dazzled by it in a good large telescope, and you don't really need to wait to dark adapt your eyes either. If you have a 'moon filter' this would be an opportunity to expand on its uses.

During the summer, Mars will rise progressively earlier. 1AM on June 1, 11 PM on July 1, 9 PM on August 1, and 6:30 PM on September 1. So to see it, you will have to stay up late. It's always there in the early morning though. It will be up during the Perseids Meteor Shower.

Afocal photography through the eyepiece is a good way to snap photos of Mars. It's so bright that a short exposure will provide a sharp image. Be sure to use less than 1/10 second or you will need to have a tracking telescope mount. Or better yet, buy a gadget that allows your camera to look through the eyepiece of another telescope, and then ask to use a friend's scope to get your shot of Mars.

How much more can you see in the photo compared to what you can sketch?

Note that Mars rewards the patient observer. Sky conditions can sometimes clear up for a few seconds, as a spot of non-turbulence happens to line up with your sky view. Then you will see exquisite detail. 2 seconds later, it will be comparatively murky.

The best nights to observe are a day or 2 after a storm system has passed.

*(Continued on [page 7](#))*

## The Sky For Summer 2018 (continued)

### Saturn

This month, we have the chance to observe *Saturn* at Opposition. (and the Moon at opposition too, apparently, on June 27th). For starters, that means it will rise at Sunset, and be up all night, but more than that, the sun is shining directly on the rings, from our perspective. For a week before and after, they will be especially bright.

Opposition is on June 27th, so take the time to observe Saturn soon, and then again at opposition and see the big difference. Saturn, being a planet, is bright. The full Moon will not trouble you.

At opposition, You will also have slightly brighter views of Saturn's Moons. This is a chance for you to count how many moons of Saturn you can see. 5 is a respectable number for our skies. The full Moon will interfere with seeing Saturn's moons, though.

### The Moon

Not much to say about the Moon this time. The full Moon will rise at 20:32 on June 27, curiously listed as 100.0 % illuminated. It's not a super moon or anything like that... but it's big and white and round, and has a lot of detail in its quarter phases... As you should know, the Moon is better observed when the Sun hits it at a low angle, so that bumps and craters cast shadows.

### Asteroids

*Vesta* is at opposition on June 20th. It will be very bright. 3rd quarter moon might give you a chance to see it without a telescope. It's definitely an easy binocular object all this month. In Sagittarius, from Binbrook, you might see it, magnitude 5.7, without a telescope.

Best attempted by those under 30 years of age, and from south of the city.

### Comets

We are lucky that this Summer, there are 2 bright comets passing through. One of them is in Ursa Major.

Here's the chart from Heaven's Above for the end of May:

Comet	Brightness	Date of last reported observation	Angular separation from Sun	Altitude	Azimuth	Constellation
<a href="#">C/2016 R2 PANSTARRS</a>	12.0	30/05/2018	34°	21.0°	318° (NW)	Auriga
<a href="#">37P Forbes</a>	12.0	30/05/2018	91°	-40.4°	61° (ENE)	Aquarius
<a href="#">C/2016 N6 PANSTARRS</a>	12.5	30/05/2018	47°	31.8°	305° (NW)	Lynx
<a href="#">C/2015 O1 PANSTARRS</a>	13.0	30/05/2018	87°	74.0°	317° (NW)	Ursa Major
<a href="#">C/2018 EF9 Lemmon</a>	13.0	30/05/2018	62°	39.8°	354° (N)	Cepheus

#### Warning!

**Never attempt to observe objects close to the sun without taking the proper precautions. In particular, never point optical instruments near the sun and look through them, or you risk permanent eye damage or blindness.**

(Continued on [page 8](#))

## The Sky For Summer 2018 (continued)

Note that a 12th magnitude comet is actually an 8 inch telescope object, because comets are not like stars when it comes to finding them against skyglow.

Some of these are one-off comets. Take the first one, for instance. Its repeat time is estimated to be 18,000 years. We won't be waiting up to see it again. Maybe it will not actually get all the way back ... your descendants will stop it and use it for water and space materials. Yummy... Lots of fusion fuel there... *37P Forbes* on the other hand is only a 6.43 year comet, and it's right now a bit ahead of Mars and not far from Mars' orbit.

Here's the link: <https://heavens-above.com/comet.aspx?cid=37P&>

It's not going to get much brighter, so look for it this time, while you can. Next time it will be on the wrong side of the sun for easy viewing.

Unfortunately, Heavens Above does not let me put in dates more than a year or so from now, so I cannot see if it will have favourable viewing from Mars by the explorers there in 2024.

Those comets are just a warm up. This Summer there will be 3 comets that will be in easy reach of binoculars, as detailed here...

<http://www.cometwatch.co.uk/bright-comets-of-2018/>

Suffice it to say, 21P, 38P and 46P are pretty easy to see. The article says 21P should be in June 2018, but they must be mistaken. It looks more like a few months later. Last observed brightness was 20th magnitude in 2013.

<https://heavens-above.com/comet.aspx?cid=21P&>

Can you spot it? You can use the link to see where it will be any time. It's in Cygnus right now.

### The Perseid Meteor Shower

This year, the Moon is out of the night sky for the Perseids. If it's clear there will be quite a show on the evening of August 11/ morning of August 12.

There will still be a fair number of stragglers on Saturday August 11 when we have our public Perseids party.

Take this opportunity to come to the park, help with the event, and enjoy the night sky.

### Finally...

Remember that if you can brave or thwart the mosquitoes, the summertime is the best time to observe, because all of the concerns of winter from cold and frost are gone, and it is also easier to convince a friend to observe with you.

Watch for chances to observe with your club members, whether it is sidewalk astronomy, one of our several public stargazing evenings, or invited events at Binbrook Conservation Area.

It's not going to be fun. It's going to be ... super fun.





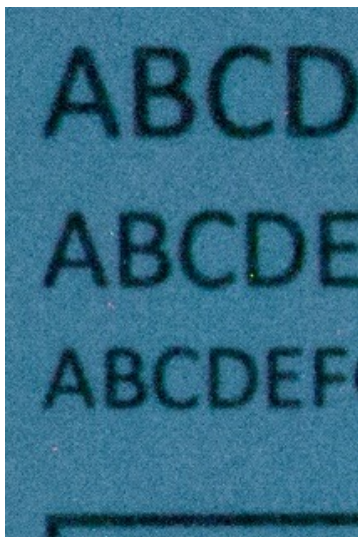
# Benefit of Fan Cooling your DSLR for Astrophotography

by Peter Wolsley

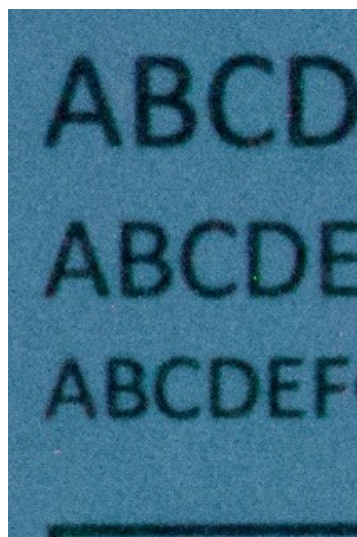
Something I started doing last year was to add a very simple attachment to my astrophotography system. I added a computer fan to my Nikon D5300 camera. I had read a lot about thermal noise and how some people have tried to add cooling to their DSLR cameras. There are devices called Peltier coolers which most of the dedicated astrophotography CCD cameras use to cool the imaging chip as much as 50 degrees Celcius below the ambient temperature. The big issue with this much cooling is to avoid condensation on any of the imaging glass or on the circuit boards. DSLRs are not designed to use these types of coolers and will most certainly have big issues with condensation. I thought about this problem and noticed that my DSLR warms up over time. It's well documented that it doesn't take much increase in temperature to significantly increase the amount of noise recorded on an imaging chip. I also noticed that there is nothing designed into the DSLR for addressing cooling except for maybe an internal heat sink or thermal insulation.

Condensation occurs when the temperature of a surface becomes colder than the ambient air temperature. The temperature at which this happens is called the Dew Point and it is always slightly below the ambient temperature and gets closer to the ambient temperature as the relative humidity rises. This means that when the relative humidity is high that most outside surfaces will very quickly become wet after sunset. I realized that a fan can play an important role here. I can use the fan to blow air on the case of my DSLR which will help it to dissipate heat. This should help the electronics in the camera to run at a cooler temperature which should reduce the thermal noise in the resulting image. Because I am blowing ambient air on the camera, the surface of the camera will not be cooled below the ambient temperature. There should be no risk of internal condensation. I chose a 12 volt computer fan from an old computer that I was scraping. It has seven fins. I believe this is important because the larger the number of fins, the less vibration there seems to be coming from the fan. With the fan running, I can't feel any vibration when I place my hand on my DSLR. I decided to perform a test to prove that the noise recorded by my DSLR is less when using this fan.

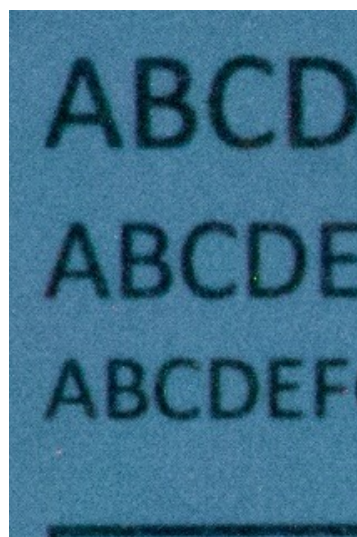
I set-up a test in a darkened room where I took 300 second exposures at ISO1600 for several hours. I took photos of a piece of paper with some printing on it. The room was illuminated by a single white LED. The camera was put into MANUAL mode so that every photo was taken using the exact same settings. After taking photos with the fan OFF for two hours I turned on the fan and continued shooting. Waiting two hours ensured that the camera was up to temperature just like it would during a hot summer evening of astrophotography. After a third hour of fan cooled 300 second exposures I was done. Here are the results:



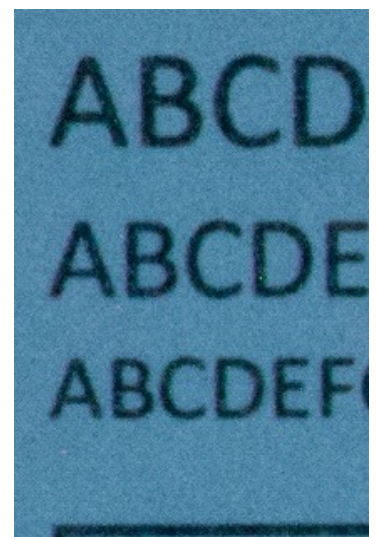
2 hours No fan



Fan on for 10 minutes

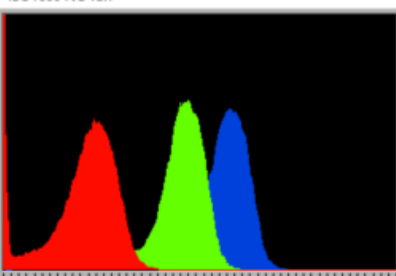


Fan on for 20 minutes

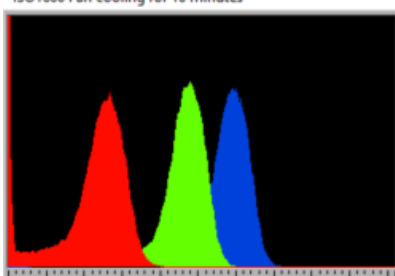


Fan on for 40 minutes

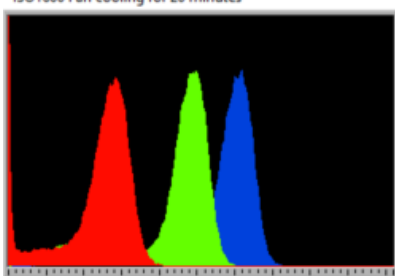
ISO1600 NO fan



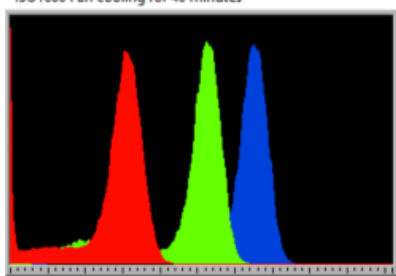
ISO1600 Fan cooling for 10 minutes



ISO1600 Fan cooling for 20 minutes



ISO1600 Fan cooling for 40 minutes

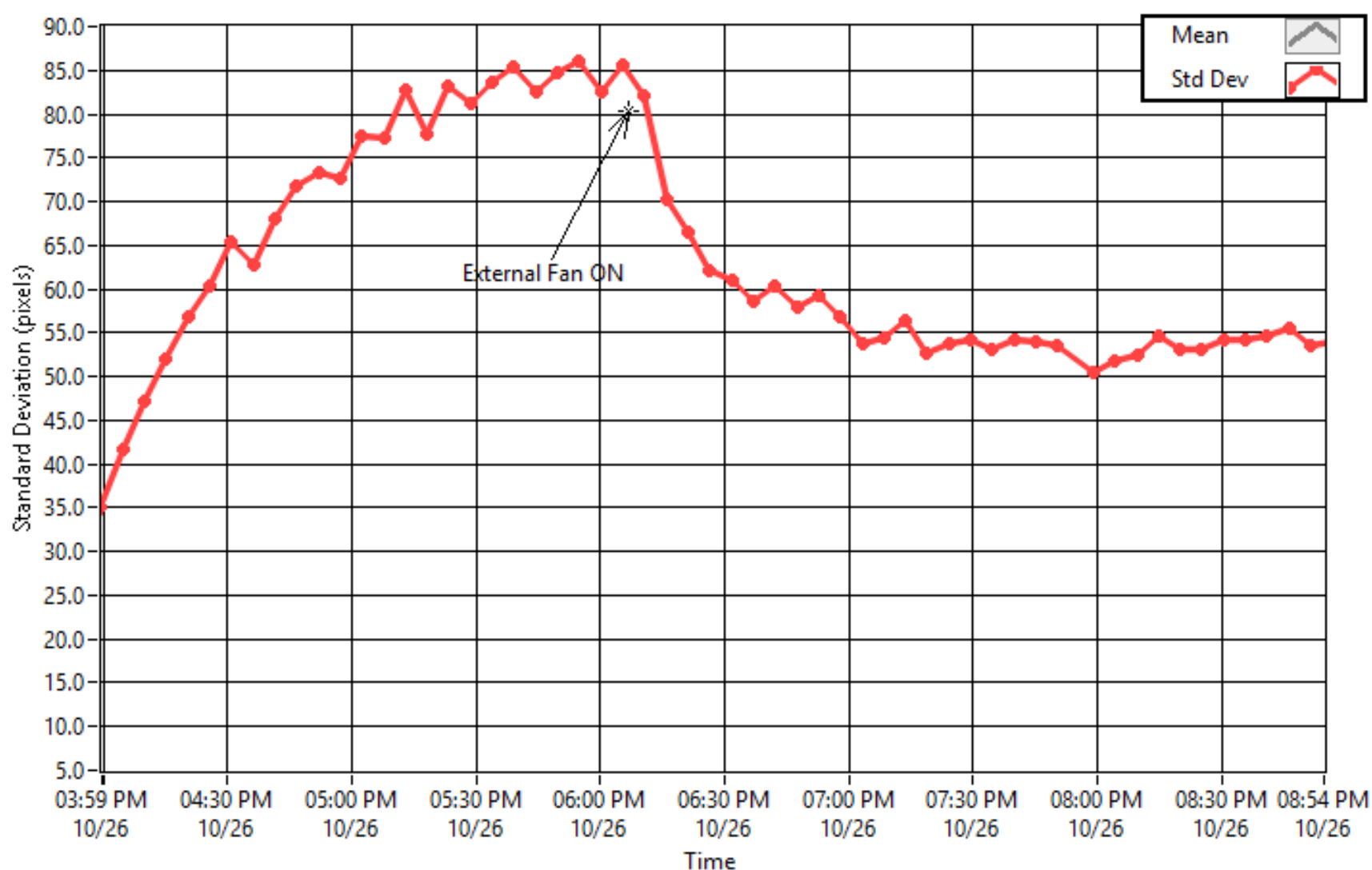


(Continued on [page 10](#))

## Benefit of Fan Cooling your DSLR for Astrophotography (continued)

If you compare the first and last photo you can see that the noise is much finer and reduced. If you also compare the histograms you can see that the red, green and blue histograms get taller and thinner as the fan does its magic. I also wanted to generate some form of graph that would help visualize the benefits of fan cooling.

I invented a test where I took several 300 second DARKs at ISO800. A DARK image is created with the lens cap on the camera. In theory there is no light hitting the imaging chip so all of the noise in the image is due primarily to thermal noise. Again, I waited two hours with the fan OFF. Then I turned the fan ON. I wrote a program to calculate the standard deviation of the RAW data in the image files and graphed them here. Standard deviation can be used as a measurement of noise. *Note: The Y-axis is actually scaled in counts.*



From 4PM until roughly 5:45PM the camera was warming up. As it did the standard deviation, or noise, steadily increased. It started at 35 when the camera was cool and more than doubled to 85 in less than two hours. Once the fan was turned on the noise quickly reduced to roughly 54 in less than an hour. I believe this proves that adding fan cooling to a DSLR will significantly reduce the thermal noise. This also shows that a DSLR takes a significant amount of time to reach its equilibrium temperature.

(Continued on [page 11](#))



## Benefit of Fan Cooling your DSLR for Astrophotography (continued)

Here are two photos showing how I have mounted the computer fan. I have the articulated LCD display rotated away from the camera and the viewfinder cap installed. The fan blows squarely onto the rear of the camera. I used a piece of clear Plexiglas and fastened it to the bottom of the camera. The RCA jack is plugged into a 12V source.



*Image Credit: Peter Wolsley (both)*



## M22, Saturn and Two Moons by Bob Christmas

This spring, before going on my astrophotography trip to Spectacle Lake, near Barry's Bay, ON, I checked with the [Stellarium](#) planetarium program on my laptop when planning my targets.

Here's a screengrab of Stellarium showing Saturn's location in Sagittarius, less than 2 degrees north of the globular cluster M22, at 1:45 am the morning of May 7, 2018, just before 3rd quarter moonrise (*M22 label mine*).

On the *next* page is my actual image of Saturn and M22, taken on that date and time.

What I *didn't* plan for is getting one or more of Saturn's moons. I thought even with the magnification of my 300mm telephoto lens, all of Saturn's moons would be either too dim or lost in Saturn's glare.

But after processing my image, I took another look at this particular scene with Stellarium. Zooming in on Saturn shows the moon Titan to the west of Saturn in the upper right corner of the screengrab below and Iapetus to the east in the lower left corner. (Don't forget east & west are flipped in the sky.) Curious, I took a closer look at the immediate area around Saturn in my image. (*Continued on [page 13](#)*)





## M22, Saturn and Two Moons (continued)



So here's my actual image, and below is a labelled close-up from it of Saturn.

I examined a number of other images online of this part of Sagittarius that show the immediate starfield around Saturn's location in my image, and those 2 labelled dots are definitely not background stars.

I also checked the chapter "Configurations of Saturn's Brightest Satellites" in the [2018 RASC Observer's Handbook](#) (pages 237, 239) which describes Iapetus as being at greatest elongation east on May 4 and Titan being at greatest elongation west on May 6, ...both close to early morning Eastern Time May 7.

I've concluded that the orange blob just off the right side of Saturn is Titan (magnitude 9.11 at the time according to Stellarium), and the tiny spec labelled to the left of Saturn is Iapetus (magnitude 11.94).



*(above) Saturn above M22, May 7, 2018, taken with a Canon 40D DSLR through a Tamron 300mm telephoto lens, tracked on an SP EQ mount; exposures: 10x91 secs (15 mins 10 secs) at ISO 1600*

*(right) Close-up inset of Saturn with moons Titan and Iapetus  
Image Credit: Bob Christmas (both)*





# NASA Space Place

visit [spaceplace.nasa.gov](http://spaceplace.nasa.gov)

**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](http://spaceplace.nasa.gov) to explore space and Earth science!



## What Is the Asteroid Belt?

By Linda Hermans-Killiam

There are millions of pieces of rocky material left over from the formation of our solar system. These rocky chunks are called asteroids, and they can be found orbiting our Sun. Most asteroids are found between the orbits of Mars and Jupiter. They orbit the Sun in a doughnut-shaped region of space called the asteroid belt.

Asteroids come in many different sizes—from tiny rocks to giant boulders. Some can even be hundreds of miles across! Asteroids are mostly rocky, but some also have metals inside, such as iron and nickel. Almost all asteroids have irregular shapes. However, very large asteroids can have a rounder shape.

The asteroid belt is about as wide as the distance between Earth and the Sun. It's a big space, so the objects in the asteroid belt aren't very close together. That means there is plenty of room for spacecraft to safely pass through the belt. In fact, NASA has already sent several spacecraft through the asteroid belt!

The total mass of objects in the asteroid belt is only about 4 percent the mass of our Moon. Half of this mass is from the four largest objects in the belt. These objects are named Ceres, Vesta, Pallas and Hygiea.

*(Continued on [page 15](#))*



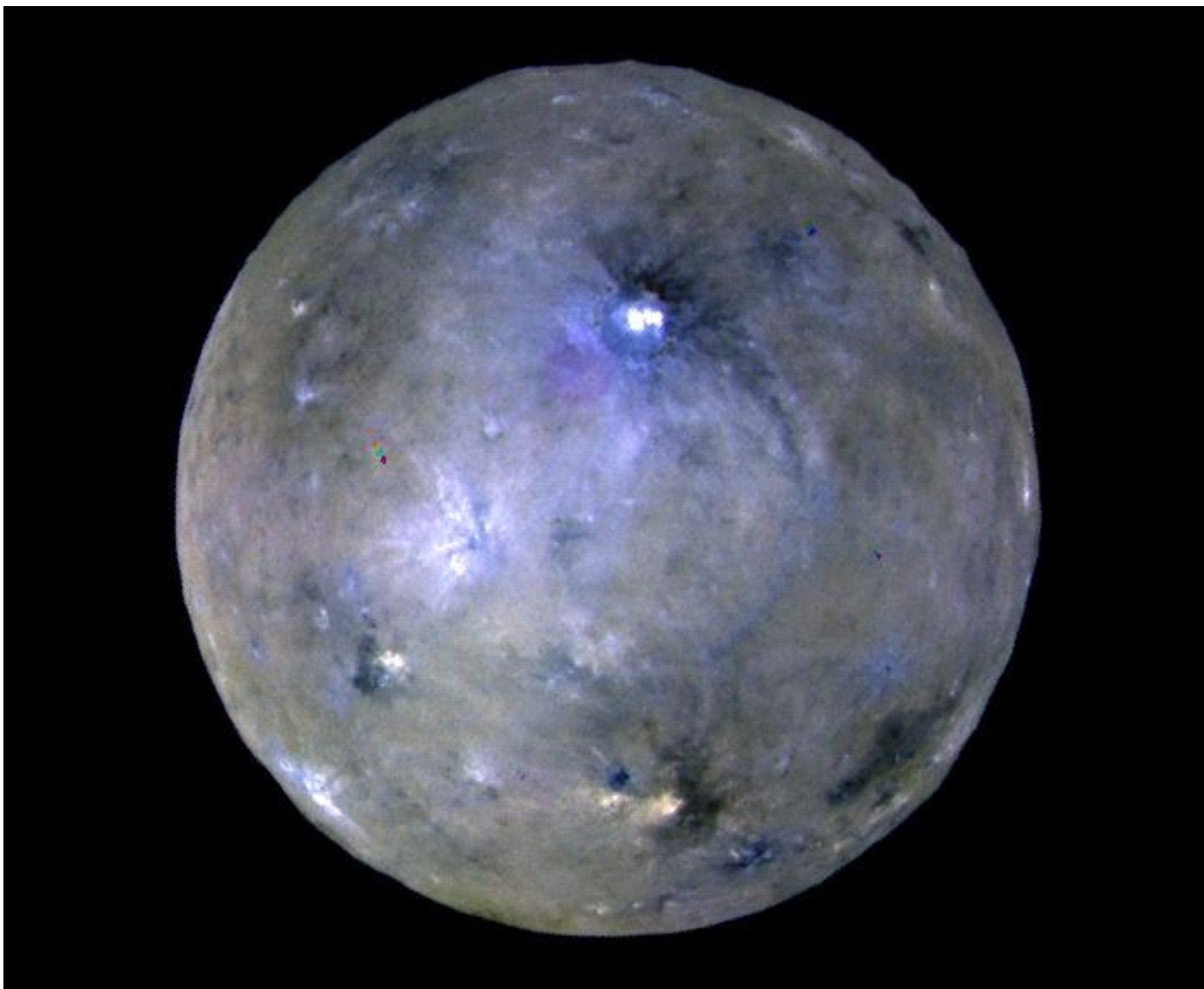
## NASA's Space Place (continued)

The dwarf planet Ceres is the largest object in the asteroid belt. However, Ceres is still pretty small. It is only about 587 miles across—only a quarter the diameter of Earth's moon. In 2015, NASA's Dawn mission mapped the surface of Ceres. From Dawn, we learned that the outermost layer of Ceres—called the crust—is made up of a mixture of rock and ice.

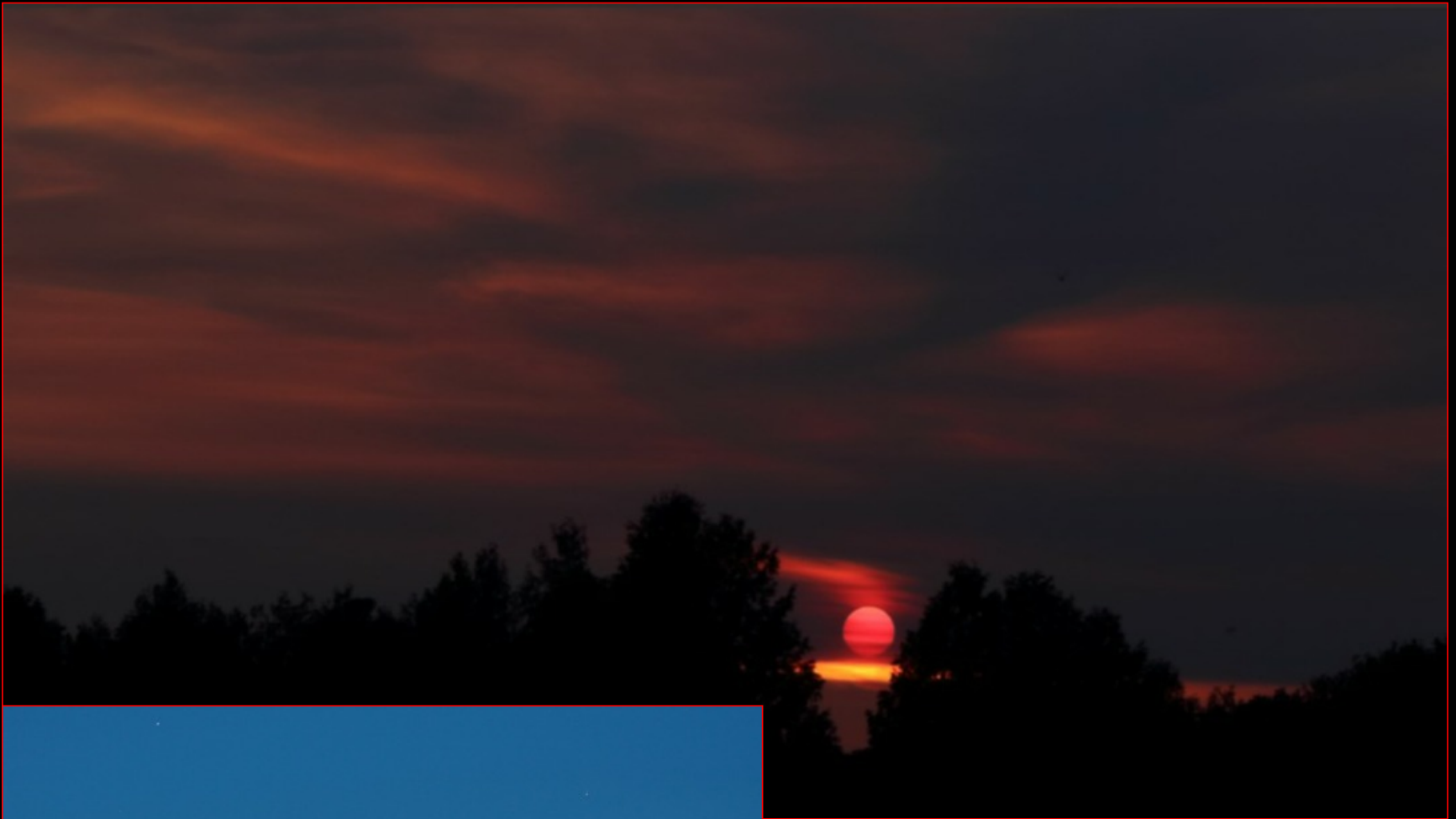
The Dawn spacecraft also visited the asteroid Vesta. Vesta is the second largest object in the asteroid belt. It is 329 miles across, and it is the brightest asteroid in the sky. Vesta is covered with light and dark patches, and lava once flowed on its surface.

The asteroid belt is filled with objects from the dawn of our solar system. Asteroids represent the building blocks of planets and moons, and studying them helps us learn about the early solar system.

For more information about asteroids, visit: <https://spaceplace.nasa.gov/asteroid>



*This image captured by the Dawn spacecraft is an enhanced color view of Ceres, the largest object in the asteroid belt. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA*



*(above)* **Sunset at Fenelon Falls, ON,  
May 24, 2018, by Sylvie Gionet**

Single 1/40 second exposure at ISO 100 with  
Canon Rebel TGi.



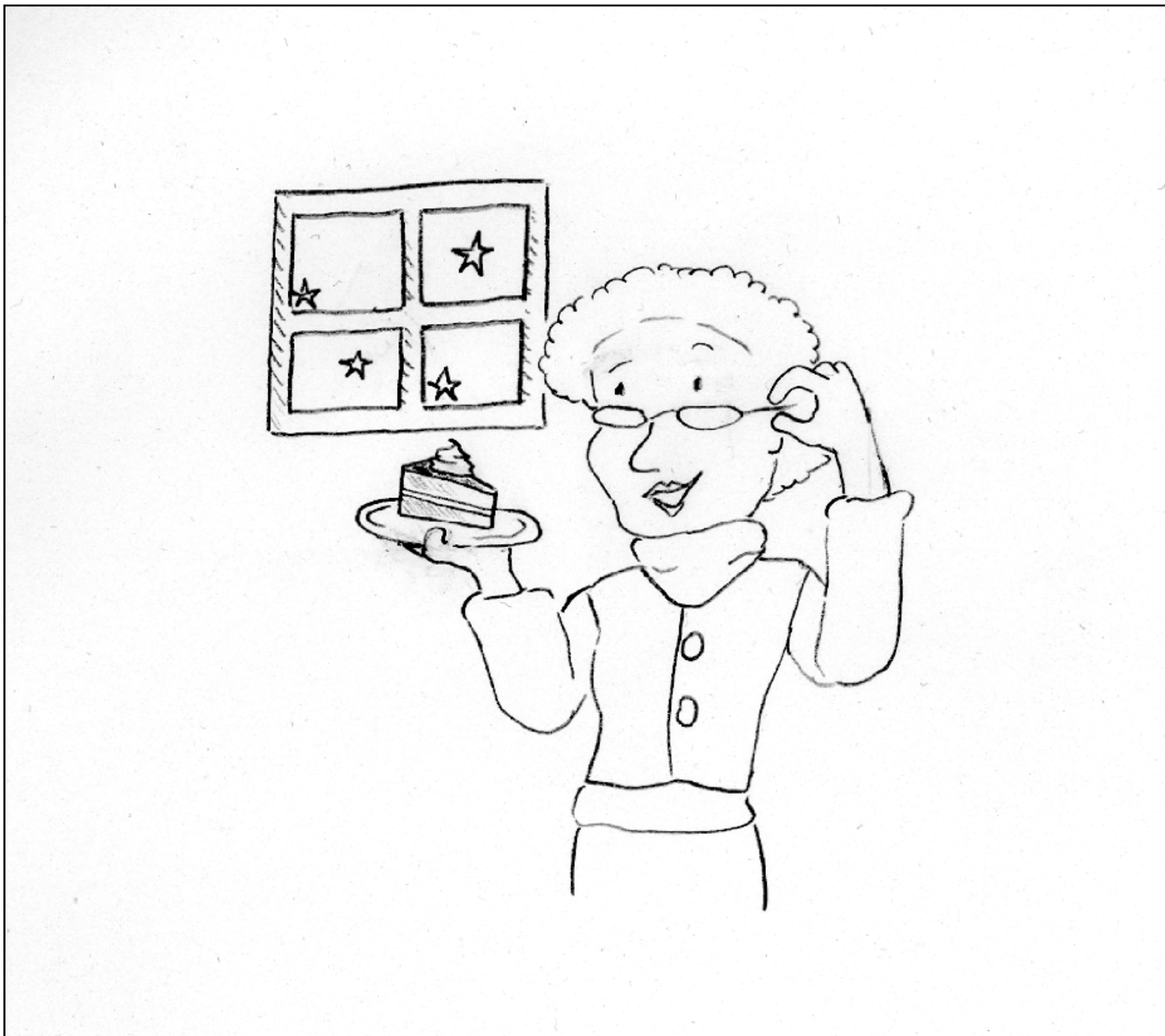
*(left)* **Jupiter at Opposition Rising over  
Spectacle Lake on May 8, 2018 near  
Barry's Bay, ON, by Bob Christmas.**

Single 10 second exposure at ISO 200 with  
Canon 40D.





## Cartoon Corner by Alexandra Tekatch



**"If the universe is expanding, then I must be getting slimmer by comparison.  
So I can have this cake and eat it, too."**



## Treasurer's Report by Ann Tekatch

### Treasurer's Report for May 2018 (Unaudited)

Opening balance:	\$9,428.55
<u>Revenue:</u>	
Memberships:	\$25.00
50/50 Draw:	\$63.00
Picnic Ticket Sales:	\$210.00
<u>Expenses:</u>	
PayPal fees:	\$2.64
Closing Balance:	\$9,723.91



# 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:
  - **Jun 6: Introductory Astronomy for Kids — Galaxies**
  - **Jun 13: James Webb Space Telescope: Acrobat, Time Machine, Spying Glass**
  - **Jun 20: Ripples in the Fabric of the Universe**
  - **Jun 27: Death from the Skies!**
- For more details, visit  
[www.physics.mcmaster.ca/planetarium](http://www.physics.mcmaster.ca/planetarium)





# William J. McCallion Planetarium

McMASTER UNIVERSITY, HAMILTON, ONTARIO

- Public shows every Wednesday (7:00pm)
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- Tickets \$7 per person; private group bookings \$150
- Different shows every week
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  - **Jul 4: Introductory Astronomy for Kids — Solar System**
  - **Jul 11: New Solar System Discoveries**
  - **Jul 18: Space Explosions**
  - **Jul 25: Carl Sagan's Universe**
- For more details, visit  
[www.physics.mcmaster.ca/planetarium](http://www.physics.mcmaster.ca/planetarium)



# 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:
  - **Aug 1: Introductory Astronomy for Kids**  
— **Galaxies**
  - **Aug 8: Rust and Stardust**
- For more details, visit  
[www.physics.mcmaster.ca/planetarium](http://www.physics.mcmaster.ca/planetarium)



## UPCOMING EVENTS

**June 8, 2018 - 7:30 pm** – *HAA Meeting* at the Hamilton Spectator Auditorium. Our main speaker will be **Ron Brecher**, whose talk is entitled “Introduction to Deep-Sky Image Processing with PixInsight”.

**June 23, 2018** – *Public Solar & Stargazing Event* at Lakeland Park, Hamilton, ON.

**July 21, 2018 - 8:00 pm - 11:00 pm** – *Public Stargazing Night* at McQuesten Park, 1199 Upper Wentworth St, Hamilton, ON.

**August 11, 2018** – *Perseids Meteor Shower Public Night* at Binbrook Conservation Area. Stay tuned for more details.

**August 18, 2018** – *Public Stargazing Night* at Lakeland Park, Hamilton, ON.

**September 8, 2018** – *25th Anniversary Celebration, BBQ & Night Sky Tour* at Binbrook Conservation Area.

**September 14, 2018 - 7:30 pm** – *HAA Meeting* at the Hamilton Spectator Auditorium.

### 2017-2018 Council

Check out the H.A.A. **Website**  
[www.amateurastronomy.org](http://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	Barry Sherman
Event Horizon Editor	Bob Christmas
Recorder	Matthew Mannering
Secretary	Kevin Salwach
Publicity Director	Mario Carr
Councillors at Large	Brenda Frederick Christopher Strejch Dee Rowan Gary Sutton Jim Wamsley John Gauvreau 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/>  
 905-692-3228

### HAA Portable Library Contact Information



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