

Nova Notes

The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

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Highlights

MARCH / APRIL 2021

VOL 52 NO 2



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From the Editor

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Cover Photos:

Main Photo:

NGC 2244, the Rosette
Nebula by Kathy Walker

Thumbnails (l-r):

"Crescent Moon"
by Lisa Ann Fanning
"Milky Way Bayswater
Panorama" by Jason Dain
St. Croix Observatory
drawing by
Mary Lou Whitehorne

When I was asked if I would be interested in becoming layout editor for Nova Notes, I didn't give it a second thought when I said "yes!"

But then, afterwards, all these questions popped into my head: Could I do it justice? Could I bear the weight of responsibility of helping to record Halifax Centre's history? What will it be like as the 'foreigner' working remotely from New Jersey (or as I jokingly call it, 'Halifax South')? Could I even help work on an astronomy-focused publication? (My background is, after all, as a naturalist, leading bird walks and doing conservation work with beach nesting birds along the Jersey Shore.)

But yet, it was still a resounding "Yes!" in my mind when all was said and done.

It didn't take long to feel welcomed in my new role, just as I felt very welcomed to join as a member back in the summer of 2020. It is a pleasure working under the newsletter's co-editor, John McPhee. Despite never having met outside of a few Zoom meetings, I am having a blast working with him, and he has helped challenge me in the best way possible. (Including reminding me how to spell certain words correctly, such as "favourite" or "colour").

When Dave Chapman encouraged me to transfer to Halifax Centre from a national membership, he told me that it was the best centre around, and I've soon come to realize how true this is (okay, maybe I'm biased.) Even as a newcomer to astronomy, some of you have entertained my elementary questions and taken all the intimidation out of a subject I was always very curious about but didn't know where to start. For that I am incredibly grateful.

Whenever I have put out word that we are editing the next edition and need some content, many of you have graciously shared your photos, articles, thoughts and feedback. The opportunity to showcase all the wonderful and diverse things Halifax Centre members are working on is what motivates me most in this role.

For me, when I speak of the pandemic, I am always quick to point out that there are also some good things that have come out of all the craziness. I honestly never imagined I would end up on this journey learning about astronomy, and making so many wonderful and talented friends along the way. Cheers! 'Til the day we can share lenses in person, I will be here celebrating the many talents of the members of Halifax Centre, and very honoured to do so.

Wishing you clear skies,



Lisa Ann Fanning

Meeting Dates for 2021

- **May 1 (Speaker - Chris Gainor, RASC Victoria Centre: Amateur use of the Hubble Space Telescope) & Special Presentation: Tony Schellinck, RASC Halifax Centre - Basics of Lunar Sketching**
- **June 5 (Speaker: Leslie Sage, Nature magazine's astronomy editor)**
- **September 11 (Speaker - David Hoskin: Comet NEOWISE)**
- **October 2**
- **November 6**
- **December 4 (+ AGM) - Speaker at Members' Meeting: Dr. Phil Groff, Exec. Director, RASC)**

In lieu of a face-to-face meeting, we will now be hosting Members' Meetings using Zoom. You do not require a Zoom account to join in but you are required to register for this webinar. The webinar is limited to 100 registrants - first come, first served. The panelists' presentations are being recorded and will become accessible via a link on <https://halifax.rasc.ca>

St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, N.S. The site has expanded over the last few years and includes a roll-off roof observatory with electrical outlets, a warm-room, and washroom facilities. We welcome you to bring your own equipment or to use the Centre's 400-mm Dobsonian telescope, 100-mm binoculars, and the recently acquired SCT and gear for astro-imaging.

Enjoy dark pristine skies far away from city lights and the company of like-minded observers searching out those faint "fuzzies" in the night. Most clear Moon-free nights, you will find our keen observers out there! Announcements of members visiting SCO are made on the Centre's Discussion List. If you are not a key holder and would like to become one or need more information, please contact the SCO Manager, John Liddard at scomanager@halifax.rasc.ca.

As of April 27, 2021:

The Board of Directors earlier this evening unanimously agreed to the following position regarding the use of the St. Croix Observatory (SCO).

Because of the provincial COVID-19 restrictions and the province-wide lockdown, SCO is CLOSED to all RASC Halifax Centre members until provincial restrictions have eased. Members will be notified of any changes.

Go to our website (halifax.rasc.ca) for the latest SCO usage guidelines.

Halifax RASC Board of Directors, 2021

President: Judy Black	(Elected)
Vice-President: Patrick Kelly	(Elected)
Secretary: Peter Hurley	(Elected)
Treasurer: Gregg Dill	(Elected)
Director: Tim Doucette	(Elected)
Director: Mathew Dyer	(Elected)
Director: Wayne Harasimovitch	(Elected)
Director: Paul Heath	(Elected)
Director: David Hoskin	(Elected)
Director: Kathy Walker	(Elected)
Honorary President : Mary Lou Whitehorne	(Appointed)
Auditor (2020-2021): Ian Anderson	(Appointed)
Co-Chair, DSP Committee: Dave Chapman	(Appointed)
Co-Chair, DSP Committee: Tony Schellinck	(Appointed)
Librarian: Wayne Harasimovitch	(Appointed)
Observing Chair: Dave Chapman	(Appointed)
Outreach Chair: Paul Heath	(Appointed)
National Council Rep: Judy Black	(Appointed)
SCO Manager: John Liddard	(Appointed)
Co-Editor, Nova Notes: John McPhee	(Appointed)
Co-Editor, Nova Notes: Lisa Ann Fanning	(Appointed)

Nova East Star Party

August 6-8 (New Moon: Aug 8)

NOTE: The Board of Directors will determine in April/May if this event should go forward based on the status of provincial restrictions related to the pandemic.



A Message from a Proud President

Much has happened since the last issue. The Halifax Centre discussion list informs us that members are indeed observing, and our more experienced members are providing online mentoring to those new to astronomy. The St. Croix Observatory (SCO) is seeing more traffic with members enjoying the new electrical capabilities of the site and implementing the newly revised guidelines regarding its use. In the world of science, the world watched the short but successful flight of NASA's small robotic helicopter Ingenuity on April 19.

What makes any venture successful, regardless of scope, is the dedication of the people involved. In the past year, I have seen many examples of the dedication of our members – volunteering as speakers, submitting items to this publication, answering discussion list questions, volunteering to serve on the board of directors, and the online “discussions” about subjects too many to list. Members have hosted live observing and astroimaging processing sessions that have been well attended. All these actions shape the present status of the RASC Halifax Centre and move us into a future of which we can all be proud, one that is the envy of other RASC centres across the country.

It was the friendship and unwavering willingness of longtime members to mentor newbies like me that drew me to this centre and keeps me here. When members don't hesitate to share their knowledge and expertise, it bodes well for a centre's continuing health and its mindset. It fosters excitement about the skies above us, increases interest in learning more about what and how we are observing, and inspires us to keep learning. I've come to learn how much you are dedicated to the continuing health of our centre. Our membership has increased, and I like to think that it's because of you and your willingness to share and volunteer, whether you are new to astronomy or experienced. It is because of this and everything else that we do as a community of amateur and professional astronomers that I am extremely proud to state to anyone anywhere that I am president of the RASC Halifax Centre.

Now, if only we as volunteers had any say about the quality of Nova Scotia night skies. Paulo Coelho, a Brazilian lyricist and novelist best known for his novel *The Alchemist*, once said, “Don't forget, beautiful sunsets need cloudy skies.” Yes, we have seen some beautiful sunsets as of late. However, would we not have preferred the skies to be more observing friendly with no cloud, little if no wind, and good to great transparency and seeing? Oh, well, may we continue to enjoy the beautiful East Coast sunsets. Be safe. Stay well. May the skies open to viewing the universe more frequently in the coming months.

With Regards,
Judy Black, President

Nova Notes: The Newsletter of the Halifax Centre of the RASC

PO Box 31011, Halifax, Nova Scotia B3K 5T9

Nova Notes is published five times a year, in February, April, June/July, September/October and December.

The opinions expressed herein are not necessarily those of the Halifax Centre.

Articles on any aspect of astronomy and related activities will be considered for publication.

Members' Universe

Lunar X



On March 20, 2021, 50 participants joined Dave Chapman during a live webcast for a tour of the Moon. The star of the show was the "Lunar X" pictured here. Photo by Jerry Black

M44 / NGC 2632 The "Beehive Cluster"



Photo by Kathy Walker

The Horsehead Nebula



Photo by Blair MacDonald

M101



Photo by Blair MacDonald

Do you have something you would like to share in an upcoming edition of *Nova Notes*?

Send your photos, poems, articles and other works to

novanoteseditor@halifax.rasc.ca

FOOD for the SOUL

LAST STAR

By *Paul Heath*

They moved into the darkness,
Skies filled with sparkling wonders
The long glass moving, wonder to wonder.
Enraptured he followed his father's lead.

She followed her father out into the darkness,
Majestic the skies, sparkling and shining so bright.
With indrawn breath, a new wonder they watched.
Steady, the gleaming light drifted across the Stars.

She took her son beneath the darkened skies
To show him wonders, stretched across the skies.
To tell the tale of the first,
As gleaming lights, sped now between the Stars.

He took his daughter far from town,
The ancient glass, still wonders found.
A sudden Gleaming glow rose high, to cross the sky,
The Stars, a magic floating home now held.

She took her daughter far from town,
A hill she knew were wonders once, did abound.
But the distant glow, did mute the Stars,
As lights, from all directions outran the night.

She took her son far from their town,
Days the drive, in search of darkness.
The ancient glass, pulled wonders from the night,
Quick, between the rushing, lines of circling lights.

He took his daughter into darkness,
So far from home, they wandered.
Brief the glance within the ancient glass,
Faint the Stars, between dashing, glowing lines of light.

She had the stories from all the years,
The journeys the ancient glass had made,
Filling up with wonders of the skies.
Hers alone now, together with a desperate task.

She traced each step the ancient glass had made,
Yet unfound, the wonders of the tales, remained.
Then a thought lit up her night,
Each glowing bead, a circuit, mapped in detail made.

Their paths from out the cloud she claimed,
A glowing picture built of shame.
And then her eyes beheld a spot,
Quick she pulled it deep within her heart.

In hope and wonder to its starting point,
Cradled loving, the ancient glass was brought.
Set with gentle care, then to her eye she dared,
A single, gleaming mote, UNMOVING upon the ancient glass,
rested there.

Then the Last Star, from Earth, with her son did share.

A “new star” shines briefly in Cassiopeia

By David Hoskin

On March 18 of this year Yuji Nakamura, a Japanese amateur astronomer, was studying images taken that day of the area around the constellation Cassiopeia when he noticed a 9.6 magnitude star at a location where nothing as bright as magnitude 13 had been visible four days earlier. This bright new nova, Nova Cassiopeia 2021 or Nova Cas 2021, soon received its permanent designation V1405 Cas. Nova Cas 2021 ultimately increased in brightness to 7.5 magnitude, making the nova visible with binoculars but not the naked eye. The exact distance of Nova Cas 2021 from Earth is not yet known but is most likely between 30,000 and 32,000 light years.

Nova (plural novae), which is Latin for “new,” refers in astronomy to a star that experiences a strong and sudden increase in brightness. Novae that are visible with the naked eye are relatively rare with most being binocular or telescope targets. The last good naked eye nova (magnitude 4.3) that was visible from the northern hemisphere was Nova Delphini 2013 in the constellation Delphinus about eight years ago.

Novae are usually caused by a white dwarf star in a binary star system accumulating on its surface hydrogen that has been gravitationally attracted from its main-sequence or red giant companion star. Compaction and heating of this “stolen” gas triggers a violent nuclear explosion on the surface of the white dwarf, causing the star to briefly shine several orders of magnitude greater than normal. Most of the accreted hydrogen is ejected into space, forming a rapidly expanding shell of gas.

Novae typically fade after days or a few weeks but may briefly re-brighten. The white dwarf star remains intact and continues to pull hydrogen from its companion star so that at some future date another explosion will occur.



Photo: Jerry Black



Photo: David Hoskin

Nova Cas 2021 appeared in the vicinity of the Bubble Nebula (NGC 7635) and the open star cluster Messier 52, making the nova quite easy to locate and photograph. Halifax Centre member Jerry Black photographed Nova Cas 2021 on March 23 using a Nikon 7Z DSLR and SkyWatcher Esprit 120mm refractor. The Bubble Nebula, Messier 53 and the +5-magnitude star 4 Cassiopeia are also seen in Jerry’s image.

Eight days later, the author photographed Nova Cas 2021 with an ASI183MC CMOS camera and Orion 80mm refractor. The location of Nova Cas 2021 in the author’s image is indicated by the two

white lines. Comparing Nova Cas 2021 with HIP 115661, a blue-white supergiant star with apparent magnitude 7.8, it appears that the nova was also magnitude 7.8 or a bit brighter nearly two weeks after its discovery. Nova Cas 2021 put on a good show for observers and astroimagers alike. Perhaps we will be treated to a naked eye nova before the end of the decade!

Resources

- [Bright Nova Erupts in Cassiopeia - Sky & Telescope - Sky & Telescope \(skyandtelescope.org\)](#)
- [New Binocular Nova Cas 2021 Flares in Cassiopeia - Universe Today](#)
- [Recent Novae \(nasa.gov\)](#)
- [What is a nova? \(Beginner\) - Curious About Astronomy? Ask an Astronomer \(cornell.edu\)](#)
- [Nova | astronomy | Britannica](#)

Gegenschein, Mars, and a Mystery Solved

by Dave Chapman, RASC Halifax

“God bless you!” At least that’s what I think Tony said—or words to that effect—after I exclaimed “gegenschein!” Tony Schellinck and I were casually reclining in our camp chairs, just after midnight, gazing up into the heavens after observing some “spring” double stars in our binoculars. It was February 25, 2017, and we were dressed in our summer clothes, enjoying the balmy night of the Florida Keys at the Winter Star Party (24.7°N, 81.3°W). The constellation Leo was high over ahead, around 80° altitude, and I was wondering about the misty patch that seemed to be hanging in the body of the Lion. It wasn’t light pollution, nor a passing cloud, and certainly not the Milky Way. Then it struck me—if I were looking at the anti-solar point (which it turned out to be), the patch might be the elusive gegenschein, which I had heard of but never seen.

“Gegenschein” (German for “countershine”) is akin to zodiacal light. Both are part of the zodiacal band of sunlight scattered by micrometre-sized grains of dust in the plane of the solar system. Both are difficult to spot, requiring dark, transparent skies unpolluted by artificial light and free of moonlight. From our mid-northern latitude, zodiacal light is typically spotted in the west after dusk within a month of the spring equinox, or in the east before dawn within a month of the autumn equinox.

In contrast, gegenschein is best seen in the dead of night, opposite the Sun, where the glow is enhanced by a physical effect called “opposition surge” whereby the particles are fully illuminated, providing an enhanced backscatter overall (a similar effect makes the Full Moon extra-bright). Gegenschein is hard to spot if the background sky is “busy” with stars (such as where the ecliptic crosses the Milky Way).

Checking the ecliptic longitude of the patch centre relative to that of the Sun (using SkySafari on my phone), I confirmed the sighting as gegenschein, and then I decided to record it. That was a fairly simple matter of taking a tracked photo with my Canon SL1 camera with a SamYang 14 mm lens (ISO 800, f/2.8, 238 s) which gave a respectable 77°x56° field of view. As the lens has a bit of vignetting, I corrected for that using a “flat” frame. Figure 1a below shows Leo right of centre with the gegenschein embedded (it is very subtle and may not reproduce well, so here’s an online version <https://www.dropbox.com/s/3v846jh8uvm4tvd/Figure1a.jpg?dl=0>).

In Figure 1b, I have added a couple of labels to orient the reader, and a circle 20° across containing the brightest portion of the glow as I see it, centred on the star 52 Leonis. At the time of the photo, that star was 14 minutes short of culmination at 79° altitude and had ecliptic coordinates (158° Longitude, +6° Latitude), while the Sun was at (337° Longitude, 0° Latitude), a longitude difference of 179°—the patch I spotted definitely included the anti-solar point.



Figure 1a: The author's photo of gegenschein in the constellation Leo at the Winter Star Party, 2017 February 25.

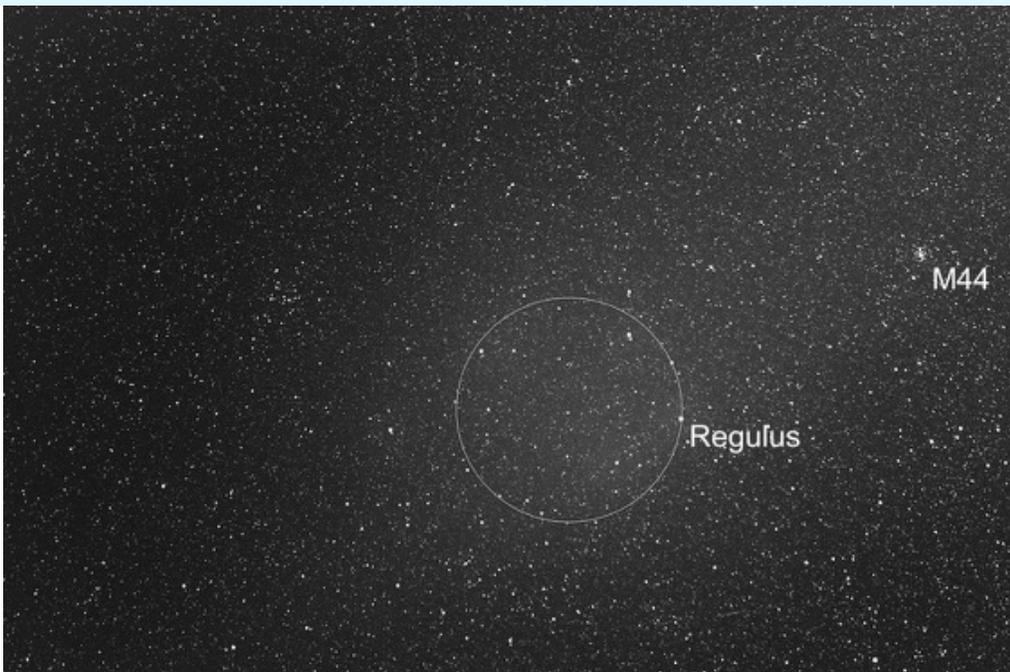


Figure 1b: The image from Figure 1a with annotations. The 20° circle is centred on the star 52 Leonis.

I had satisfied myself that I had observed the gegenschein, and that I had located it fairly well, but I was bothered that it appeared to be centred 6° above the ecliptic. I reckoned that it should be ON the ecliptic. I did a bit of research at the time, and I found that indeed there were existing scientific observations of systematic variation of the ecliptic latitude of the zodiacal band with longitude. I did not think more about it at the time, until just recently. Read on!

On March 9, 2021, NASA announced that data from the interplanetary probe Juno confirmed earlier hypotheses on the connection between zodiacal light and the orbit of Mars.* (<https://www.nasa.gov/feature/goddard/2021/serendipitous-juno-spacecraft-detections-shatter-ideas-about-origin-of-zodiacal-light>).

If you type “zodiacal light Mars” into your web browser, you will find all manner of popular accounts of this finding, but the peer-reviewed paper is here: <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020JE006509>.

The “why?” of that connection is not fully understood, but it tweaked my memory about my own observation of gegenschein in 2017 (it is interesting to note that the cited paper does not mention gegenschein, only zodiacal light). It was a simple matter in SkySafari to project the orbit of Mars (as seen from Earth) onto the background sky at the time. Here is the graphic:

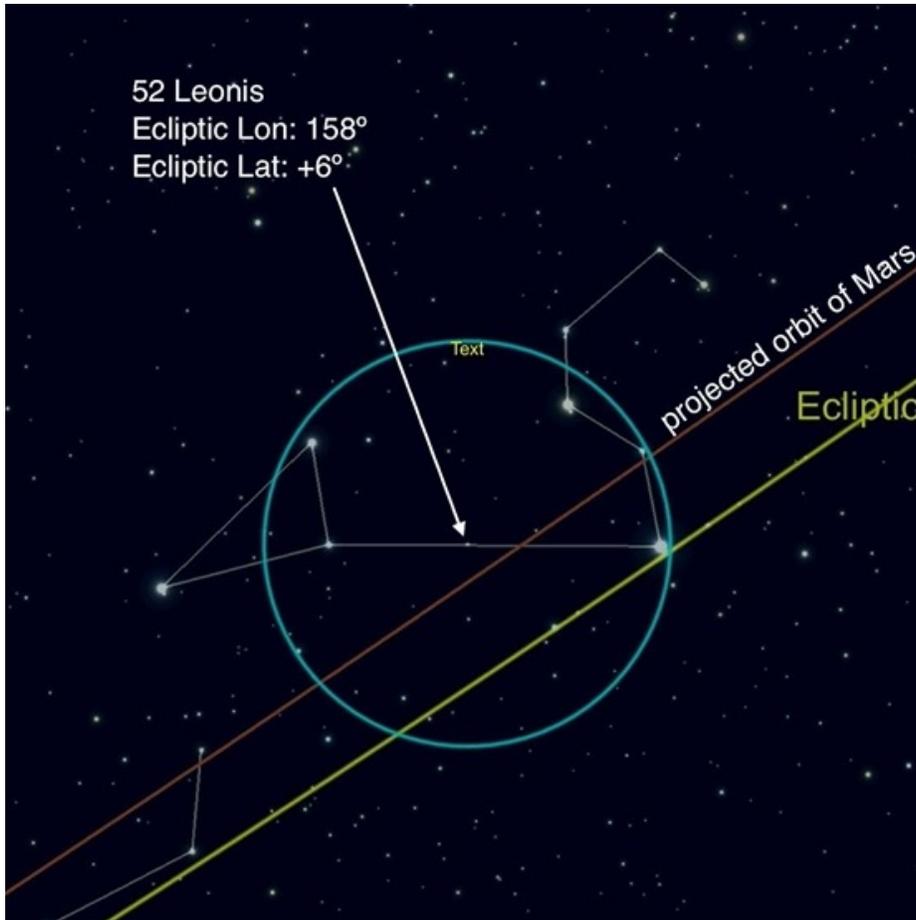


Figure 2: The geometric relation between the observed gegenschein of 2017 February 25, the ecliptic, and the projected orbit of Mars.

I have reproduced the 20° circle from Figure 1b centred on 52 Leonis that captures most of the gegenschein. The first thing to note is that the gegenschein was significantly displaced from the ecliptic (about 6° give or take one degree). The second thing to note is that the orbit of Mars (think of it as a giant hula hoop) is also displaced from the ecliptic in the same direction (about 4.5° at that longitude). If that sounds large compared to the 1.8° orbital inclination of Mars, remember that the smaller number is from the Sun’s point of view, while we on Earth are $2/3$ of the way to the orbit of Mars, so the angle of view would be enhanced. The ascending node of the orbit of Mars is at ecliptic longitude 50° , so the largest apparent displacement of its orbit (at opposition) would be at longitude $50^\circ+90^\circ=140^\circ$. That position is near the boundary between Leo and Cancer, about halfway between Regulus and M44 in Figure 1b, only 18° away. If you do the math (a homework assignment), 4.5° is about right. As an aside, on 2027 February 19, Mars will be at opposition within that 20° circle.

In conclusion, the recent news about Mars and the zodiacal light appears to solve the mystery of why my gegenschein observation in February 2017 seemed to be “off.” My analysis above is really only a sketch, a better job could probably be done; however, I am pleased that my chance observation of the gegenschein on that night is consistent with the recent scientific results. Going one step further, I wonder if my observation of the displaced gegenschein might be a small contribution to the science of this phenomenon.

* Distribution of Interplanetary Dust Detected by the Juno Spacecraft and Its Contribution to the Zodiacal Light, J. L. Jorgensen *et al.*, *JGR Planets* **126**(3), March 2021.

The author thanks Prof. Roy L. Bishop for his insightful comments on the draft of this article.

How I got start photographing the Milky Way

By Jason Dain

Like many others, my first attempt at astrophotography was taking pictures of the Moon. In the summer of 2015, after getting a new DSLR, I tried some moon photography with my 70-300mm lens and realized to do a good job, I would need more focal length. After seeing some photos on the web, I decided to try my hand at Milky Way photography.

My first attempt at the Milky Way was in the woods, west of Halifax near my house in late summer 2016. I did some reading on how to find the Milky Way in the night sky and discovered a great planning tool for my phone called Photopills. I picked my spot and went out to see what I could do with my Nikon crop sensor camera, kit lens and tripod. I managed to see and capture a shot of the Milky Way and was determined to try more the next year.

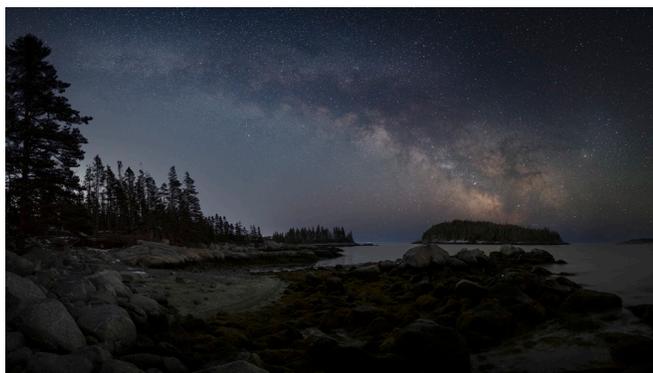
I tried a few more times the next year at various locations and learned some editing techniques to help bring out the Milky Way in my photos. I also discovered the importance of the foreground in a Milky Way shot: Something of interest but not too overpowering as to take attention away from the focus of the photo seemed to be a good recipe.

The following few years I upgraded my photography equipment, image capture, and post-processing techniques. I purchased a more solid tripod, full frame camera and dedicated Milky Way lens that was very fast (large aperture) and wide angle (20mm focal length). I started to capture multiple images of the sky for stacking and I took long exposures for the foreground and/or used light painting to get less noise and better detail in my images. I learned how to stack my sky images in Sequator and about how to process and blend my sky and foreground using Photoshop tools. I also tried to get out and shoot the Milky Way at least once each new moon cycle.



The author's first photo of the Milky Way taken in 2016

Last winter, I decided that I wanted to add a small star tracker to my Milky Way kit. Having the tracker would allow for longer exposures at a lower ISO and minimize the need for stacking my sky images. The tracker introduced some new challenges blending a tracked sky and static foreground. I really liked the colours and detail that the longer exposures help bring out with the tracker. While practising with my star tracker I stumbled into deep sky objects and took my first images of the Orion Nebula. That experience sent me down the astrophotography rabbit hole but that is a story for another day!



One of the great things about photographing the Milky Way is you can make it as simple or as complex as you like.

There are a whole range of different types of compositions, equipment, accessories and processing techniques that you can use to make a photo. The best part for me is getting out somewhere dark, being under the stars and enjoying the moment. If you want to go see and photograph the Milky Way, do not let your skill or equipment hold you back!

Between me and the trees - using 360-degree panoramas in planetarium software

By Jerry Black

So as it turns out, placing my tripod on the western pad at the St. Croix Observatory was not the best place for me to image the Horsehead Nebula. There is a large *nebula-eating* spruce tree nearby waiting to be fed as the night progressed.

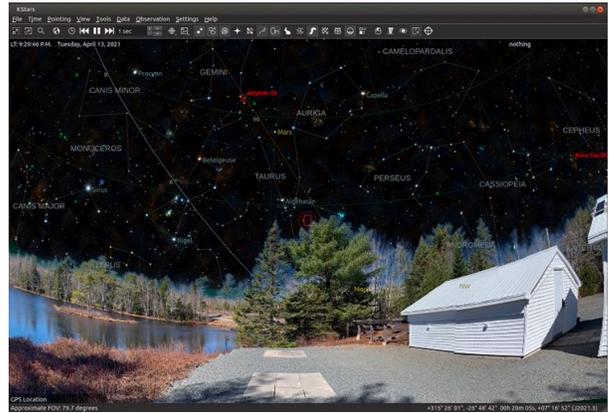
This led me to investigate using planetarium software to pre-plan my imaging session in a manner than might optimize my viewing time. A recent update to the software I use to control my camera/mount/guide scope/focuser – cross-platform KStars — allows me to add a 360-degree spherical panoramic image into the planetarium sky viewer to show me where the visible skyline is. Planetarium software permits you to choose the date and time of the sky view, so you can plan in advance to choose when to view or image your targets of interest.

Stellarium, a popular cross-platform planetarium software (<https://stellarium.org>), also supports this functionality using installable “landscapes,” so in this note I’ll briefly outline the steps to create your own panos.

Capturing the pano

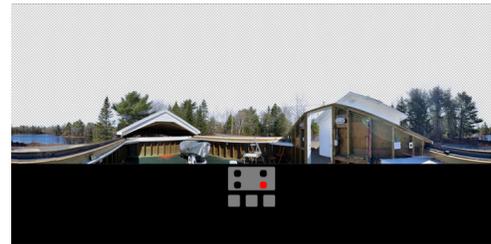


I used the free app Google Street View on my iPhone to create a 360-degree pano for each observing spot. I rested the phone on a tripod (as I don’t have a phone tripod adapter) and the app instructed me on where to point the camera as it took several photos to stitch together into the pano. It worked best for me if I started the set of captures facing north. This app is geared toward publishing your pano online. I found it a bit tricky to get it to save the image only to your phone but it can be done.



Editing the image

I transferred my panos to my computer to edit the images. I used Photoshop, but any imaging software might work. The first step is to create a blank image that is 4096 x 2048 pixels in size. Paste your pano image onto this canvas and centre it horizontally. Move the image vertically until the horizon in the image is centred vertically on the canvas. You then need to select the sky area and “delete it” or otherwise make it transparent. I used the “select sky” tool in Photoshop. Finally, fill the area below the pasted image with a solid colour to prevent the stars from showing “through” the Earth. Save this as a PNG image.



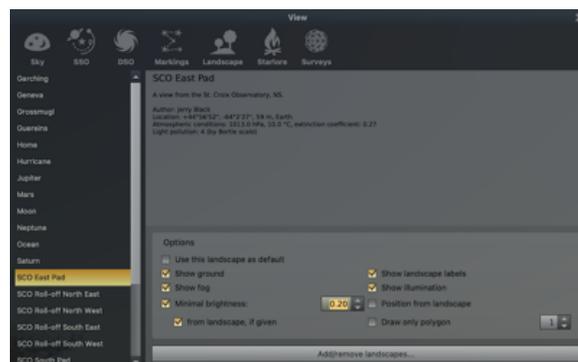
Saving the pano for use

With KStars you can use the PNG file directly by adding it to the KStars .local/share/terrain folder.

With Stellarium you must first add this PNG image into a folder containing the other reference information to describe the landscape. You can use one of the folders (zipped on dropbox, see *below*) as a starting point. They are not perfect, but they work in this setting. The second step is to edit the landscape.ini file to describe the landscape. For example, within the SCOEastPad folder, I edited the landscape.ini file as such:

```
[landscape]
name = SCO East Pad
author = Jerry Black
description = St. Croix Observatory, NS
type = spherical
maptex = SCOEastPad.png
# Orientation: South is Top!
# maptex_illum = trees_illum_512.png
# maptex_fog = trees_fog_512.png
angle_rotatez=90
maptex_top=90
maptex_bottom=-90

[location]
planet = Earth
latitude = +44d56'52"
longitude = -64d02'27"
altitude = 59
atmospheric_extinction_coefficient = 0.27
atmospheric_temperature = 10.0
atmospheric_pressure = 1013.0
```



```
light_pollution = 4
timezone = America/Halifax
```

to name the reference pano image and describe its orientation and environment.

Accessing the panorama

In Stellarium, select the sky viewing options and choose “landscape” and “add/remove landscape” to select a zip file containing the folder to be added.

In KStars, using the EKOS options to enable and define the reference “terrain” image location.

SCO perspective

I’ve created seven landscape zip files to display the view from each observing pad at the St. Croix Observatory. Hopefully this will help keep the nebula-eating spruce tree at bay.

Notes:

I’m sure other software can use these pano images, although I haven’t experimented with any other software to-date.

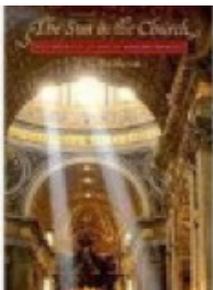
In the near future, in theory, KStars will add functionality to its scheduler to incorporate a visible skyline polyline created from these panos as a scheduling constraint to ensure that it automatically chooses imaging sequences based on your actual visible skyline, in addition to the other available constraints.

Book Review:

The Sun in the Church – Cathedrals as Solar Observatories

J.L. Heilbron Harvard University Press. 1999

Review by Tony McGrath



“The Roman Catholic Church gave more financial and social support to the study of astronomy from the late middle ages into the Enlightenment than any other, and possibly all other, institutions.” So starts this wonderful book that carries out a thorough examination of the relationship between Catholic ecclesiastical patronage and the development of the natural sciences in Italy and France during the 17th century. I say wonderful because of Heilbron’s skill at weaving the personal and the scientific stories into a very thorough narrative of the one hundred years after Galileo.

The problem that set the whole thing in motion was calculating the date of Easter.

This had to be accomplished far enough in advance to allow the church time to prepare and ensure that Easter was celebrated everywhere at the same time. These calculations involved dealing with the irrational solar and lunar calendars, a discipline fraught with difficulty and a history of failure. The key parameter in these calculations was the time of return of the sun to the same equinox. The best way to do this was to lay out a “meridian line” in a large dark building with a precisely located hole in its roof. Cathedrals and large churches were the obvious choice.

The book deals principally with the period between 1650 and 1750, the century after Galileo. This was a time of change. Copernicus had published *De Revolutionibus* in 1543. His theory was slow to catch on, and by the early 17th century relatively few astronomers espoused the Copernican theory. To be sure, he had competitors, not only Ptolemy but also Tycho Brahe and Kepler.

So there was much beyond the date of Easter that needed sorting out. The obliquity of the ecliptic, parallax of solar system objects, atmospheric refraction and the dimensions of the solar system were all uncertain. This required the time and attention of competent people and the money to construct the instruments of investigation. While telescopes did exist, they came with severe limitations that rendered them useless for the purposes of 17th century astronomy. The instruments required were in the form of armillary spheres, astrolabes, mural quadrants and meridian lines. Astronomy was all about mathematics and geometry.

Primary in the book is the work of Cassini, Riccioli and Grimaldi. Cassini enters the story when he is consulted on the renovation of the meridian line installed in San Petronio cathedral at Bologna. Cassini designed and supervised the installation of the renovated meridian line, and it was Cassini who was to make great use of the instrument throughout his lifetime in Italy as well as France.

Heilbron's approach is an interesting mix of history, academics, and politics. The technical problems being faced by the astronomers are discussed in light of the social and religious setting of the time. He goes beyond a simple recounting of the facts and provides insight into some of the personalities involved, which included popes, princes, and academics. This was a time when patronage and what we would call science were inextricably linked. Money was needed to build instruments and carry out investigations and it invariably came from the rich and powerful, principal among them the church of Rome. The fact the church was committed to a geocentric philosophy made the problem even more complex.

If you enjoy reading about the history of astronomy, and are not intimidated by geometry, then I think you may well enjoy Heilbron's work.

COVID-19 Eye & Eyepiece Protector

By Tim Doucette, Deep Sky Observatory, Tusket, N.S.

Disclaimer: I do not make any claims that this device will completely protect you from Covid-19. Please continue to follow appropriate COVID-19 practices such as wearing masks, washing your hands and practising social distancing. Build and use at your own risk.

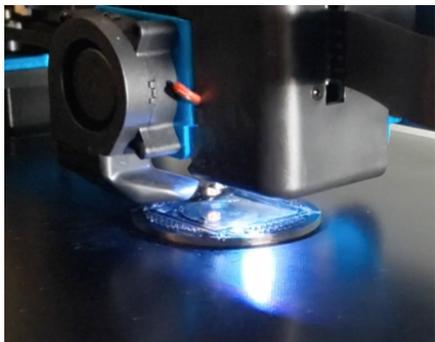
Due to the COVID-19 pandemic, sharing the night sky with the general public using a telescope has been challenging.

The coronavirus is spread mainly by inhaling water droplets from an infected person, normally through a cough or sneeze. It can be transmitted not only through the mouth, but the nose and eyes as well.

In order to continue to safely share the night sky with everyone at Deep Sky Eye Observatory, we've had to take necessary precautions. These include creating an outdoor-only experience for a limited group of 10 people and following social distancing guidelines (standing two metres apart).



When using the telescope, each person must wear a mask. Guests are not permitted to touch the telescope. When a person is finished looking through the eyepiece, we have to wait a short time, sanitize the eyepiece and telescope, wait for another short time and then the next person can take their turn.



As you can imagine this becomes very time-consuming. Not to mention that it will eventually wear down the coatings on your eyepiece, especially if you do this 100 times a week.

I had an idea to create a reusable washable eyepiece sleeve that fits over top the eyepiece, 3D printable of course. The concept is very simple. Each person (or family group) would get an eyepiece sleeve at the start of the session. When it's their turn to observe, they simply slide the sleeve over the eyepiece.

When they are finished, they take the sleeve with them. This would add an extra layer of protection when they are looking through a telescope. It also reduces the time needed to sanitize the eyepiece and reduces the wear on the eyepiece itself. Other measures I mentioned before still need to be followed.

We used a type of plastic known as PETG, a type of thermoplastic polyester that's commonly used in a lot of applications including personal protective equipment.



In order to create the lens for the sleeve I purchased a \$12 poster frame from Walmart that had a clear plastic sheet, and cut out pieces to fit (31mm x 31mm). I'm sure there's a cheaper solution but this was a first test to see if this will work.

The 3-D model itself is very simple. I used TinkerCad, a free online 3-D modelling tool, to build it. It's a simple cylinder with a square 32mm x 32mm x 1mm gap in order to place the clear plastic lens.

In order to do this I set up the printer to pause after a certain layer. During the pause, I put glue in the corners and attach the plastic lens. In this case I used a UV curable glue, which is easy to work with. I think superglue would work too and it's a lot cheaper.

Once the lens is glued in place, I coat it with hair spray and continue the print. The hair spray acts as an adhesive to allow the plastic to stick more easily. This worked reasonably well although it's not perfect.

Once the print is done, look for any holes in your model and fill with glue.

That's it. I hope you find some use for this project. I'd like to get your feedback and any suggestions you might have. One improvement I think I may make in the future is a replaceable lens holder, similar to a filter wheel used in astrophotography.

<https://youtu.be/-GiNU65Pkew>
<https://www.thingiverse.com/thing:4808613>
<http://deepskyeye.com>

Stay safe and clear skies!



Regarding the Use of the St. Croix Observatory (SCO) during COVID-19

As of April 27, 2021:

The Board of Directors earlier this evening unanimously agreed to the following position regarding the use of the St. Croix Observatory (SCO).

Because of the provincial COVID-19 restrictions and the province-wide lockdown, SCO is CLOSED to all RASC Halifax Centre members until provincial restrictions have eased. Members will be notified of any changes.

March Members Meeting

March 6, 2021 (47 attendees)

To watch a replay of the meeting, please visit <https://www.youtube.com/watch?v=Y4IVpUZUUEk> on the RASC Halifax YouTube Channel.

President's Remarks

RASC Halifax President, Judy Black welcomed everyone to the monthly meeting and reviewed the agenda. In addition to members from RASC Halifax in attendance, there were many in attendance who joined from other centres as well.

Photo Montage (Paul Gray)

Paul Gray presented members' astrophotos taken over a few months, given recent weather challenges. He highlighted some wonderful contributions by Jerry Black, Michael Boschat, David Chapman, Melody Hamilton, David Hoskin, Peter Hurley, Blair MacDonald, and Charles White. Members can send their images to the email chat list or directly to his email.

Special Announcements

Congratulations to James Edgar on being named as a Fellow of the RASC

Congratulations to Blair MacDonald on being the recipient of The RASC Halifax Service Award

Special Presentations

Dr. Luigi Gallo presented *Black Holes: The Loud, the Quiet, the Silent*

Dr. Gallo provided an overview of research conducted in the past few years related to black holes and defined the types of black holes based on their characteristics. Topics such as active galaxies, black hole imaging, the Milky Way galactic centre, and gravitational waves were also addressed. Some of the research he is conducting at Saint Mary's University that was recently highlighted by the European Space Agency was also discussed.

Michael Gatto presented *Sketching & Digitizing Images of Mars* in which he demonstrated his technique in drawing Mars using soft pencils (4H, Medium, 4B), blending knob and a pencil-like eraser. He then used the scanned image he drew to add colour using Photoshop.

Food for the Soul (Paul Heath)

Paul Heath recited the most recent poem in his monthly Food for the Soul presentation called *Last Star*. (Refer to Members' Universe - page 6).

What's Up in the Sky? with Dave Chapman

Dave Chapman provided his monthly rundown of what's in the night sky. He highlighted the objects included in the *Explore the Universe* observing program. His presentation can be viewed in the meeting video or accessed directly on the RASC Halifax Centre website.

News from the Board

Reminder: RASC astronomical calendars are still available for sale - email an e-transfer to treasurer@halifax.rasc.ca to get a copy - include name and mailing address in the messages field.

Saint Croix Observatory upgrade fundraising update - \$8,610 has been raised for the upgrade at SCO. Astroimages sale has yielded a \$357.52 profit. Some new photos may be offered later in the year.

SCO Upgrade - On Feb. 15, the inspection masthead was connected to the power grid. The lights were installed on March 6.

Observing Certificates - Lisa Fanning earned her Explore The Moon (Telescope Edition) Certificate.

Nova Notes - Vol 52 No 1, co-edited by John McPhee and Lisa Ann Fanning has been published and is available to view on the RASC Halifax website.

Halifax Centre Stars

- Dave Chapman and Cathy Leblanc featured in *SkyNews* March/April 2021 edition - Meeting Halfway Seeing The Whole Picture
- Congratulations to James Edgar and Blair MacDonald on their awards (see "Special Announcements")

Unisteller Optics Messier Marathon March 10-16, 2021 (this is not a RASC Halifax organized event.) Become a member! Join online or via mail-in form. There are many perks available from National and Halifax Centre. Financial assistance for membership is available - contact Adela Zyfi mempub@rasc.ca

RASC Online Activities - Judy invited members to check out the calendar on the RASC website for the full slate of events - speaker series, star parties, etc. She noted the new program beginning April 1 - *The Moon at Noon* - which will be hosted by our Centre's John Read and RASC Jenna Hines. Dave Lane stated he would be providing a talk to Kingston Centre about his Mini-Robotic Observatory next week and again in May for Winnipeg Centre.

Upcoming meetings - April 10, May 1, June 5 - see Meeting Dates for 2021 on page 3 for more detail

Nova East Star Party - August 6-8 - The Board of Directors will determine in April/May if this event should go forward based on the status of provincial restrictions related to the pandemic.



April Members Meeting

April 10, 2021 (34 attendees)

To watch a replay of the meeting, please visit https://www.youtube.com/watch?v=DF08OdJ_7RA on the RASC Halifax YouTube Channel.

President's Remarks

RASC Halifax President Judy Black welcomed everyone to the monthly meeting, explained the benefits of membership and reviewed the agenda.

"RASC as well as RASC Halifax Centre believes in and practises inclusivity and diversity. All are welcomed regardless of age, disability, gender, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, ethnic origin, colour, nationality, national origin, religion or beliefs or sex and sexual orientation. And we are opposed to all forms of unlawful, unfair discrimination."

"Also, for the first time, we will be making an Indigenous Land Acknowledgement and this will continue in all of our meetings - RASC, Halifax Centre would like to begin by acknowledging that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People. This territory is covered by the "Treaties of Peace and Friendship," which Mi'kmaq and Wolastoqiyik (Maliseet) Peoples first signed with the British Crown in 1725. The treaties did not deal with surrender of lands and resources but in fact recognized Mi'kmaq and Wolastoqiyik (Maliseet) title and established the rules for what was to be an ongoing relationship between nations."

Special Presentations

Adam Gonzales of St. Mary's University presented *High-velocity outflows in active galactic nuclei*, an overview of his PhD thesis research.

Every massive galaxy hosts a supermassive black hole at its centre that is a million to a billion times more massive than our Sun. When these black holes actively accrete material from their surroundings they become the most luminous continuous sources of emission in the universe, so-called active galactic nuclei. The extreme physical conditions manifested nearest the black hole are capable of driving matter out of the central region at velocities nearly the speed of light. This material may form a large-scale tightly collimated outflow (i.e. a jet) or a small-scale diffuse outflow (i.e. a wind). Adam presented an overview of how these outflows of material are produced, how we study them, and their implications on the formation of the universe as we know it.

David Chapman presented an overview of the new RASC Double Stars observing program. An overview of the program can be seen at the end of Dave's What's Up in the April Sky? presentation.

Basic Facts:

- 110 objects (easy to challenging)
- all must be observed and logged
- small-to-medium sized telescopes
- moonlight and light-pollution friendly
- RASC observing certificate
- expect it to take about a year for the average observer

For more information, visit <https://www.rasc.ca/double-stars> or see the article in the February edition of *Nova Notes* written by Melody Hamilton.

New Members' Question Period

President Judy Black presented a brand new segment that encourages new members to submit questions.

Three questions were submitted for this inaugural segment: how stars should appear in a telescope; how to use Sky Safari Pro to display a field of view perspective; and how to sketch and describe targets in observing programs. To see responses, please visit the April 2021 Meeting YouTube video. All are invited to submit questions for future meetings by emailing president@halifax.rasc.ca.

What's Up in the Sky? with Dave Chapman

Dave Chapman provided his monthly rundown of what's up in the night sky. For April 2021, he highlighted objects included in the *Explore the Universe* observing program. His presentation can be viewed in the meeting video or accessed directly on the RASC Halifax Centre website.

News from the Board

Guidelines regarding the use of SCO have been reviewed in accordance with COVID guidelines. For a detailed list of guidelines, please visit page 17 in this newsletter.

Observing Certificates:

- John Read earned his Explore The Moon (Telescope Edition) Certificate. John is one of the co-hosts of *Moon At Noon*, which is broadcasted Thursdays at 1 p.m. AT live on Zoom or YouTube.

Halifax Centre Stars:

- The RASC Weekly's Astro-image of the Week (March 29-April 4) was a photo of M81 by David Hoskin.

Official announcements of awards were made on April 1:

- Congratulations to Blair MacDonald on being awarded the Service Award and to James Edgar on being nominated as a Fellow of the Royal Astronomical Society of Canada.



Blair MacDonald,
Winner - Service Award

Congratulations!



James Edgar
FRASC

- A photo of James Edgar's carving of the moon also is featured in the inside cover of the April 2021 edition of *JRASC*.

If you have submissions for the next edition of Nova Notes, please send them to novanoteseditor@halifax.rasc.ca.

Become a member of RASC Halifax Centre! Visit the RASC website for more information. There is an emergency fund allocated for dues for those who need financial assistance. Contact Adela Zyfi at mempub@rasc.ca for more information.

Upcoming meetings - May 1, June 5 - see Meeting Dates for 2021 on page 3 for more detail.

RASC General Assembly (GA) will be held virtually June 25-28, 2021- more to be announced soon!