

Nova Notes

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



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DAVE CHAPMAN FINDS EASY
PICKINGS AT THE FIRST QUARTER
MOON

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COMPLETING THE THREE
ASTROIMAGING CERTIFICATES

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STAR TRAILS

JUDY BLACK AND TONY
SCHELLINCK REPORT ON
THE NOVEMBER AND
DECEMBER CENTRE
MEETINGS

November/December 2017

St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, NS. The site has expanded over the last few years and includes a roll-off roof observatory with electrical outlets, use of the Centre's new Go-To 400-mm Dobsonian telescope and 100-mm binoculars, a warm-room, and washroom facilities.

Enjoy dark pristine skies far away from city lights and the company of like minded observers searching out those faint "fuzzies" in the night. Observing nights (Fridays close to the New Moon or Saturday backup) are open to both members and their guests. If you are not a key holder and would like to become one, or need more information, please contact the SCO Manager, Tony McGrath.

Upcoming Observing Nights:

Friday 19 January (alternate Saturday 20 January)
 Friday 16 February (alternate Saturday 17 February)
 Friday 17 March (alternate Saturday 18 March)

Meetings usually begin at 8:00 p.m. at Saint Mary's University in Room 101 of the Atrium Building (AT).

All meeting locations and presentations subject to change

Meeting Dates for 2018

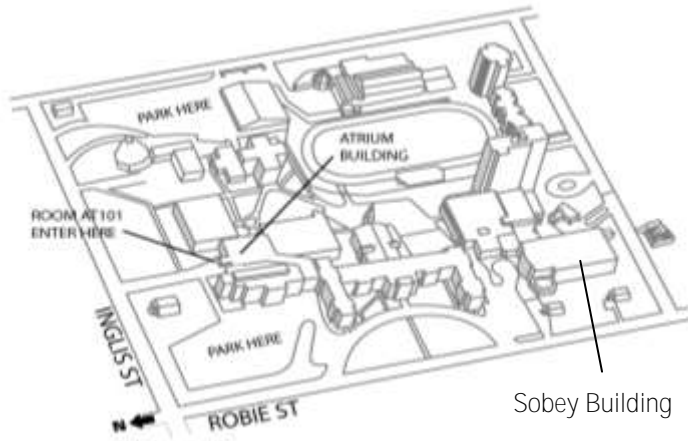
January 19
 February 16
 March 16
 April 20
 May 11
 June 15 (tentative) - BBQ at SCO
 September 21
 October 19 (tentative)
 November 16
 December 7 (tentative) - AGM

Meeting Location:

Saint Mary's University

Atrium Building (AT)
 Room AT 101

The Atrium is located in front of the Patrick Power Library, between the Burke Building and Science Building.



Sobey Building

Meetings are usually held on the third Friday of the month, except for the months of July and August.

Executive meetings begin at 6:45 p.m., usually in room AT306, and all members are welcome.

Halifax RASC Executive, 2017:

Honorary President	Dr. Roy Bishop	rlb@eastlink.ca
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Cover Photo

Tony Schellinck

Nebulosity surrounding NGC 2264 December 26/27, 2014, Port Mouton, Nova Scotia.
 Canon T3i (modified), 8" Newtonian Astrograph, CGEM mount.
 26 180-second raw photos, 10 180-second darks, at ISO 1600.
 6 600-second raw photos through an H-alpha filter, 10 600-second darks at ISO 1600.
 Processed initially in Images Plus.
 Each stacked image rotated and combined in GIMP II.

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From the Editor, Tony Schellinck

I would like to thank Dave Chapman, Art Cole, Paul Heath, Jim Millar, Matt Paine and Chris Young for their ongoing contributions to *Nova Notes* this year. I would like to thank them all for their timely submission of interesting and well written articles. You made my job as editor much easier. *Nova Notes* also benefitted from the submission of special articles written by: Pat Kelly, Judy Black, Melody Hamilton, Blair MacDonald, Roy Bishop, Paul Heath, Wayne Mansfield, Tony Schellinck, John Read, Gillian Webster, Michael Boschat, Dave Chapman, and David Lane. Several other RASC Members agreed to have their photographs printed on the front page of the issues: Art Cole, Karl Hudson, Blair MacDonald, Tony Schellinck and David Chapman. Each issue was thoroughly edited before release by Pat Kelly, Michele Arenburg and Heather Schellinck. Pat Kelly posted the issues promptly on the Halifax RASC site when submitted to him and he has maintained the *Nova Notes* archives on the site. Judy Black put out the notification to all Halifax RASC members that the issue was ready. Paul Gray displayed the latest issue of *Nova Notes* at the next available RASC meeting in

order to promote readership. I am just one member of a very large team dedicated to producing a quality issue five times a year and I would like to thank you all for contributing your time and expertise to produce *Nova Notes* over 2017.

Three Astroimaging Certificates

Tony Schellinck

A group of far-thinking volunteers in RASC in 2016 created three astroimaging certificate programs that challenge the aspiring astrophotographer to see the opportunities for astroimaging, to get out of the house and take astrophotos, to master their equipment, and to process those photos at a basic level. The three certificates are the Wide Field, Solar System, and Deep-Sky (<http://www.rasc.ca/astro-imaging-certificate>). Each is quite distinctive in terms of the subject matter photographed, the skill sets honed, and the opportunities to take the photos.

The Solar System Certificate – This certificate allows the submission of both snapshots of solar system targets and stacked images. Targets include the moon (3 photo options), Jupiter or Saturn and their moons, Venus (no blobs please), two stacked images among Mars, Jupiter or Saturn that show surface detail, and the Sun (H-alpha or white light). To earn the certificate eight pictures must be submitted, along with a log of all dates, location, equipment, settings, and steps taken for each picture. I tackled this certificate first as I had all but the photo of Venus already sitting on my hard drives. All that

remained was to take a photo of Venus which fortunately was still high in the sky at the time. If I had been starting from scratch the targets would have been available most nights and days over several months, though capturing the outer planets may have added a couple of months to the time required.

The Deep Sky Certificate – Obtaining this certificate is the most technically demanding of the three. Framing the shots, tracking, focusing, the quality of your optics, knowledge of how to take sub frames, darks, and flat frames (to eliminate the vignetting), stacking and how to process the photographs using your preferred software programs are required to succeed. To receive this certificate one must submit two pictures from each of: emission or reflection nebulae, spiral galaxies, planetary nebulae, open clusters, globular clusters, and dark nebulae or comets. I submitted photos of Comet Lulin (2009) and Banard 168 as my comet or dark nebula, the nebulosity surrounding NGC 2264, the Christmas Tree cluster and the Packman Nebula for emission nebulae, M3 and M22 for globular clusters, M35 and M44 for open clusters, M27 the Dumbbell and M97 the Owl for planetary nebulae, and M33 and M51 for galaxies. The images had to be stacked with flats to eliminate vignetting, stretched to bring out the details, the background neutralized, and coloured to bring out the proper star colours. It was emphasized that the white areas should not be clipped. By the end of 2017, I and six others had completed this certificate.

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

The deadline for the next edition is February 19, 2018

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.

(Continued from page 3)

The Wide-Field Certificate – This certificate is aimed at the novice astroimager and should serve as an introduction to a wide range of possible astronomical imaging. This has so far proven to be the most popular certificate with 13 recipients. This one is the least demanding in terms of equipment, processing and astronomical imaging skills. There are 23 categories listed and to receive the certificate one must submit 15 pictures. The categories in which I sent photos were: sunrise or sunset; moonrise or moonset at full Moon; gibbous, half, or crescent Moon; new Moon with earthshine; Moon and a planet; Moon or planet beside a deep-sky object; two or more planets; ISS or iridium flare; the Milky Way; constellation; asterism such as the Big Dipper or the Summer Triangle; aurora; two or more pictures showing movement of a planet or asteroid; Uranus or Neptune identified in a picture; lunar or

solar eclipse; comet; and meteor. The categories I missed were: Sun or Moon halo, or sundogs, zodiacal light, noctilucent clouds, Mercury and star trails.

The committee had several suggestions for improvements including: several of my images were too dark; the Moon in my gibbous waxing Moon was blown out; prominent DSOs were to be named; my Milky Way should show more contrast; a longer exposure might have brought my constellation out better; a five-minute exposure is not enough for a star trails image. In the end they needed better images of at least two of three images I submitted before they could give me a certificate.

Anyone wishing to improve their astroimaging skills should take on these programs. I found them inspiring and educational and loads of fun to do.

Lunatic Ramblings 9: Easy Pickings at First Quarter (Q-day 0)

Dave Chapman

This column (started in April 2015) is based on *Explore the Moon*, the RASC beginner's observing program with certificate. For details, see www.rasc.ca/observing/explore-the-moon-observing-certificate. This issue, we review features visible on the night of First Quarter (that, is Q-day 0). The central part of the Moon has loads of features: if you observed on the night of the First Quarter and on one night either side, you would see about 40% of the entire *Explore the Moon* list! Here are upcoming dates relevant to this article: January 24, February 22, and March 24 (all in 2018). Remember that the Q-day method is approximate, and uncertainty is part of the fun!

On one night you would see about 40% of the entire *Explore the Moon* list!

Far to the north, Mare Frigoris is a lunar "sea" that extends 1450 km from east to west, but tonight is bisected by the terminator. Just north of the equator we see the smaller Mare Vaporum (240 km), and Sinus Medii (a bay of Oceanus Procellarum, 290 km). The eastern part of the Alps Mountains is south of Mare Frigoris on the shores of Mare Imbrium, and it easy to see the Alpine Valley (160 km) cutting through the mountains. The prominent craters Cassini (55 km), Aristillus (55 km), and Autolycus (40 km) are in the eastern part of Mare Imbrium. The eastern shore of that sea is defined by a mountain range interrupted by a narrow channel to Mare Serenitatis: the north branch is the Caucasus Mountains and the south branch is the Apennines Mountains, which are so high they catch the sunlight west of the terminator.

The southern hemisphere is heavily cratered and devoid of lunar basins along the terminator, but the craters tend to form convenient groups. Just south of the equator we see the large



▲ Robert Reeves (San Antonio, Texas) captured Hipparchus, Halley, and Albategnius in deep shadow.

(Continued from page 4)

craters Hipparchus (150 km) and Albetegnius (130 km), with tiny Halley (35 km) in between (see the figure). A little to the west and south we have a north-south crater group consisting of Herschel (40 km), Ptolomaeus (160 km), Alphonsus (110 km), and Arzachel (100 km).

There's lots to see around this part of the Moon, but that should keep you busy for now. In my next article, we'll move on to Q-day 1 and look around—we are about two thirds complete, but much to come! Email if you have questions or comments! dave.chapman@ns.sympatico.ca

Does the Supermoon Make Noise?

Matt Paine

First off, I need to thank Tony for giving me the opportunity to contribute to *Nova Notes*. Tony has done an amazing job as Editor. He has brought to my attention that there are more people interested in radio astronomy in this world than just myself! Thanks Tony...

Recently I was attending a local meeting of my astronomy club south of Boston, just before the last "supermoon" appeared. For the record, I do not like the term "supermoon". Local media outlets love the term because it is flashy and grabs peoples' attention to the local news. Of course we see all the effects of the Moon at perigee, its closest approach to Earth. These include higher/lower tides than normal and in some cases the higher tides causing splash-over along coastal sea walls.

OK, so how does this "supermoon" business have anything to do with radio astronomy you might ask. Well, back at that local astronomy club meeting, a newer member of the group asked me "Does the supermoon make noise?" I kinda stopped in my train of thought for a second, as no person has ever asked me that question before. Now I could come up with a cute and funny answer to that question or give some more thought for a reasonably good answer. So I turned to this newer member of the group and said "Why yes, the supermoon does make noise on occasion." The newer member responded with a look on his face of confusion "How so does the supermoon make noise!" I said the "supermoon" can make noise when radio astronomers bounce radio signals of the Moons surface in the process called (EME) or Earth-Moon-Earth.

EME was first proposed in the radio astronomy community in the late 1930s. People started asking themselves, could we really use the Moon as a giant reflector for radio signals. With the onset of World War II and the subsequent technology boom in communications, EME had its first successful transmission/reception of a radio signal off the Moon in 1946. This

was followed shortly thereafter by the amateur radio community in the 1950s. Most EME takes place on the 2-meter and 70-cm amateur radio bands. The use of these amateur radio bands allows antennas to be a reasonable size, anywhere from 3 feet to as long as 10 feet, and the large availability of equipment for these bands, keeps the cost of operating low. Furthermore, modern radio transceivers often have filtering or digital processing that helps reduce Doppler Effect. Depending on the Moons distance from the Earth, the Doppler Effect, or fading of the radio signals can be more or less pronounced. However, when we have a "supermoon" occur as the Moon is at its closest to Earth, EME can be quite fun. Doppler Effect is at a minimal because the radio waves travel less distance than if the Moon was farther away approaching apogee. Lastly, because the "supermoon" is at its closest approach to Earth, the Moon is a slightly bigger target (larger reflector of radio signals) which means communication via EME can be up to 12,000 miles between two points on the Earth.

So now that we know the "supermoon" makes noise occasionally, next time someone or some news media outlet tells you we are going to have a "supermoon," give a listen and see if you can hear something.



▲ Dave Chapman's comparison of the sizes of the Supermoon and the smallest moon

► This image taken at SCO was composed from 329 30-sec exposures, f/2.8, ISO 3200 at 14 mm on 14-24 mm Nikkor using a Nikon D800. Stacked using StarStaX with the “Comet” option enabled. WB set to 3300. One vehicle passed at 3:15 am to provide additional foreground illumination. The air temperature went from about 10 to 6°C overnight. I shot photos from 1:44 - 5:21 am. *Photo: Jerry Black*)



▲ We noticed aurora when we arrived home about 10:00; it lasted an hour but only a faint glow on the horizon. If there had been any low haze we would not have seen anything, but conditions were good and we could see the Aurora. It was probably over northern New Brunswick or Southern Quebec. I took over 200 exposures at twenty-five seconds and stacked them in Photoshop without star alignment to make an aurora star trail photo. *(Photo: Bruce Hamilton)*

Halifax Centre's AGM & December Meeting

Judy Black

On Friday, December 8, 2017, RASC Halifax Centre held its Annual General Meeting. Officers and Committee Chairs provided their annual reports to the 27 members in attendance; the reports will be provided in their entirety in the January/February edition of Nova Notes. Members were informed that going forward the "Council" is now the "Board of Directors" and that the approved Bylaw #1 (2016) is now enacted and that the elections of the Executive and Directors of the Board were being conducted in accordance with Bylaw. They were reminded that no less than 5 but no more than 10 directors could comprise the Board. The following Board members were elected by acclamation:

Executive:

President - Paul Gray
Secretary - Judy Black
National Council Representative - Pat Kelly
Vice-President - *vacant*
Treasurer - *vacant*

Directors:

Melody Hamilton
Sean Dzafovic (Sean has agreed to also act as Observing Chair)
John Read
Paul Heath (Sean has agreed to also act as Outreach Chair)
Charles White
Andrew Frank

Paul Gray, requested that members should consider either volunteering or nominating someone for Vice-President or Treasurer.

Paul Gray and Dave Chapman, as part of *What's Up?*, informed members of the recent revisions made to the *Explore the Universe Guide*, such as sky charts and a map of the moon. He requested that any member wishing a copy should contact him and he will place a bulk order.

Dave Chapman also mentioned that an informal night at SCO was being organized, weather permitting, for a viewing of the Geminids on December 13/14. He offered to bring hot



▲ Dave Chapman (Photo: Tony Schellinck)

chocolate and others who planned to attend were invited to bring snack foods. A call will be made on Tuesday evening through the Announce List as to whether or not the observing night was to be held.

Dave Chapman, as the Guest Speaker, addressed "The Unusual Moons of Early 2018." He explained how we can have two full moons in one month. The long-term average of the synodic period of the moon is 29.53 days, and that months with 31 days are three times more likely to have two full moons than 30-day months. That meant that February would

Jan 2	2 ^h 25 ^m 12 ^s
Jan 31	13 27 51
Mar 2	0 52 28
Mar 31	12 37 58
Apr 30	0 59 19
May 29	14 20 42
Jun 28	4 54 07
Jul 27	20 21 29
Aug 26	11 57 18
Sep 25	2 53 32
Oct 24	16 46 18
Nov 23	5 40 19
Dec 22	17 49 42

▲ Two full moons in January and March, an unusual occurrence according to Dave. (Slide: Dave Chapman)

have either one or no full moons. How often does this happen? Looking at dates of its occurrence in years past - 1961, 1980, 1999, 2018 - it appears to happen every 19 years. The future occurrence is therefore in 2037. He referenced page 125 in the *2018 Observers Handbook*.

Dave also noted that "calendars" are not astronomy based but that they were religious or political instruments. They were in essence developed by humans, our "bosses", telling us what to do and when. For instance, the Caesars (Julius and Augustus in particular) adjusted the number of days in a month to suit their political needs by removing a day from February (which was then the last month of the year).

He also made comparisons on the apparent size if the moon was compared to pizza - small, regular and large. The small pizza was 7% less than the regular and the regular was 7% less than the large "Super pizza!" The use of the word "super" should not be used in reference to these perigeon moons, and members should discourage its use in any outreach conducted. In answering questions from the audience, he noted this was not the same as the confirmation bias observed as the moon rose above the horizon, and there isn't any significant evidence to suggest these perigees were related to an increase in earthquakes.

The meeting portion of the meeting adjourned for members to enjoy special Christmas cookies and beverages provided by Pat Kelly and a fruited ring cake by Judy Black.

November Halifax Centre Meeting Report

Tony Schellinck

The November meeting started with Paul Gray giving announcements, including the awarding of three certificates to Halifax RASC members. Tony Schellinck received two astroimaging certificates, one for Deep-Space objects and the other for Wide-Field astrophotography. Judy Black received



▲ Paul Gray hands Tony Schellinck one of two Astroimaging certificates he received that evening. (Photo: Dave Chapman)



▲ Paul Gray hands Judy Black her Explore the Moon (binocular version) certificate. (Photo: Dave Chapman)

her certificate for observing the Moon (binocular version) program. This was followed by Paul Heath who provided food for the soul by reading one of his poems. The main event was the presentations given by the younger members of the centre. Youth member Ruining Zhang is a grade 12 student who had the opportunity to attend the SSP (Summer Science Program) to do orbital mapping of a near earth asteroid 2005 UP156. SSP is a 39 day pre-college research program operating since 1959.

Using the 14" telescope at the Frank T. Etscorn Campus Observatory, Socorro, New Mexico, Ruining and her team (Thunderstruck) collected 3 sets, 5 images/set, 15 min. separation 60s-75s exposures. Their data was processed and the Method of Gauss used to determine the 6 orbital elements. These were then compared to JPL data on 2005 UP156. The Thunderstruck team was within 0.006% to 0.2% of the six estimates obtained by JPL: this is an extremely accurate set of results. Due to the chaotic nature of asteroid orbit, it is important to continue to monitor them.

Using the 14" telescope at the

telescope at the

Besides data collection SSP has daily lectures on astronomy, physics, math and programming. It was not all hard work with visits to VLA, Madgana Observatory, White Sands National Monument and social time. Ruining's team data was accepted for Minor Planet Center publication. http://www.minorplanetcenter.net/iau/ECS/MPCArchive/2017/MPC_20171005.pdf



▲ Ruining Zhang tells us what she accomplished in the Summer Science Program (Photo: Dave Chapman)



▲ Paul Heath provides Food for the Soul (Photo: Tony Schellinck)

The next youth speakers were Kathryn and Nathan Gray. They spoke about their summer trip to Trondheim, Norway



▲ Kathryn and Nathan Gray describe their adventures at the Starmus IV festival. (Photo: Dave Chapman)

where Kathryn was invited to be a guest speaker at the Starmus IV festival. Because Kathryn was the youngest person to have discovered a supernova at the time, she was a guest at the first Starmus 6 years ago and was invited back to take part again. She did a 20-minute interview on stage and then gave a speech as part of the closing ceremony. More about Starmus can be read at www.starmus.com.

The meeting ended with the usual snacks, drinks and good cheer.