Nova Notes

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

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In this issue:

Front Page Photo: Dave Chapman

This is a camera & tripod shot (untracked) taken with a Canon Digital Rebel SL1 at ISO 6400, using a Canon 50 mm f/1.8 lens (set at f/2.0) with 8 seconds exposure. Minimal processing. It was taken on Wednesday, July 23 2014, at about 3:15 UT at the south end of Portage R well within Kejimkujik Dark Sky Preserve in Nova Scotia. The Sky Quality Meter read 21.7 magnitudes per square arc second.

From the editor *Quinn Smith*

I would like to thank Tony Schellinck for helping me with this edition of Nova Notes. I will be away during the critical time that this edition goes to press and Tony has offered to help me complete and post this edition (the spelling errors and other mistakes are, however, are all mine!)

When I take to the road, I never quite know what astronomical items of interest I will come across. Last time it was the 26,000 year Precession calendar at the Hoover Dam. Before that it was an unexpected visit to the 100" Hooker telescope just outside Los Angeles. What will it be this trip? I'm sure there will be nothing of interest in Roswell!

Before I head out, I would like to remind you all of both the Dark Sky Weekend at Keji (August 15th-17th) and our own Nova East Star Party (August 22nd-24th).

I wish you all clear skies over the summer months!

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 grown over the last few years to include 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) 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 Observing Chairman, Alex LeCreux (for contact info, see below).

Upcoming Observing Nights:

June	27th	2014	Sept	22nd	2014
July	25th	2014	October	24th	2014
August	Nova East		November	22nd	2014

Meetings begin at 7:30 p.m. at Saint Mary's

University in room AT 101.

June 19th 2014 (note location change)
The June meeting will be held at the St Croix Observatory (in our usual room if weather is bad).

No Meetings in July or August

August 22—24 Nova East

September 19th 2014
Back to our regular meetings at St Mary's University
Details to be announced

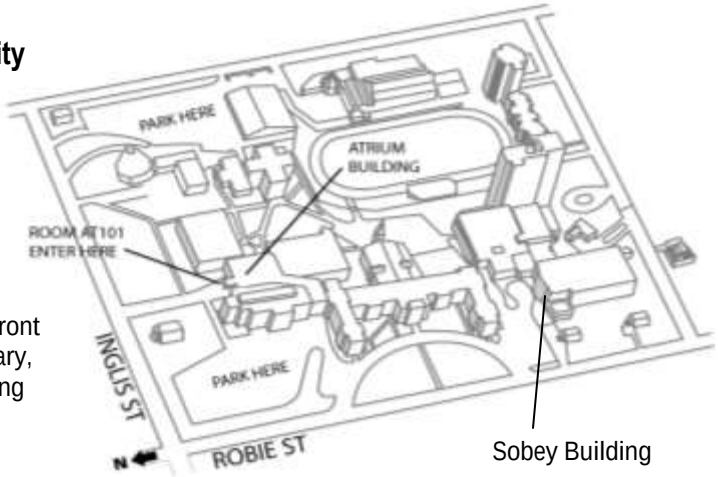
All meeting location and contents subject to change

Meeting Location:

Saint Mary's University

Atrium Building
Room AT 101

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



Meetings are usually held on the third Friday of the month, except for the months of July and August, when there are no meetings.

Executive meetings begin at 6:30 p.m., usually in room AT 306, and all members are welcome.

Halifax RASC Executive, 2014:

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National Representative	**Pat Kelly**	**(902) 472 2322**	**patrick.kelly@dal.ca**
Councilor	**Wesley Howie**	**(902) 448 3966**	**wes@lightimages.org**
Councilor			

Nova East

Blair MacDonald

Well, Nova East 2014 is open for business. We have a full schedule and a great guest speaker in Dr. Rob Thacker. Anyone that has taken in any of Dr. Thacker's IYA talks knows he is an open and entertaining speaker. We have our second annual astrophoto competition so dust off those shots and send them in, either JPEG's or prints. Judging will be from prints of your files at the event just like last year with Atlantic Photo Supply providing the prizes for the first, second and third place winners. We have our usual workshops covering solar filter making, lunar observing and image processing as well as our guided nature tour of the park and our door prize draw.

Pat and crew have been busy gathering a great collection of prizes with the grand door prize this year being an eight inch Sky Watcher dobsonian telescope.

Our closing talk this year is by our own Jeff Donaldson on his recent foray into cross border observing. He should have some great vacation photos.

It turns out that the park has had some recent upgrades and we now have a building on the concrete pad so we have a warm and dry place for the talks and workshops.

Our registrar, the mighty Quinn, tells me that the hill is already booked up so get your registrations in, end of June is the deadline for T-shirt orders. We hope to see you at this year's event.

Your Nova East organizing committee.

This year's main prize, an 8" Sky Watcher Dob

Relaxing by the tent ***Photo: Blair MacDonald***

NE 2014 Laser lights ***Photo: Jeff Donaldson***

SCO Work Party

Alex LeCreux

I am pleased to report a very successful outcome at the SCO Spring Work Party held on Saturday April 26th. We were treated to a lovely day as the weather was perfect. There were a dozen or so members on site which I wanted to pass on my sincere thanks to. It was really nice seeing us all come together for this worthwhile event.

Some of the tasks that were accomplished included a thorough cleanup of the buildings, including vacuuming of the carpet in the roll off, and removal of all the usual spider/squirrel residue. The Rascan was emptied for cleaning and then reorganized neatly keeping the Nova East items together for easy access. All the roofing screws on the roll off, which were showing significant rusting were coated with fresh rust paint, including the racks for the solar panels on the warm room.

The "Crew" take a breather during after a pleasant days work
Photo Blair MacDonald

A tree blocking the Westerly view is removed. Perhaps the spectators need a few lessons in the effects of gravity and massive objects on skulls.
Photo Blair MacDonald

The parking area, walkways and observing platform areas were cleared of weeds which was no small task. The area surrounding the buildings was cleared of brush. The siding on the buildings was cleaned up nicely as there was quite a bit of buildup/mildew present. Quite a few trees were removed from the vicinity of the buildings which were contributing to the siding deterioration.

We enjoyed a nice BBQ together on the observing pad area which was a nice break. We spent about four hours in total which was more than I expected but everyone hung in for the duration. There are still some items to be addressed but the bulk of the hard work was accomplished. I have a few things outstanding that I will pick at over the next couple of months, mostly small jobs that can be addressed during my check up visits to SCO.

Again, thank you all so, so much.
Clear skies… Alex LeCreux
SCO Observing Co-chair

FOOD FOR THE SOUL
(May Meeting 2014)

Mi'Kmaw song: Song of the Stars

We are the stars which sing,
We sing with our light;
We are the birds of fire,
We fly over the sky.
Our light is a voice;
We make a road for spirits,
For the spirits to pass over.
Among us are three hunters
Who chase a bear;
There never was a time
When they were not hunting.
We look down on the mountains.
This is the Song of the Stars.

From "Stories From the Six Worlds—Micmac Legends," by Ruth Holmes Whitehead (Nimbus, 1988)
Read by Cathy LeBlanc member of Acadia First Nation

Three Years of Privateer Days Public Viewing in Liverpool

Wayne Mansfield

Three years ago, sparked by interest shown in the community after public viewing events put on by Queens County Astronomy Group, the organizers of Liverpool's annual festival, Privateer Days, invited Tony Schellinck and myself to put on an astro event. Privateer Days is Liverpool's celebration of it's seafaring history and privateering prowess during the War of 1812.The three day event draws large crowds from all over and makes an astronomy outreach event very popular and well attended.

We set up our display near the Pirate Ship playground away from the main hustle and bustle of the festival and although our venue in the park is in quite a well-lit area, viewing of bright objects such as the Sun Moon planets and brighter stars, doubles and others, easy and able to produce a wow factor. Guests from toddlers to hobblers have viewed stars several light years away to a spider on a local church steeple several hundred meters away. We will point at anything to get them to look through a scope. The Q&A between the guests and us is one of the highlights of the evenings.

On the evening of June 21st, Tony, Philip Bentley and I were at Waterfront Park in Liverpool to put on a public astronomy event for this year's Privateer Days. We had four telescopes from 4" to 16".The evening started off around 7PM and we managed some Solar Sunspot viewing that allowed the early group to see those features. While we were waiting for it get dark enough to check out some planets, Tony, Philip and I had fun sharing the views through 4 different size scopes. We trained them on a relay tower on top of Great Hill, about 5 miles away. People were amazed how clear the views got with the increase in size of scope. It gave us an opportunity to explain how magnification is a secondary consideration in scope shopping and light gathering power is primary.

After setting up, Wayne Mansfield, Carson Perry, and Philip Bentley await the arrival of the public. Photo Tony Schellinck

Finally, the sky got dark enough to share some views of the main attractions of the evening. Jupiter was first to peek through the Sunset afterglow. Several people were amazed that the Moons of Jupiter and the banding on Jupiter was visible. After Jupiter decided to hide behind some horizon hugging clouds, Saturn and Mars took center stage and what a performance they put on. The views through three scopes my 8" Bushnell ,Philips 10" Orion and Tony's 16" Sky Watcher gave our guests an evening of viewing I think they will remember for some time. Tony also gave a presentation of his 'From Here to There' slideshow that was enjoyed by the group.

Alas, Mother Nature decided we should call it a night around 11 by bring in some cloud cover. I dare say that Philip, Tony and I had a fun evening and the 40 to 50 people who stopped by had fun also.

HALIFAX CENTRE

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

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

Articles on any aspect of Astronomy and Allied Sciences will be considered for publication.

April Meeting Report

Editor

The April meeting was opened by our President Paul Heath who started with a poem from his "Food for the Soul" series.

The meeting was very well attended, with over 70 people present, 30 of which were non RASC members. This was primarily due to the advertising surrounding our guest speaker Dan Faulk, who was promoting his new book "The Science of Shakespeare".

Paul got down to business by outlining the benefits of RASC membership, before introducing the Halifax Executive. Paul then discussed the upcoming Halcon convention which will be held in Halifax in the late Fall. It was agreed that the Halifax Centre would participate, by hosting a science and astronomy debate, centred around some of the "science" in science-fiction.

Quinn Smith then gave a brief outline of the Nova East Star Party which will be held at Smiley's Provincial Park on the weekend of August 22—24th.

Next up was Dave Chapman who described the events that will be taking place at Keji's Dark Sky Weekend, being held the weekend before Nova East.

The final person to speak was Kate Howel, who was at our meeting to promote the Planetary Society, which was founded in 1980 by Carl Sagen. Kate described the work of the Society and encouraged guests to join and support their efforts.

Paul Heath then introduced the main speaker for the evening Dan Faulk. Dan has written several books on popular science, including *"In Search of Time"*, and *"The Universe on a T-Shirt"*. Tonight Dan was going to discuss his new book *"The Science of Shakespeare"*.

Dan started his talk by pointing out the interesting period in time when Shakespeare lived (1564-1616). This was the age of "Enlightenment", the age when science and the scientific approach was being developed. This was the age of Copernicus, Galileo and Newton. Shakespeare was whiting during the dawn of modern science.

Dan pointed out that unlike Galileo, Shakespeare did not directly confront the new science, and did not directly get involved in the Geo-centric versus Helio-centric views of the Universe. He did however have several interesting astronomical and scientific references in his plays.

Dan quoted several lines from Shakespeare to indicate Shakespeare's knowledge (and sometimes lack thereof) of astronomy.

Dan also pointed out that Shakespeare was 8 years old when the 1572 supernova was visible. The supernova (also called "*Tycho's Supernova"* after Tycho Brahe*)* was easily visible with an estimated maximum magnitude of –4 (about the same magnitude as a bright Venus). Perhaps a young Shakespeare remembered this astronomical event and peaked his interest in the stars.

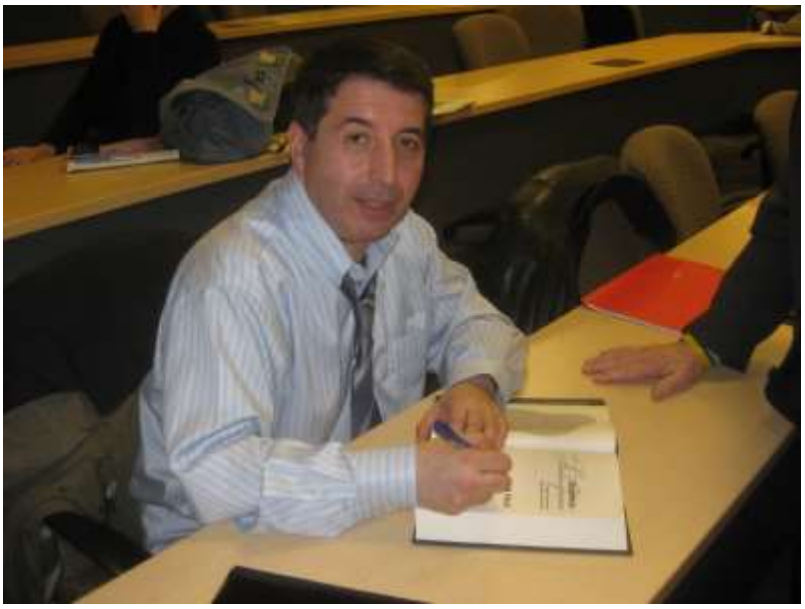
Interestingly enough there was quite a connection between Shakespeare and Tycho Brahe through a mutual friend Thomas Digger, but I will let you read the book to find out what that connection was!

All in all a very interesting talk, which was followed by many good questions. Dan had brought several copies of his book to sell (after all it was a promotional tour) and he spent quite a while at the end of the meeting discussing points from the talk and signing books for the audience.

The meeting ended with our usual "What's UP?" hosted by Sean Dzafovic. Sean pointed out some of the interesting items that would be visible during the next month. Most of the items Sean chooses are from the RASC *"Explore the Universe Certificate"*.

The meeting concluded with our usual snacks and pop along with discussions on the talks and book signing by Dan.

Another great evening!



Dan Faulk signs copies of his book. ***Photo Quinn Smith***

May Meeting Report

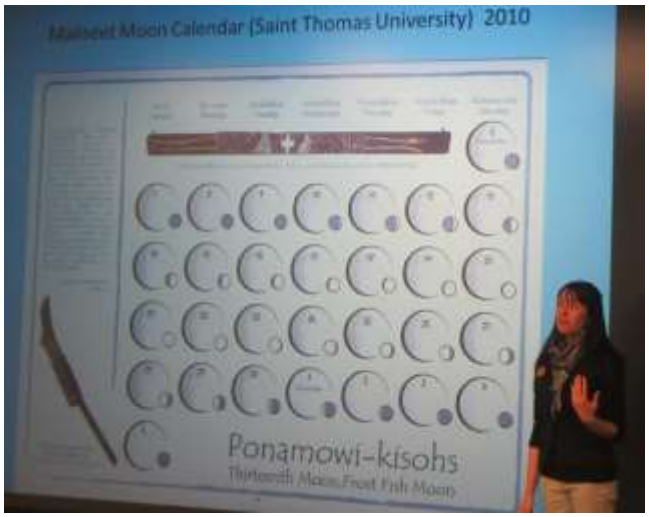
Tony Schellinck

The May meeting, hosted by Paul Heath, was well attended with 59 attendees of which over 20 were guests. After providing information on membership benefits to visitors and newcomers, Paul introduced Cathy LeBlanc and Dave Chapman. Their talk was entitled In Search of the Thirteenth Mi'kmaw Moon. Cathy LeBlanc opened the meeting by reading the words to a traditional Mi'kmaw song "Song of the Stars" from the book "Stories From the Six Worlds—Micmac Legends," by Ruth Holmes Whitehead.

Cathy is an Acadia First Nation member and a seasonal cultural interpreter at Kejimkujik National Park. Dave Chapman is a long time amateur astronomer and lunar expert who has recently been working with Cathy conducting research into the traditional time-keeping customs of the Mi'kmaw Nations, before contact with Europeans (See the April 2014 Nova Notes for a description of the search for the thirteenth Mi'kmaw moon). They have been using the "Two Eyed Seeing" approach to their research where the researchers learn to see from one eye with the strengths of indigenous knowledge and way of knowing, from the other eye with the strengths of western knowledge and way of knowing, and learn to use both eyes together for the benefit of all (Elder Albert Marshall, 2004).

Cathy ***LeBlanc and Dave Chapman***
Photo Tony Schellinck

Cathy first introduced us to the twelve Mi'kmaw moon names (Mi'kmawe'k Tepknusetk), then described the Maliseet moon calendar to introduce the thirteenth moon called the Frost Fish Moon. She finished by introducing the audience to the book by Joseph Bruchac and Jonathan London entitled *Thirteen Moons on Turtle's Back* which describes the Native American year of moons.



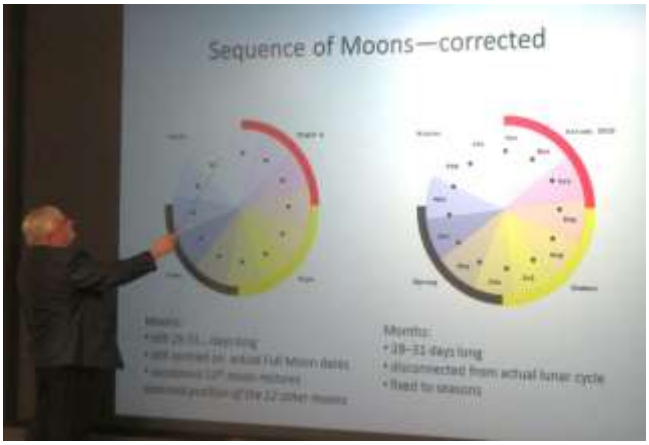
Cathy LeBlanc explains the Maliseet moon calendar.
Photo Tony Schellinck

Dave then took over and described how other first nations also had thirteen moon names and noted that the RASC Observers Handbook covered this. He then presented a series of slides that cleverly described the process by which the Gregorian and lunar months overlap over the span of a year and necessitate the need for a thirteenth moon name. He concluded by explaining that more than twelve moon names were used by the Mi'kmaw to subdivide the natural cycle of the solar year and that most moon names were connected to seasonal activities. He indicated that there are good astronomical bases for using a pattern of twelve and thirteen month "years", told us that the name of the thirteenth moon may have been Kji'kus and emphasized that it is time to seek more teachings from the Mi'kmaw elders.

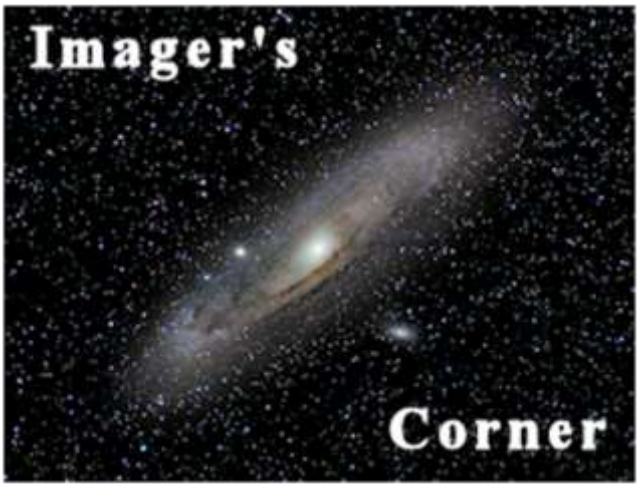
A lively question and answer period followed the presentation and the audience was clearly very appreciative of the presentation and the extensive research conducted by these two presenters.

Sean Dzafovic was the final speaker for the evening and gave the "What's Up" talk for the month. He started by highlighting objects in the sky that those working on the Explore the Universe Certificate for beginners should be looking for: Spica in Virgo and Arcturus in Boötis. His DSO highlights included M13 in Hercules, M5 in Serpens, Epsilon Lyrae, the famous double double and Zeta Lyrae, both double stars in Lyra. May 30 was scheduled to be member's night at SCO. |

And finally, Paul reminded people that Nova East is scheduled for August 22 – 23 and the Keji DSP is August 15 – 17.



Dave Chapman explains the relationship between Gregorian and lunar months. ***Photo Tony Schellinck***



Part #15 in a series by Blair MacDonald

This edition continues a group of Imager's Corner articles that will focus on a few techniques that are useful in processing astrophotos. Over the next several editions of Nova Notes I will continue with a guide to several techniques that I find most useful. All the techniques discussed will be useable with nothing more than a standard image processor that supports layers and masks. No special astro-image processor is required.

This edition will deal with recovering star colour in images that have been stretched to the point where the star colour has bleached close to white. The technique works because the stellar image is usually a Gaussian where only the central area has had the value of the colour channels stretched to 255. When each colour channels approaches the maximum value, much of the star colour gets lost and the image loses some punch.

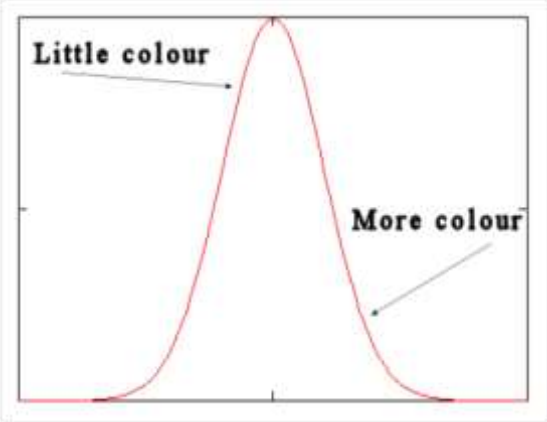


Figure 1 - Stellar Gaussian

The trick is to smear the colour from the tails of the Gaussian so it covers the entire star, then greatly boost the saturation. This sounds reasonable, but the effect on the rest of the image is intolerable. Like a lot of astro-processing it is a case of layers and masks to the rescue. Start by duplicating the image on another layer. Now blur this layer with a Gaussian filter having a width of three or more. Blur the image enough to spread the colour from the tails of the stellar image throughout the whole star. Next turn up the saturation rather drastically on this layer and set its combine mode to colour. Now there should be lots of star colour, but the rest of the image will look like crap so a star mask made from the original image is used to combine the two layers and limit the colour boost to the stars.

Let's take a look at an image of a star field near the Iris Nebula.

Figure 2 - Original low colour image

As you can see from the image, there is very little star colour due to the stretch applied to make the nebula visible (it's out of the frame in the lower right). Now we apply the layer stack used to boost the star colour as shown in below.

This produces an image with much more star colour, but no artifacts in the sky background or the deep sky object.

Figure 4 - Final image with enhanced star colour

It is important to make the star mask from the original image so the effect will be limited to the cores of the stars and a little blurring will help to blend the effect into the background.
The same technique with a different mask and no saturation boost can be used to remove much of the colour noise from an image, but that is another column.

Remember, this column will be based on your questions so keep them coming. You can send them to the list at hfxrasc@lists.rasc.ca or you can send them directly to me at ***b.macdonald@ns.sympatico.ca***. Please put "IC" as the first two letters in the topic so my email filters will sort the questions.

SaltScapes Show

The Editor

I would like to thank everyone who helped out at the SaltScapes show held at Exhibitions Park on April 25th—27th. Thanks to Melody Hamilton, Dave Chapman, Wes Howie, and Blair MacDonald. Without you support and dedication, this event would not have been possible.

It was a very busy show and by my estimate, we interacted with over 600 members of the public. As an outreach event, it is hard to beat the shear number of people that a trade show like this can reach.

As a Centre we usually attend two of these shows at Exhibition Park, the other being the RV show, usually held in March. Unlike the RV show, which although subsidized by the show management costs the Centre several hundred dollars to attend, booth space at the SaltScapes show was generously donated by Atlantic Photo Supply. I would like to thank Brian Giffin and all the staff at Atlantic Photo Supply for their generosity and help throughout the show.

The SaltScaspes show is an excellent opportunity to talk to the general public about astronomy, light pollution and the Halifax Centre. As a Centre we do not consider these shows as a method of gaining members (although that is always great when it happens), but rather an opportunity to "spread the word" about astronomy. From the number of Star Finders that we gave away, and judging from the discussions we had, there is a growing awareness both of astronomy in general and light pollution in particular. It's all good!

Thanks again to everyone!

Blair MacDonald doing his best to (unsuccessfully) scare away customers at the RASC SaltScapes booth.

Astrophoto Gallery: Photos by Blair MacDonald

This issue we feature two photos taken by Blair MacDonald with an unmodified Canon and processed using basic photo processing software (Paintshop Pro), in order illustrate what incredible photographs can result using very affordable equipment.

HorseHead & Flame Nebula

RASC (Halifax Centre) St. Croix Observatory. Processing: Eight 10 minute images converted to tiff and dark corrected using Paint Shop Pro. Stacked and flat field corrected using Maxim DL. Image stretched and masked layer approach used to maintain detail in bright areas. Noise reduction using Paint Shop Pro. Final sharpen using Focus Magic (a Photoshop and Paint Shop Pro plugin)
Equipment: Canon EOS 350D , Meade SN8 8, Camera unmodified
Exposure 80 minutes, 10 minute subs

FOOD FOR THE SOUL

(SCO JUNE meeting 2014)

MINDS EYE

With brilliant flash and quick indrawn breath
We hold an Image on our eye.
Perhaps.

Woo – wo – Woo, the Owl calls
Through the darkening night
Perhaps, that image holds upon his sight

Ber – eep, Ber – eep, the Peeper calls
Perhaps, that flash too
Has set an image onto his eye.

And now the Imaged Eye looks back
Through Eons long . . . long gone
And wonders, perhaps.

Did not Ichthyostega . . . perhaps
With that very First indrawn breath,
Set an image to his eye
Of a brilliant flash, across Devonian Skies.

And Perhaps, this image, passed, step by step
Throughout the Eons from Devonian Shores
To Rest, forever now, deep, within our Minds Eye.
Perhaps . . . Perhaps.

By Paul Heath

Lagoon Nebula (M8)

RASC (Halifax Centre) St. Croix Observatory . Processing: 3 5 minute images converted to tiff and dark corrected using Paint Shop Pro. Stacked and flat field corrected using Maxim DL. Image stretched and masked layer approach used to maintain detail in bright areas. Noise reduction using Paint Shop Pro. Final sharpen using Focus Magic (a Photoshop and Paint Shop Pro plugin).
Equipment: Canon EOS 350D , Meade SN8 8" f4 telescope, Unmodified camera.
Exposure 15 minute, 5 minute subs

June Meeting Report

Tony Schellinck

The June meeting took place at the Saint Croix Observatory (SCO) with hot dogs and burgers at 6:30 followed by the meeting at 7:30 in the SCO warm room. Sixteen RASC members attended the meeting which was kicked off with a poem by Paul Heath.

Discussion first focused on possible meeting themes for the 2014-15 season to start in September 2014. Paul suggested the September meeting might be geared toward providing information useful for new observers. This would include how to use the equipment and how to keep logs and record viewing session details. He was looking for volunteers who could speak on the various aspects of observing that night. For October, he suggested David Griffith, a meteorite expert and a RASC member who recently moved to Nova Scotia, could be the guest speaker. As for November, several suggestions were made including a Quirks and Quarks questions show type evening or a short presentation evening where RASC members talk for 5 to 10 minutes on a topic that might interest other members.

Discussion then turned to the value and feasibility of setting up an All Sky Network as a project for the Halifax RASC centre. This would involve installing up to seven All Sky Cams in observatories around Nova Scotia, having someone download the data from each camera on a regular basis and analysis of the data to find meteor trails that might help identify meteor showers. This suggestion generated quite a bit of discussion among those in the warm room. It was noted that a similar system had been set up in New Brunswick. It was suggested that if we could raise the funds, perhaps through crowd sourcing, that national might match the funds. Presence of the network could shed some light on the nature of the fireballs that, according to Paul Grey, have been frequently recorded in the Spring since the 1980s.

Roy Bishop noted that we in Nova Scotia would be much less likely to find this meteor shower than all sky networks in other parts of the world as our skies are clear only in about a third of the nights. Also, it was pointed out that much of the success of an All Sky Network depends on someone skillfully analysing the data on a regular basis. Paul Heath suggested that graduate students at one or more of the universities might be interested in taking this on as part of their education. There was discussion around the advisability of relying on graduate students and their supervisors to do this task.

The third major topic covered by the group was how to build membership. Paul Heath noted that attendance at the monthly meetings was up. Ian Anderson, in his capacity as treasurer, noted that we have 35 new members since October 1st, but this was offset by those who did not renew their membership. Paul suggested we needed to have common events with other societies such as the Young Naturalists to generate interest in their members participating in RASC. Others suggested the need was to improve retention of current members by finding them things to do to keep them engaged. The recent success of Dave Chapman's Lunar Observing Programme trial was cited as a way to engage members, even newer members. Sean Dzafovic's "What's Up" section of the meetings may be helpful in encouraging members to start more observing programs .Their progress could be reported in the Nova Notes as was done in New Brunswick years ago in order to encourage a competitive spirit. However, this may be more effective if several members take up an observing program as a challenge at the same time.

Dave Chapman (Second from right) explains how to use SCO's 16" Dobsonian.
Photo Tony Schellinck

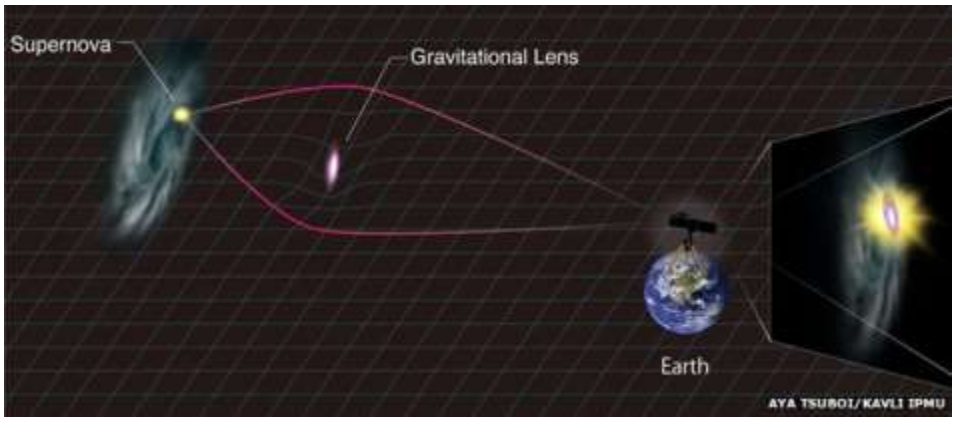
The evening concluded with Dave Chapman giving a "How To" session with SCO's new 16 inch Dobsonian scope.

Did you know?

Jimmy Walker is leading the PGA's FedEx Cup standings. He is known as professional golf's astroimager and one of his sponsors on the PGA Tour is Celestron. You can visit his site to see his photos at http://www.darkskywalker.com/.

Cosmic Debris

Odds and Sods from the world of astronomy and astrophysics



Dazzling supernova mystery solved!

By James Morgan
Science reporter, BBC News

An exceptionally bright supernova that baffled scientists has been explained.

It is so luminous because a galaxy sitting in front amplifies its light - making it appear 100 billion times more dazzling than our Sun. This cosmic magnifying glass lay hidden between Earth and the supernova - and has now been detected with a telescope in Hawaii.

The discovery, reported in the journal Science, settles an important controversy in the field of astronomy. In 2010, a team of scientists observed the supernova, PS1-10afx, shining 30 times brighter than any other in its class. They concluded it was a completely new type of stellar explosion.

But while there are a few, rare supernovas that have been found with comparable luminosities, there was something odd about this one, according to Dr Robert Quimby of the University of Tokyo's Kavli Institute.

"PS1-10afx was different in just about every way. It evolved too fast, its host galaxy is too big, and it was way, way too red," he explained. His team had another idea. They ventured that PS1-10afx was a normal Type Ia supernova magnified by a lens in the form of a massive object, such as supermassive black hole, nearby.

The only problem: "We had no direct evidence for the lens," said Dr Quimby. "Thus [our] explanation required a bit of magic... and scientists don't generally buy into magic."

However, he reasoned that if there was a gravitational lens magnifying the supernova, this lens would still be there today - even though the supernova has faded away.

To find it, his team used the Keck telescope in Hawaii to observe PS1-10afx's host galaxy. "Looking at the spectra we could check to see if there was light coming from two sources at two separate distances, which is what we found," said Dr Quimby.

"There is a second, previously unidentified galaxy, hiding in plain sight in front of the supernova." The lens galaxy was missed previously because its light was lost in the bright glare of the supernova, the authors say.

"Although the lens galaxy is closer to us, it appears fainter because it has older stars that, like flashlights with old batteries, don't shine as bright," said Dr Quimby.

The Universe was almost a billion years younger when the supernova exploded than when its light rays were bent by the foreground lens. "Although this warping of space time probably created four separate images of the supernova when viewed from Earth, we find that these likely appeared as a single source after atmospheric blurring," said Dr Quimby.

The discovery could provide astronomers with a new tool to measure the expansion of the Universe.

That's because PS1-10afx is the first supernova of its kind to be magnified by "strong gravitational lensing" - where multiple images of the supernova are formed - creating the extra-bright appearance.

"Each image will arrive at a different time with the exact delay dependent on how fast the Universe is expanding. In principle, measuring this delay provides a direct way to measure cosmic expansion," Dr Quimby explained.

Unfortunately, the scientists could not do this with PS1-10afx because it faded away before its importance was recognised. But now they know what to look for.

"Our discovery implies there are many more gravitationally lensed supernovae that are barely resolved, like PS1-10afx," said Prof Masamune Oguri, of the University of Tokyo.

"Our selection method can soon be applied to future surveys to improve our understanding of the expanding Universe."