Nova Notes

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

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SPECIAL ISSUE: ALL ABOUT OUTREACH

Wayne Mansfield describes how he creates outreach in a small community

Under the Dome Darkly—Reaching audiences on cloudy nights by Patrick Kelly

Matt Paine considers the possibility of sidewalk radio astronomy

Art Cole illustrates the use of smart phones for astrophotography during outreach

Paul Heath gives a "how to" when it comes to youth presentations

November meeting covered Cepheid variables and DSLR cameras for astrophotography

Member Profiles: Andy and Elli Hasler

The 2016 Observer's Handbook launch at the December meeting

St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix. 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:

February 6 (alt 7)
March 4 (alt 5)
April 1 (alt 2)

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

University in Room 101 of the Atrium Building (AT).

All meeting locations and presentations subject to change

Friday, January 15th 2016 7:30 to 9:30 p.m.
Paul Gray on the "Great American Eclipse!"

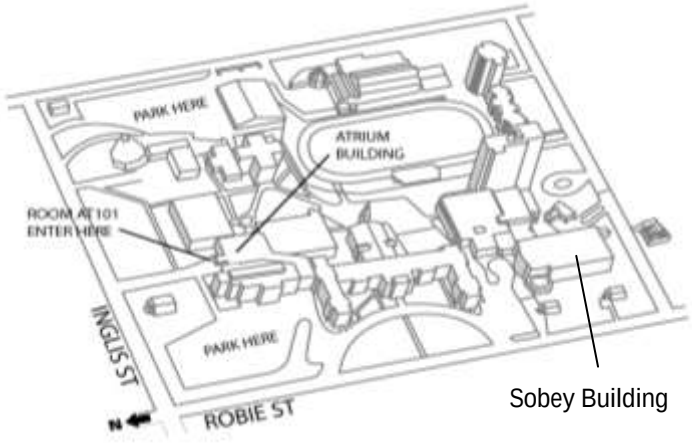
Friday February 19 2016 7:30 to 9:30 p.m.
"Tweet Yourself to an Astrophoto" or
"You Too can Use a 0.6-m Planewave CDK (or Celestron 14) Telescope for Imaging"
Dave VIII Lane (Director, Burke-Gaffney Observatory and Abbey Ridge Observatory)

Other Meeting Dates
Friday March 18 2016
Friday April 15 2016

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.



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, 2016:

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Councilor	**Paul Heath**	**pheath@eastlink.ca**

In this issue:

Cover Photo
Tony Schellinck

Photo of NGC 896, October 27, 2014, 10:12 – 10:28, 5 4min subs, ISO 3200, Mod T3i, H Alpha, 8" Quattro, CGEM, guided, Stacked in Images Plus and some stretch.

NGC 896 is an emission nebula in the constellation Cassiopeia.

From the editor ***Tony Schellinck***

This month's issue focuses on outreach. I was fortunate to have several members step up to the plate so to speak and produce content specific to the topic. Art Cole talks about astrophotography at public viewings and how cell phones can be used by the public to dip their toes into photographing the planets and the moon. Matt Paine examines the feasibility of sidewalk radio astronomy and concludes it may be worth a try. Pat Kelly talks about RASC volunteers giving shows at the Halifax Planetarium, something other members might consider doing. Wayne Mansfield describes his outreach activities over the last year in the South Shore; a great example of what anyone can do in their community. Paul Heath has been introducing astronomy to school children for many years and provides us with a "how to" when presenting to youth.

In keeping with the theme, I pulled out a sample of photos of members involved in outreach that I took over the last year and used them to fill spaces in the issue. I actually had many more photos of different people I could have put in as those selected represent only a small portion of members who were involved in outreach, but I ran out of spaces.

I believe that outreach is one of the most rewarding activities in which members can partake. In my annual report on outreach (everyone involved in outreach should send an email to RASCals outlining their year's activities with the word outreach in the subject) I estimate I interacted with about 850 people last year during 13 events in which I was involved. I took advantage of the opportunity to give four planetarium shows at the Halifax Planetarium so that I could learn the sky; created a flat screen planetarium show for the Astor Theatre in Liverpool; tagged along with Wayne Mansfield when he had public outreach during Privateer Days in Liverpool, and set up during the International View the Moon night, and entertained guests at White Point Lodge. There was also Nova East, Keji Dark-Sky Weekend, and the Hal-Con table. I put on a play entitled The Milky Way Galaxy: Where Empires Exist at Hal-Con and hosted over 20 people at my private observatory in Port Mouton.

As you can see in this issue, outreach can take many forms and you are only limited by your imagination. So, don't wait for someone else to organize something, get out there and do it.

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.

Youth Presentations

Paul Heath

Presenting astronomy to youth is not as hard as it may seem. Young people are very keen and knowledgeable about space, and eager to learn as much as they can. However, there are many misconceptions that they have and this is what needs to be addressed during a presentation.

Realise that I do not say 'TALK'. You cannot give a talk to young people. Their attention span shortens very quickly when you stand in front of them just giving a list of facts or even showing pictures. It is very important that you engage them in the process of learning. Do not expect the Q & A to follow your presentation. Let it be a part of it and perhaps let the questions lead the direction of your presentation.

▲ *Paul Heath (right) and Jerry Deveau introduce astronomy to young people attending the 2015 Hal-Con convention in November. (Photo: Tony Schellinck)*

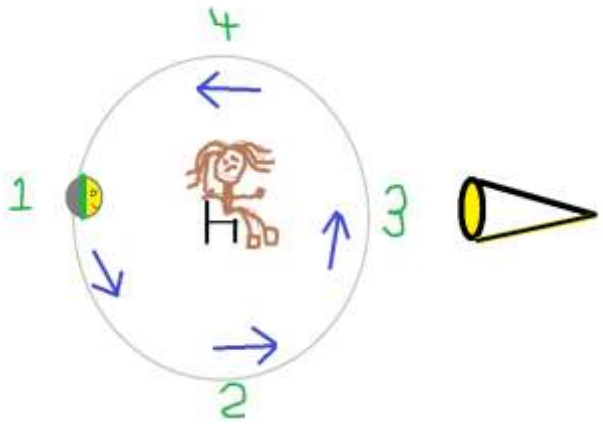
Begin by asking them a question. Gauge their understanding of the topic, then address any misconceptions they have. This will lead to many more questions. Also be aware of your age group. The younger they are the less you should focus on. 4-6 years old, look at just the Moon. 7-10 years old, look at the Solar System, 11 years and up let them lead with their questions. Present the facts as we know them but let the youth know that this could change. New telescopes, new instruments, new space probes will show us things we did not know. This will mean we will have to change our understanding of them and how we look at the objects we see. Let them know that this is what science is, CHANGE.

Be interactive, let the youth participate in the presentation. With simple models you can show many concepts at a level that the youth will understand.

Example: Does the Moon rotate?

Props: one chair, one bright light, one smiley face ball with the back covered (black paper or duct tape, with a colored tape line dividing the halves). One youth volunteer.

Dim lights if possible, have youth sit in chair, stand opposite the light with smiley face of ball facing light – ask group if they agree that when the Moon is Opposite the Sun (bright light) it is a full Moon.



Ask youth in chair what they see i.e., Full smile face

Ask group if the Moon Rotates/ Does not Rotate

Assuming no Rotation, hold smilie face in place, walk slowly around chair, ask youth at each of 4 points what they see

Assuming Rotation, hold smiley ball , slowly turning it as you walk around the chair so that the smilie face always faces youth in chair, ask youth what they see at each of the 4 points

Ask group which view is what we see? (Moon turns - one rotation = one month) Repeat second turn and focus on the changing shadow on the smilie face(phases of the moon)

Indicate that Moon's orbit is not round, Moon wobbles up and down , in and out – green line is part of back side of moon that can be seen because of the wobble ~9% of back of Moon can be seen.

Youth Presentations (Continued)

Paul Heath

This demo is easy to put together and will let the youth VISUALIZE the idea that you are presenting. Having them participate, this will make them focus on what is happening and give them a better grasp of the concept you are showing them.

Use slides and facts, to enhance what they have experienced with the demos, this helps to broaden their interest in the topic and perhaps go out on their own to learn more.

Presenting to youth can be very rewarding. Especially if you see some young person who had attended a past presentation, passing the information they learned on to their friends. The smiles you get and the excitement you instill in the youth show how much your presentation meant to them. If they are still asking questions as you leave, you have done what you set out to do. Instill your love of astronomy onto a new generation.

Demo's, models, games, asking the youth questions, are all ways to be interactive. This is a must when presenting to youth. If they feel a part of the presentation, they will look to learn more. You begin their journey with fun and a feeling that they can, and they will.

However, presenting to youth can lead to one serious issue. **YOU** may start to have **FUN** presenting to youth, and this can lead to a CAR full of DEMO materials!!

Paul Heath

The Universe's Symphony of Sound: Lend me your ears, not your eyes

Matt Paine

I have often wondered if I could bring radio astronomy out to the general public similar to sidewalk astronomy. I have seen several displays from local colleges that have their own astronomy programs, to amateur set-ups using old satellite dishes. None of these amateur radio set-ups were really "attention-getters" compared to a big light bucket telescope that draws crowds of people. Plus, I asked myself would someone rather see the rings of Saturn or hear random noise coming out of a speaker.

Then there is the practical side of sidewalk radio astronomy. Radio gear requires power, sometimes more than your average telescope, and sensitive electronics typically do not like moisture. Living in the Maritimes and New England, we can all attest as to how many times dew fall, or fog has ended our observing session early. Radio astronomy unlike astronomical observing is usually not as hands-on as operating a telescope i.e. focusing, making sure you are collimated, dew heater on etc. With sidewalk radio astronomy set-up I have seen, all your parameters can be set up ahead of time. Very little adjustment is needed in the field, just turn the power on and tune to your desired frequency.

Ok, so now that we have gone over a few of the differences and challenges with sidewalk radio astronomy, I am spurred on to go out and try this myself. Reading Michael Boschat's recent email on the Quandritids Meteor Shower got me thinking. I could set up a small notebook computer with some spectrum software, a receiver, and a small 4-element Yagi antenna pointed at the sky where the shower emanates. In fact, I will investigate further, but I believe I can use my iPhone or iPad as both the computer and the receiver. All I would need to do is build an interface from the antenna to the iPhone or iPad. All of this put together would be a small, easy package, to set up anywhere with minimal effort. In fact, this might be easier to set up than a telescope!

I think the key to making this or any sidewalk radio astronomy set up work, is to keep people engaged and involved. Explain what's going on, what they are hearing, and the significance of the noise coming out of the speaker. But also make sure that any sidewalk radio astronomy set up is not overly complicated and can be replicated by any person, not just by someone with a radio or an astronomy background. Now I want to put something together to try this out, to see if sidewalk radio astronomy can work for astronomy outreach.

Matt Paine
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W1AXB@comcast.net
Nova Notes Columnist
RASC Halifax Centre

Beneath a Dome, Darkly

Patrick Kelly

Astronomy outreach activities take many forms but anyone who has planned one that involves looking at the real sky will know that the event will always have that caveat: weather permitting. Even if the sky is clear, there are not a lot of people willing to stand still outdoors during the winter months to get a tour of Orion and company. The Halifax Planetarium, on the other hand gives people the ability to see the night sky (or a reasonable facsimile!) without a need to check the clear sky chart and they get to do it at room temperature. The Centre actually started using volunteers at the planetarium for group and public presentation back in the late 1980s and early 1990s. The public shows were free and for a while they were actually scheduled weekly, but with limited ways to advertise some shows had few people in attendance and some even had no attendees at all! With a limited number of volunteers, burnout set in and the planetarium shows became quite limited. That is no longer the case!

▲ Pat Kelly in the operator's seat at the Halifax Planetarium *(Photo: Tony Schellinck)*

Several years ago, Stephen Payne and David Tindall, both with the Physics Department at Dalhousie, set about to re-energise the planetarium. Advertising in places like the four-page weekly "flyers" that are free in many food outlets as well as listing shows on the Astronomy Nova Scotia web site started to draw more and more people, to the point where it almost became too popular for its own good! Most shows are not only fully booked, but often there are so many request for spots that a second show is now routine. I recently did back-to-back shows and out of curiosity asked attendees if they had been to a previous show. They were all first-time visitors! I think it has reached that critical mass where enough people are now talking about it that it is likely to stay busy for some time to come.

That is despite the fact that the shows are no longer free. The admission fee goes to giving presenters a small honorarium and setting aside funds to help update some of the equipment. That is a key concern given that the projector is over 50 years old. Graduate students from the department now help out with the public in advance of the show, checking attendance lists, collecting admissions, and passing out monthly sky charts. When it is time for the show, the visitors make their way inside and the magic begins.

One advantage of having an older projector is that it is only capable of showing the brighter stars so what you see is more realistic for those who live in the city or its suburbs. I'm not sure what the magnitude limit is, but back in the late 1980s, I recall Doug Pitcairn practicing the correct pronunciation of Camelopardalis only to find not one of its stars on the dome! That would mean the cutoff is less than 4.0. The other nice thing about using a fully manual projector is that you can stop and take questions, and even use the projector to answer them if need be. That is not something you can do at a large modern one where the experience is closer to watching a movie.

There are some university classes that use the projector. The basic motions of the stars are covered in both my first-year astronomy class at Dalhousie and my graduate-level archaeoastronomy and architecture course that I teach in my own faculty. Students find that actually feeling like you are under the real sky works far better when it comes to teaching basic concepts that diagrams or using planetarium software to try to project what appears to us as a hemisphere as a flat image on a projector screen.

There are also a greater number of people giving presentations now, which means that even with weekly shows, each presenter typically does about eight evenings per year, usually two weeks apart, once per season. That also greatly reduces the risk of burnout among the volunteers. For me, the best part is at the end, when we have a quick question-and-answer session, and if we are really lucky it is clear and we pop outside to look at the real night sky.

If you have not been to a show in recent years, I would encourage you to make it something you do before the year is out. You can find more information at www.astronomynovascotia.ca.

December Halifax RASC Meeting

Jim Millar

The 11 December 2015 meeting of the Halifax Centre was the Annual General Meeting.

Reports from the committees and executive will be shared in the next issue of Nova Notes.

Nominations were opened for the Executive. The 1st vice president position is under review so there were no nominations for that position. Chris Young resigned as Recording Secretary and Judy Black offered to replace him. Patrick Kelly had served more than his allotted five years as National Rep and was replaced by Dave Chapman. Alex Lecreux resigned as SCO Observing Chair and was replaced by Tony McGrath. Wes Howie resigned his position as Councillor. Pat Kelly, Chris Young and Paul Heath offered to serve as Councillors. Paul Heath will focus on outreach.

The Centre's auditor stepped down just prior to this year's audit. Dave Lane was appointed as the replacement auditor for the 2014-15 fiscal year. Gregg Dill was appointed as auditor for the current year.

After the business portion of the meeting there was a book launch for the 2016 Observer's Handbook. This is the last one with Dave Chapman as Editor. Dave explained how he had wanted to have a Nova Scotia focus to this year's book and also wanted to highlight the contributions of Cathy LeBlanc and Chris Green.

▲ Chris Green, Kathy LeBlanc and Dave Chapman pose for a selfie after the book launch *(Photos: Tony Schellinck)*

Cathy is a member of the Acadia First Nation and has worked with Dave on a "Two Eyed Seeing" project to meld the scientific and first nations view of the moon and the universe. She wrote the guest editorial for the Handbook.

Chris Green is a local (Liverpool) astrophotographer who has shared many photographs of the night sky. Dave Chapman commissioned him to shoot a picture of the Milky Way that would serve as the cover photo for the Handbook. Chris donated the final product.

▲ Kathy LeBlanc reads from her article in the 2016 Observer's Handbook

The contributors to the handbook who were present were available for signing autographs. As usual the meeting ended with treats, a slide show and social time.

Outreach on the South Shore

Wayne Mansfield

I believe that outreach is one of the most valuable tools that we as members of the RASC have in our kit to help achieve one of the Society's mandates. I've been involved with outreach in Lunenburg, Queens and Shelburne Counties for over 10 years now. Doing events at Provincial Parks, parks in the local area and just impromptu outings has been a highlight for my hobby experience. My favourite thing is what I call the 'Saturn Moments'. When I have a guest looking in one of my telescopes and they see any object, be it craters on the Moon, the Galilean satellites or the rings of Saturn and you hear their shouts of glee, some quite colorful; THAT makes it all worthwhile for me. This past year has been a good one. White Point viewing with Tony Schellinck on June 20th, another great Dark-Sky Weekend at Keji, International Observe the Moon night and also assisting Tony with observing after his innovative Flat Screen Planetarium show for binocular users at the Astor Theater in Liverpool. Great stuff.

We had a good fall this year in both Queens and Shelburne Counties. My first outing was on the evening of Sept. 28th, the night of the eclipse. I went to a small spot here in Milton called Tupper Park. For equipment I brought along my 2 telescopes and my 25x100 binoculars. Throughout the evening I was joined by fellow astronomers Carson and Susan Perry, as well as about 9 passerbys. Into the wee hours we talked about the Moon, the geometry that causes the eclipse and the total beauty of the sky with the full moon surrounded by the stars. In total, a beautiful evening.

My second venture on October 10th involved a trip to Shelburne Islands Provincial Park along with my wife Pamela to talk to the late season campers. The evening began around 7 with some enthusiastic young people coming by while we were setting up. They were filled with questions about the telescopes and how they worked, to about the sky, to whether "there was life out there". As the evening continued, the parents of the children arrived. They too were filled with questions including one who asked " OK, where is the nerd who is going to show us space stuff?". This time I only had one scope along with my binoculars but later I was joined by a fellow astronomer from Shelburne named Trenton Bennick. He brought along his 10" Celestron. It was new to him so I spent some time showing him how to track some objects and this was how we found M31. Along with M31 we also viewed the Coathanger cluster and Albireo, the latter being the favorite because of its color.

▲ Wayne Mansfield shows an image of the sun on his solar funnel during the Keji Dark-Sky Weekend in 2015. Wayne has been a member of the RASC team since the event's inception. (*Photo: Tony Schellinck*)

The third and final outing of the year was on December 28th at White Point Beach Lodge. I set up near the tennis courts ,a fairly dark spot Tony and I found on previous evenings at the Lodge. The sky was not responsive to viewing with only a couple quick peeks of Pleiades and the Orion Nebula. A small but always enthusiastic group of about 9 joined us in conversation on the telescope, solar flares, the demotion of Pluto, the birth of stars just to name a few topics which again included the question of "Is there life out there?". Viewing the Orion Nebula made for one of the best times in quite some time.

I find the interest in astronomy on the South Shore growing over the last few years and hope this continues in 2016 and beyond.

Editor's Note: Wayne has close to two hundred members on his Facebook page: Queen's County Astronomy Group.

Member Profile: Andy and Elli Hasler

Tony Schellinck

Andy Hasler and his daughter have only recently become involved in amateur astronomy, though he grew up in Australia where he would go out into the bush with his swag and view the Milky Way as it stretched across the sky. He also saw Halley's Comet and an eclipse when very young, though he got into trouble for looking directly at the sun. In 2000 he witnessed a meteor shower in Port Douglas which he describes as a phenomenal experience.

▲ *(Andy and Elli Hasler beside their telescope while attending Nova East 2015. (Photo: Tony Schellinck)*

In 2009 he moved to Halifax and for Christmas 2010 gave Elli a 4-inch telescope. They used the scope to explore the moon. They then borrowed an 8" SC and viewed Jupiter and its moons as they transited across the face of the planet, as well as seeing the Orion Nebula from their backyard on Herring Cove Road. In 2012 Elli suggested they attend RASC meetings in Halifax and they joined the society. Since then they have been out to the Saint Croix Observatory three or four times and have used the 16-inch scope there. They finished the Nova course presented by Sean Dzafovic and as of last summer they had almost completed the Visual Astronomy for New Observers course available on RASC National's website. They have become involved in the society taking on the role of librarians for the chapter and thus members of its executive.

They recently acquired two telescopes, an 8" Celestron Neximage and a 114-mm Newtonian on a Virtuoso mount. They find they use the smaller scope much more often because of its portability and ease of set up. Andy has been inspired by Blair MacDonald's photography and so has taken photos of the moon, a comet last December, and of various nebula. When visiting his parents in Inglewood in central Victoria (Australia) he took a time-lapse photo with a 9mm wide-angle lens of the Milky Way which he posted to YouTube. He has purchased Alan Dyer's recent book which provided guidance when taking this photo. He is interested in shooting with the wide-angle lens as it easier to use, less fussy to set up, and he can go anyplace and use it. The resulting photos are very rewarding as he can share them using his iPhone.

Elli still prefers visual astronomy. They read the stories associated with the constellations and then they both go out and explore them in the night sky. Andy says that when he looks up in the night sky it takes him away, he realizes how small we are and that up there, there are other life forms and they may be thinking the same thing. He feels the discovery of exoplanets is exciting stuff and could lead to the discovery of other life. He wants to share that sense of discovery and in effect become part of it.

▲ *Patrick Kelly operating the star projector in the Halifax Planetarium— see story page 6. (Photo: Tony Schellinck)*

Starlight and Semiconductors: Astrophotography at Outreach Events

Art Cole

The Chinese philosopher Lau Tzu said, "Even the longest journey must begin where you stand", and in the case of astrophotography, this adage can be taken quite literally. In this age of smartphones containing digital

▲ The Moon: 8" SCT and iPhone 4s *(Photo: Art Cole)*.

cameras, people attending public viewing events can take their first-ever astrophotos by simply stepping back from the telescope, holding their smartphone up to the eyepiece, and hitting the shutter button. Whether or not they decide to become more involved with astrophotography is up to them, but it's a fun, easy way for astronomy newbies to take their own astrophoto, and is a great tool for outreach.

So what can we do, as astronomy's ambassadors, to help people more easily take these shots at public viewing events? The first thing we can do is learn how to do it ourselves, and do it quickly. While taking cellphone snapshots isn't the most difficult thing to do, on a public observing night when there are more people than scopes it's important to make sure that one person isn't tying up your telescope for too long. The biggest problem with taking cellphone snaps at the eyepiece is that there are many degrees of freedom that need to be simultaneously controlled, all while trying to press the shutter button. The optical axis of the camera has to be aligned with the optical axis of the eyepiece, the camera exposure has to be set so that the image isn't overexposed, and the phone needs to be held steady without touching the telescope. The easiest strategy I've found to overcome these problems is to just hammer away on the shutter button while doing my best to hold the phone in place, and then keep the best images.

▲ A moon crater: 8" SCT and iPhone 4s *(Photo: Art Cole)*.

▲ Jupiter with bands: 8" SCT and iPhone 4s *(Photo: Art Cole)*.

To eliminate most of these problems, commercial eyepiece/smartphone adapters are available and reason-

ably priced, and will allow people to take the best images. Bear in mind, however, that setting up one of these adapters for someone's smartphone can be time-consuming. In order to keep people busy at the telescope I would advise setting up the adapter off of the telescope and then swapping it in when it is ready to go

▲ *Jupiter and three of its moons:* 8" SCT and iPhone 4s *(Photo: Art Cole)*.

– that way people can continue to look through the scope while someone is setting up the adapter. Another key benefit of these adapters is that a group of people can all look at the phone's display at the same time, allowing you to describe what is there to several people at once.

Target selection is another important consideration. The Moon is the most obvious and delightful target for beginners, producing Facebook-ready images that are packed with detail. Maria, mountains, and craters all stand out and amaze people who have never taken an astrophoto before. But it doesn't end with the Moon – there are a number of planets that smartphones can image, including Venus, Jupiter, Saturn, and Mars. While these planetary images won't have the same eye-popping quality that moon shots have, people are shocked to see that they have just taken a photo of a planet and can see belts, rings, phases, or ice caps. Make sure, though, that you install a Moon filter on the eyepiece – the Moon and planets all have a high surface brightness and can easy be overexposed by a smartphone camera.

So at your next public observing night, why not give it a try? You can use almost any type of telescope to do this (I've done smartphone imaging through equipment ranging from 7x35 binoculars to the 60" telescope at Mount Wilson Observatory). You just might plant the seeds of astrophotography in someone!

Any questions? Contact me at art.cole@gmail.com.

▲ *Karl Penny (left) showing the Sun at Keji Dark-Sky Weekend 2015. (Photo: Tony Schellinck)*.

Sincerest Thanks

I have always felt that I had acquaintances and colleges but seldom friends. Perhaps this was because my best friend was always at my side, no matter the adversity or hardship, no matter the joy or excitement. When tragedy struck I was lost, yet amidst the pain I received comfort and support from an unexpected source. I and my sons cannot begin to express our thanks and gratitude for the kind words and support that I have received from my 'friends' at RASC. The strength of your words and support has allowed me to once again step into my life and continue on with what I have always enjoyed and cherished. My sincerest thanks and gratitude for all your support.

Thank You All

Paul Heath

November Meeting Report

Jim Millar

The regular meeting of the Halifax Centre Royal Astronomical Society was held at 7:30 at St. Mary's University.

The President reminded everybody that the December 11th meeting would be the Annual General Meeting. This served as official notice of the meeting.

The list of executive positions was shared and the president called for nominations. Those who were reoffering were mentioned and those who were not were thanked for there service. The president suggested that anyone who was interested in any of the positions could contact him before the next meeting.

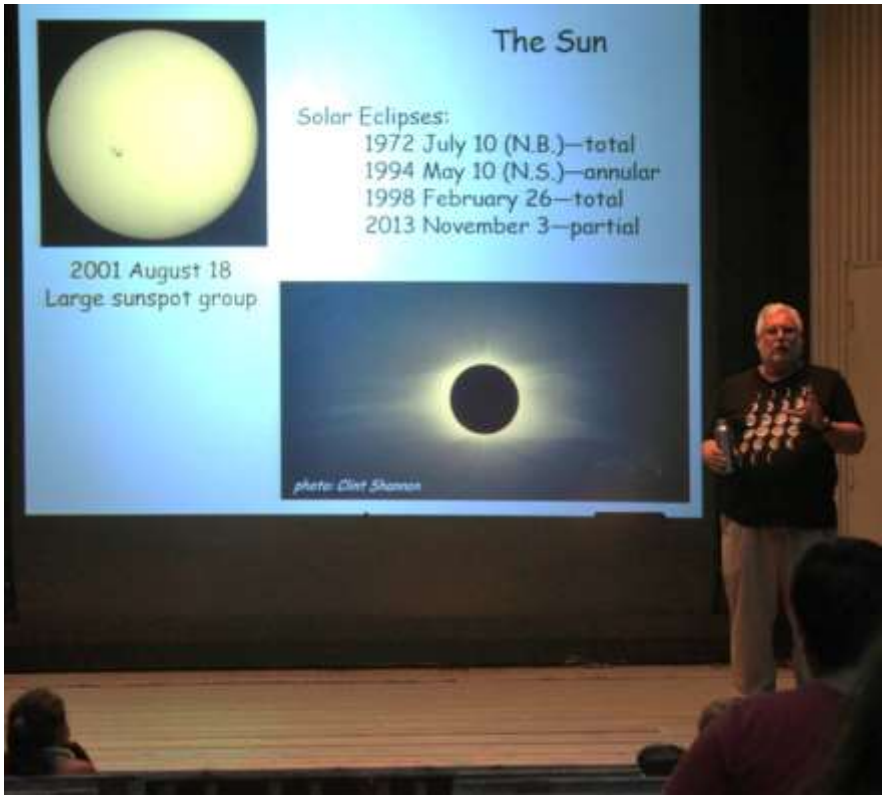
There was a short presentation on Nova Notes. This is the Centre's regular publication that covered recent events and had some great educational materials. It is available as a pdf online and also as a hard copy for $17 per year. Members should have a look.

Dan Majess gave a short presentation on his work with the VVV Survey. It is a study of Cepheid variables that are used to determine distances in the universe. The survey is carried out in the near infrared.

Blair MacDonald then gave a short talk on the differences between three DSLR cameras that he and Art Cole had used. The comparison was between the Canon 60Da, the Canon 7D MkII and the Nikon D810a. These were all excellent cameras for astrophotography and there was not much to choose between them.

The meeting ended with the usual treats and the President showed a slide show of pictures that had been shared on the RASC list.

▲ *John McPhee is a happy camper at the Keji Dark-Sky Weekend 2015. (Photo: Tony Schellinck).*



▲ *Dave Chapman was the keynote speaker at the 2015 Keji Dark-Sky Weekend. He covered fifty years of astronomy experience, and told us how he become somewhat famous for rediscovering the Lunar X during Nova East in 2004. A Google search of "Lunar X Chapman" takes you to http://the-moon.wikispaces.com/Lunar+X which relies heavily on Dave's* 2007 article **The Lunar X Files: a fleeting vision near the crater Werner** in the *Journal of the Royal Astronomical Society of Canada (Photo: Tony Schellinck).*