

Nova Notes



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

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Front Page Photo: **Zodiacal Light**
Keith Walker February 22nd 2014
Canon 350D (modified), 18-55mm lens @
18mm, f/4, ISO 1600, 4 frames @ 30 sec
each, Stacked in DSS, Processed in PixIn-
sight

From the editor *Quinn Smith*

There are a couple of things I would like to draw your attention to this month.

The first is the April meeting where Dan Falk will give a presentation about his new book "The Science of Shakespeare". This meeting will be advertised to the general public (see page 11)

The second event is the annual spring work party at SCO (see page 3). This is a chance to give back a little to our Centre observatory and have a little fun in the process. Being in April (assuming the snow has gone) the bugs won't have returned from their Florida vacations.



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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:

April	25th	2014	July	25th	2014
May	30th	2014	August	Nova East	
June	27th	2014	Sept	26th	2014

Meetings begin at 7:30 p.m. at Saint Mary's University in room AT 101.

April 17th 2014 (Thursday—note day change)

Our guest speaker will be author Dan Falk who will talk about his book "The Science of Shakespeare".

May 23rd 2014 (Note week change)

Our guest speakers will be Dave Chapman and Cathy LeBlanc will present "In Search of the Thirteenth Mi'kmaw Moon".

June 19th 2014 (Note location change)

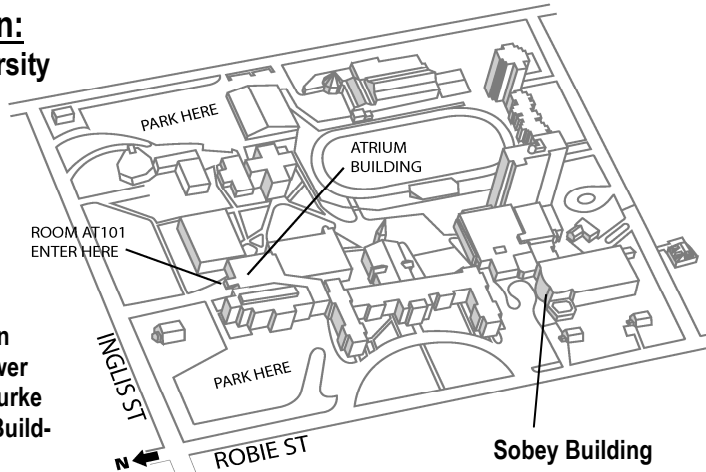
The June meeting will be held at the St Croix Observatory (or in our usual room if weather is bad).

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. New starting time is 7:30 p.m.

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

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Keji Dark Sky Weekend

August 15th-17th

This year's Keji Dark Sky Weekend will take place on the weekend of August 15th-17th 2014 (the weekend before Nova East). This is the fourth in the Parks annual astronomy focused weekend events.

Events kick off on Friday night with public observing at the Sky Circle. Saturday's keynote speaker is Mary Lou Whitehorne, and her talk is enti-

itled "This Amazing Place." This will be followed by a sky tour at the Sky Circle and then public observing.

Camping for the weekend books up quickly. The booking web site opens April 14

<https://reservation.pc.gc.ca/Kejimkujik>

Looking forward to seeing the many Halifax Centre members who enjoy not only a wonderful Park but also magnificent skies.

Photo by Chris Green



Nova East Star Party

August 22nd-24th

Plans are completed for this year's Nova East Star Party. As usual it will be held at Smileys Provincial Park (near St. Croix).

This year our guest speaker will be Prof. Rob Thacker from Saint Mary's University. In his keynote talk, on Friday night, Prof. Thacker will be discussing the next generation of astronomical instruments and what we might discover with them.

The Nova East web site may be found at <http://halifax.rasc.ca/ne> and the registration form at: <http://halifax.rasc.ca/ne/reg.html>

This year we have some great door prizes, the grand prize being an eight inch SkyWatcher Dobsonian telescope. Remember you have to be there to win!

We have had some great weather in the last few years, and the organizers are looking forward to another enjoyable weekend of observing and fun.



SCO Work Party

April 26th (subject to change)

The Centre observatory at St. Croix always needs a little tender loving care once in a while. We traditionally have a spring work party to do a little maintenance ("What spring?" I hear you ask!)

Our SCO Observing Co-Chair, Alex LeCreux, has suggested Saturday April 26th as a good day (assuming the weather is OK). It's also the backup day for the April observing night.

Alex suggests hours of 11am to 4pm and he will be there the whole day. Folks wouldn't have to commit to the whole time, whenever and whatever you could contribute would be appre-

ciated. Please keep an eye on the "list" as all plans are subject to change.

Many of us enjoy using the equipment and facilities out at SCO and it is a wonderful resource for the Halifax members. So please help out if you can, and if you need more info, contact Alex at:

alecreux@eastlink.ca

In Search of the Thirteenth Mi'kmaw Moon

Dave Chapman

For those that attend monthly RASC Halifax meetings, you are in for a treat at the May meeting (note: this year on the 4th Friday, May 23). Longtime RASC member Dave Chapman is teaming with Acadia First Nation member Cathy LeBlanc to present "In Search of the 13th Mi'kmaw Moon." (Cathy is also a seasonal cultural interpreter at Kejimikujik National Park and National Historic Site.)

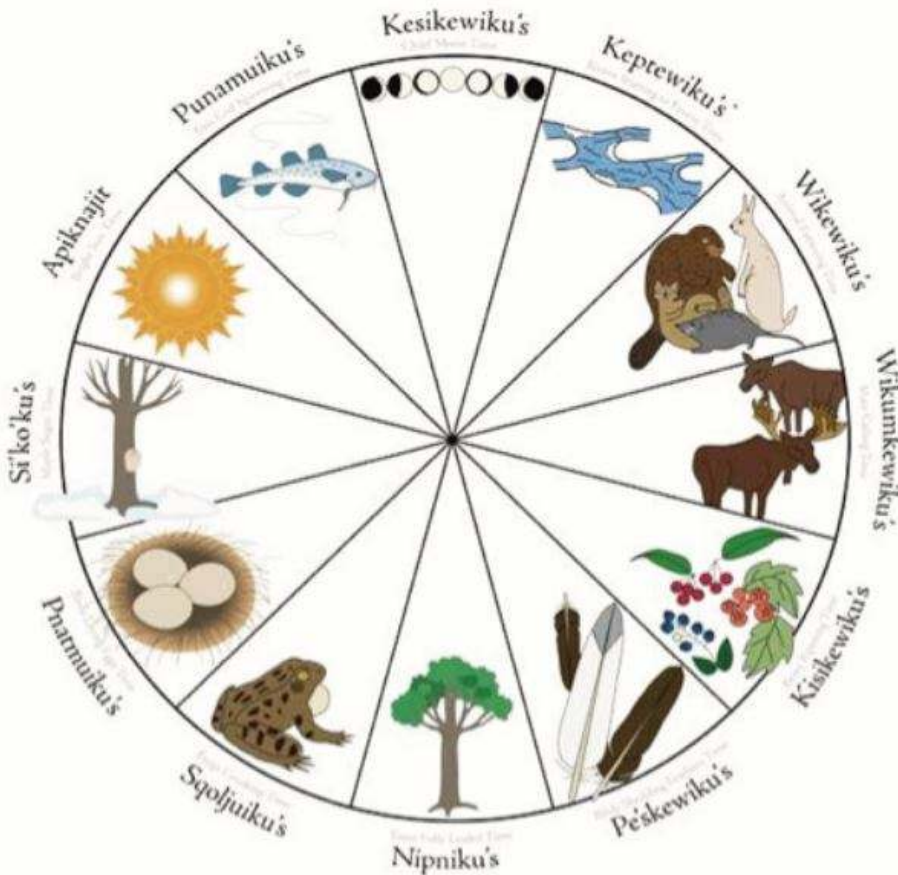
This presentation is a progress report on a joint project by Cathy and Dave to investigate the traditional time-keeping customs of the Mi'kmaw nation, before contact with Europeans. Much of this knowledge—handed down by oral tradition—has been lost over the ensuing four centuries. Today, thanks to research by Cheryl Bartlett and others at Cape Breton University, the names of the moon-times have been resurrected and applied to the 12 months of the Gregorian Calendar—but there is more to the story!

Twelve synodic months of 29.5 days (Full Moon to Full Moon) only adds up to 354 days, 11 days short of a solar year. Each year, the Moon phases occur about 11 days earlier than the last. This is not a problem in itself, but for one fact:

most of the 12 Mi'kmaw moon names refer to seasonally specific environmental events, such as the running of the maple sap, frogs croaking, moose calling, and so on. If one simply applied the 12 names in succession, by rote, the moon names would quickly become out of synchronization with the seasons.

It is as if the lunar clock is ticking faster than the solar clock. This problem occurs throughout the world, and the typical solution is to insert a 13th moon name every two or three years, to keep moons in line with the Sun. These luni-solar calendars are widespread, and there is reference to them in the anthropological literature, specifically in relation to the North American aboriginals. In the May 23 talk, Cathy and Dave will present what they have discovered so far, using a research method known as "Two-Eyed Seeing," whereby the traditional teachings guide the astronomical investigation and the astronomical facts are used to interpret the traditional teachings.

This joint presentation by Cathy and Dave is sure to be memorable—don't miss it!



HALIFAX
CENTRE

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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.

February Meeting Report

Editor

The February meeting was hosted by our President Paul Heath. As has become our new norm, the meeting began at 7:30 p.m. instead of 8 p.m. and Paul began the meeting by reading a poem from his series “Food for the Soul”.

The meeting was quite well attended, with 32 members and guests. Paul opened the meeting by welcoming new members and guests, introducing the Executive, and explaining the advantages of RASC membership.

Paul then mentioned the upcoming Outdoor Sports and RV Show in which the Centre was going to have a booth. Quinn Smith had agreed to organise the display, and would be calling on volunteers to work in the booth (show report on page 11).

Paul presented two Explore the Moon certificates, one to Jim Millar and one to Paul Evans (sorry Paul, I lost the



Paul Heath presents Jim Millar with his Explore the Moon Certificate

photo of you receiving the award).

Paul then introduced the theme for the evening, namely light pollution, its effects and its solution. The first presenter for the evening was Quinn Smith, who gave an outline of the process and history whereby Kejimikujik National Park and Historic Site became (with the Halifax Centre’s help) Nova Scotia’s first Dark Sky Preserve. A detailed description of this talk can be found on page 6.

Paul Heath then gave a talk about the causes, effects, and remediation of light pollution. Paul started his talk by showing a satellite view of light pollution in North America, pointing out that here in Nova Scotia, we have some of the darkest skies on the eastern seaboard. Paul then briefly discussed the causes of light pollution and how these caused could be reduced or eliminated.

- **Glare:** visual discomfort from unshielded bright lights. This is not only uncomfortable, but is a safety concern (especially for drivers). Glare can easily be reduced or eliminated with the use of adequately shielded lighting fixtures.
- **Light trespass:** Light that shines where it is not intended or needed (such as onto a neighbour’s property). Light trespass can result in inconvenience and poor sleep if it encroaches into a sleeping area. Again this light trespass can be easily eliminated with the use of properly designed fixture that aim the light only where it is required.
- **Sky Glow:** Light that is directed (or is reflected) upwards from the excessive use of lighting (usually industrial and roadway lighting). Properly designed lighting fixtures, and limiting the total usage of lighting can dramatically reduce sky glow.

Paul finished his talk by summarising

some of the things the RASC and the Halifax Centre are doing to not only reduce light pollution, but to raise public awareness of the problem.

Sean Dzafovic then gave the monthly “What’s Up” segment, explaining what would be visible in the night sky in the coming month. Sean bases his segment by referencing the “Explore the Universe Certificate”.

The meeting ended with our usual discussions and socialising over cookies and soft drinks. A very pleasant meeting.

Food for the Soul—Paul Heath

Stolen Night

*In fear we learned to tame the light,
Held fast against the darkening night.
In fear we learned to hold the light,
Held high against the darkening night.
And Wonder waited, as Eons pass.*

*In pride we tamed the night,
And held darkness far from sight.
In pride we stretched the day,
Until the night began to fade away.
And Wonder waited, as Ages pass.*

*Then came a time, when stories told,
Of days . . . that could grow old
And nights so dark, no light could shine,
And darkness held all night entwined.
And Wonder waited, as Years pass.*

*Yet a few had withheld the call,
And stayed in darkness throughout it all.
To seek the meaning of the sight,
Of all the Wonder that was the night.*

*Now our wait we hope shall end,
As many now, seek our fears undone.
And with our Stolen Nights renewed,
We feast on Wonders as in Eons past.*

Keji —A Brief History of a DSP

Quinn Smith

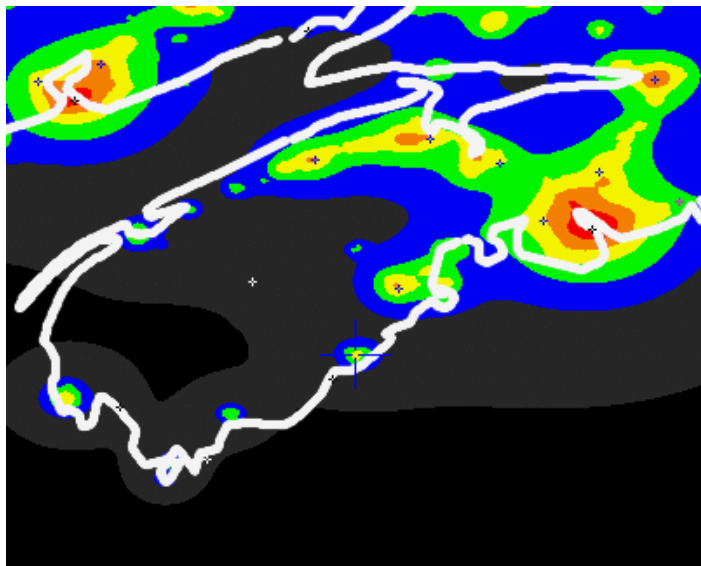
Paul Heath asked me to give a short presentation of the events leading up to the declaration of Kejimikujik National Park and Historic Site as Nova Scotia's first Dark Sky Preserve. I realised that most of our members did not know how Keji became a DSP, and thought it would be of interest to present it in the pages of Nova Notes.

It all began in 2008 while we were discussing plans for the upcoming International Year of Astronomy in 2009. I was the Chair of the IYA organising committee and amongst all the plans for IYA I thought it would be good to have a few "legacy" projects—ones that would extend well beyond IYA.

The three legacy projects we selected were:

1. Help Dalhousie University get the planetarium back as a regular public feature.
2. Start an astronomy web site that would make it easy for the general public to find out about all astronomy events taking place in Nova Scotia.
3. Create a DSP in Nova Scotia

The planetarium was easy! In fact no sooner had we decided on this project, Stephen Payne of Dalhousie University came to me with exactly the same thought. I wish I could take credit for this, but it was all the work of Stephen. The planetarium now has regular bi-weekly public shows, supported by several members of the Halifax Centre. Last year there were over 3,200 people attending shows at the planetarium. Good job Stephen!



A light pollution map of Nova Scotia. Keji is the small cross just to the left of centre.

Although I am an internet and computer Luddite, I was surrounded by many people far more knowledgeable than myself. Thanks to Saint Mary's University, and Rob Thacker in particular, the Astronomy Nova Scotia web site was set up, and remains an effective "point of contact" for all things astronomical in Nova Scotia. Thanks to Dave Chapman who currently maintains this site.

As for the DSP—are you sitting comfortably? then I'll begin.

To be honest, I didn't know where to begin with this project, and I thrashed around through most of 2008 looking for a good location. Dave Chapman joined me in the quest for a DSP and suggested Keji. I had never been to Keji, and I also didn't know that Keji had been suggested years ago as an exceptional dark sky location. We visited Keji in the early spring of 2009 and agreed that it would make an excellent DSP. The question was—how to approach the Park, since the driving force for Keji to become a DSP would have to come from them. All we could do was to guide and support them. I must have written a dozen or more e-mails to the Superintendent of the Park—none of which were sent, as they just didn't feel right. I suspected that this would be a hard sell to the Park, and I was sure that we would only have one opportunity to convince them that this would be a good idea. It had to be a great e-mail!

Well after several months of dithering, I met up with some of the folks from Keji at the 2009 Sports and RV Show (where we both had booths). I resolved that weekend to "damn the torpedos" and just send an e-mail. And that's what I did. It wasn't a great e-mail, rather I just blurted out the idea of a DSP and suggested a meeting to discuss.

Remember the happenstance of Stephen Payne contacting me about the planetarium, just as I was about to contact him? Well serendipity raised her wonderful head again. The superintendent of Keji (Harry Delong) had just returned from a national conference of Park Managers, where they discussed ideas for getting more people into the Parks and increasing the recourses that Parks could offer. In this conference they discussed DSPs!

Harry Delong arrived to his desk at Keji on Monday morning to find my E-mail suggesting that Keji should become a DSP. We were off and running, although at the time Dave and I did not know about this lucky coincidence concerning the DSP.

A meeting was arranged in May of 2009 and Dave and I went down to Keji to give our presentation to the principle Keji staff. Dave gave the opening remarks, linking astronomy to the strong Mi'kmaw history of the Park. Then it was my turn to outline what was involved and what the benefits would be to both the Park and to the visitors.

I was about five minutes into my presentation when Harry, stood up, thanked us, but apologised for having to leave half

way through the presentation. I was crushed!

As Harry was walking out of the room he turned to his associate, Jonathan Sheppard, and said “I’ve heard enough Jonathan, make this happen”. And that was that! Keji was on the road to becoming Nova Scotia’s first DSP.

Jonathan Sheppard was an excellent choice to put in charge of the project. He was enthusiastic, diligent, organised, and very, very capable. Dave and I both agree that the speed and success of the project was in no small part due to Jonathan.

Dave and I had several meetings over the summer and fall with the staff at the Park, discussing lighting, outreach, observing sites and DSP requirements in general. I must say what a pleasure it was to work with everyone at Keji, working towards a single goal.

My first surprise (remember I didn’t know Keji very well at that point) was that there were not a lot of obvious locations where there was a good overall view of the sky. Too many damn trees, which for some reason the Park staff were unwilling to clear cut for us! Eventually several good locations were selected, the main one being where the Sky Circle is now located.

In fact the Sky Circle, was suggested by Dave early on in the discussions, and although it took a couple of years, it was designed, built and implemented by the Park staff without much input (other than the original suggestion) from us. A great sense of commitment by everyone at Keji.

Jonathan wrote the DSP application over the winter and spring of 2009/10, while at the same time the Park continued to make the required improvements to the lighting and infrastructure. Dave and myself had conducted a thorough lighting audit during that winter, and that was used as a road map for the improvements.

By the late spring of 2010, the application was submitted to RASC National, which approved the application in June. I must say the Jonathan wrote what we consider the “gold standard” of DSP applications, which included both the current status of the Park, and future plans and improvements. It also included (new to applications at that time) a requirement for our Centre to monitor and audit the Park over the next four years (as a minimum).

I’m glad to say that, despite some critical reduc-



A view of the southern sky from Peter Point, Keji (photo: Andrea Misner)

tions in budget for the Park in recent years, the current superintendent, Eric LeBel, is very supportive to the DSP and its goals, and the Park has integrated the whole concept into its day to day activities.

So there you have it! Kejimikujik National Park and Historic Site, a Dark Sky Preserve and a wonderful place to enjoy the beauty of the Nova Scotia wilderness and the wonders of some of the darkest skies in North America.

Dream BIG!



July 2010, Mary Lou Whitehorne (then RASC President) presents the DSP certificate to MPP Hon. Gregg Kerr at the declaration event at Keji

Touring the Southern African Large Telescope

Tony Schellinck

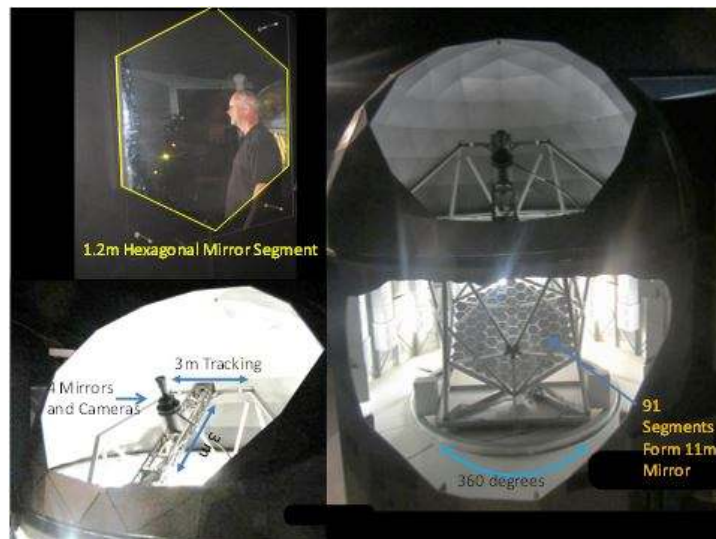
In January, 2014, with my business partner, Tracy Schrans, I attended a workshop in Cape Town South Africa, on the topic of risk due to gambling. Although Tracy is not particularly interested in astronomy I convinced her to venture into the wilderness of South Africa to visit the Southern Africa Large Telescope (SALT) located 370 km North West of Cape Town.

On the way, we stopped at a game reserve for a five hour safari and then spent the night in Sutherland, the small town located 12 km from SALT. After a fine dinner in Sutherland we headed to the outskirts of town to attend an 8 p.m. stargazing session put on by Jurg Wagner at the Sterland Observatory. We and fifteen or so other visitors, were treated to a very enjoyable two hour tour of the southern sky through several 11 inch telescopes.

The next morning we drove to the South African Astronomical Observatory where SALT and about twenty other smaller telescopes sit on a hilltop, 1,800 metres above sea level. The tour began at the Visitor Centre which has several rooms of exhibits and models explaining the workings of SALT and the scientific work that goes on there.

SALT is an ~11 metre telescope comprised of 91 individual 1.2-m hexagonal mirrors whose innovative design is modelled on the Hobby-Eberly Telescope (HET) in Texas. With a

mirror this size, one could see a candle flame on the Moon. Remarkably, despite having one of the largest telescope mirrors in the world and the largest in the southern hemisphere, it cost one tenth as much to build (\approx \$35M) as similarly sized telescopes. Its unique design enables it to track objects in the sky by moving the secondary mirrors above the big mirror itself; other large telescopes require substantial amount of expensive technology to support and move the big mirror smoothly and accurately as it tracks.



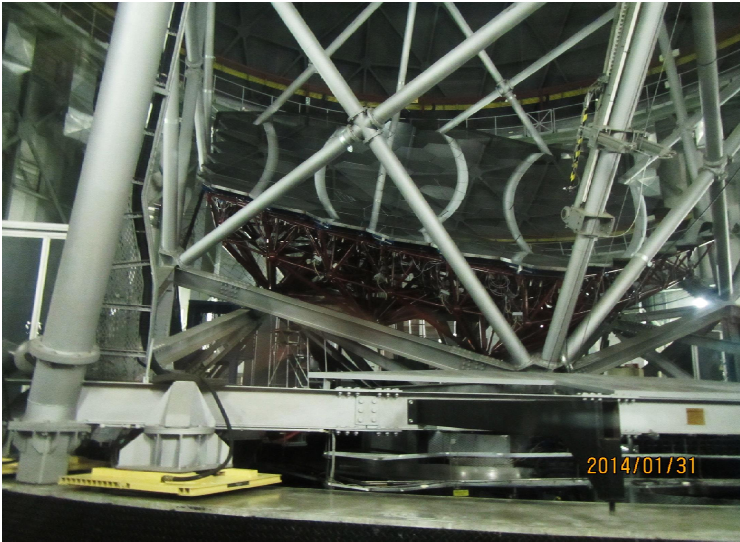
Precise pointing and tracking are handled by the moving optical corrector assembly and instrument payload at the top of the telescope tube

The SALT design is optimised for spectroscopic measurements with median seeing of 0.9 arcsec FWHM (full width half maximum).

SALT is constructed such that the light is reflected off the big mirror to four cameras, each designed to take photographs at different wavelengths of light. The cameras slowly track above the mirror so that the reflected image of the objects is stationary in the cameras for up to three hours at a time. The mirror is fixed within its supports, always pointing 53° above the horizon, but with the cameras moving it can see objects between 47° and 59° above the horizon. A very innovative design allows the mirror and payload to be rotated 360° on its four legs via eight air bearings. These are small hovercraft-like pads that lift the entire unit about two centimetres above a concrete floor and enable it to rotate and point in any direction. To track an object the mirror is rotated in azimuth to the point where the object is just coming into view in the mirror, they track it for one to three hours, then they rotate the mirror another ten degrees or so and to continue photographing the object.



A view of the telescope building, dome and alignment tower



A close up view of the air lift bearings used to help rotate the telescope (all photos: Tony Schellinck)

From a visitor observing room at the base of the ‘scope we were shown all of the equipment, and watched in awe as the technicians rotated the mirror in preparation for its weekly calibration and alignment. The tour concluded with our guide showing us the other twenty telescopes owned by researchers from around the world who use this site. Most of these scopes range in size from 0.5–2 m. My favourite, however, was the Kilodegree Extremely Little Telescope (KELT) which has a 4.2 cm aperture, wide field (26°) telephoto lens and, along with its northern counterpart, has found three exoplanets.

All in all, the night viewing at the Sterland Observatory and the visit to SALT and the OSSA in Sutherland were well worth the two days of travel for the novice and this slightly more knowledgeable visitor.

Advisory Council Report

Pat Kelly

Hi everyone:

There was a teleconference meeting of the National Advisory Council last weekend. Here are some of the items discussed that may be of interest.

Social Media:

Roland Duchesne (chair of the membership and development committee) reported on his use of paid advertising for a Facebook page and a Meet-up group, both the generate interest in astronomy in the Lethbridge area and for publicity for the Sarnia Centre. Both seem to be have been worthwhile efforts (For Meetup, the cost is \$72 per six months (might be a discount for first time advertisers).

Centre Event Banners:

We now have the ability to banner lines for Centre events added to the national web page.

Green Laser Pointers:

There is now a lot of information on the use of green laser pointers, including a “sanctioned” RASC position that can be sent to any local media in the event of a local incident. Look in

Members Area: Education: Other Resources: Green Laser.

Beginner's Observing Guide:

The BOG is sold out! This will have a revenue effect as we do not have a new version at the moment. Unlike the other Society publications, most of the layout, etc, that was done for the BOG was done at the press. We just received the files from the press (likely done in “InDesign”) so it should be possible to do another run. There was a lot of discussion (including some online after the meeting) on whether we should reprint the last version as a stopgap measure and what direction a new version should take.

Budget:

Finances are showing a significant deficit this year although that is with conservative projections in most areas. There are a number of projects underway to bring in new revenue and some projects may be postponed. There may be a modest fee increase to the Society part of the fee in order to cover upcoming increases to postal costs, once they are known. The final budget will be set at the Board of Directors meeting which will be held this coming weekend.

Board Elections:

There will be a unique election this summer for members of the board of directors. Because of the transition between the old and new governance structures, this will be the only time that all positions will be open. The top three vote getters will be elected for three year terms, the next three vote getters will be elected to two-year terms and the next three vote getters will be elected to one-year terms. After that, there will normally be three positions. Details can be found at: <https://www.rasc.ca/news/call-nominations-2014-rasc-board-directors>

2014 Victoria General Assembly:

For those planning to travel to the Victoria General Assembly, the web site is now open for registration. The early bird rate of \$130.00 is available until March 31, 2014. From April 1, to May 15, 2014, the registration fee is \$145.00. From May 16, 2014 onward the registration fee is \$155.00. A companion option is available if you are bringing someone other than you to the General Assembly but your companion MUST be registered separately. Details are at: <https://www.rasc.ca/events/>

March Meeting Report

Editor

The March meeting, held at our usual time and location, was well attended by 39 members and guests.

Paul Heath opened the meeting at 7:30 p.m. with another poem from his series “Food For the Soul”. After welcoming members and guests, and introducing the Executive, Paul indicated that this meeting (or at least the “formal” part of the meeting) would be shorter than usual, as we were going to tour the Burke Gaffney Observatory, located on the roof of the Loyola Residence building at SMU.

Paul briefly discussed some of the observing programs available through the RASC. He handed the floor to Dave Chapman, who is the co-author of the new Lunar Observing Program, which although is not (quite) yet an official RASC program, will be soon. Dave briefly outlined the program, and said that if anyone wanted more infor-

mation or wanted to be involved in testing out the program, they should contact him at:
dave.chapman@ns.sympatico.ca

The next order of business was to award Greg Dill his “Explore the Moon” certificate. Greg was actually eligible for the award in February, but was not able to attend the meeting.

Paul then introduced the speakers for the evening.

The first speaker was Tony Schellinck who talked about his recent visit to the Southern Africa Large Telescope, located NW of Cape Town, South Africa. His talk was excellent and very interesting. Rather than summarise it in this report, Tony wrote a short article, which can be found on page 8.

Paul then gave the floor over to Dave Lane, who is the author of the ECU (Earth Centred Universe) planetarium program. A slightly limited version of this planetarium software is available to all Observer’s Handbook owners (see the inside front cover of the Handbook).

Dave gave a short introduction to the software and explained how to use some of the features of the programme. ECU is a great planetarium programme and all RASC members should have it available on their computers! Dave indicated that these short guides to using ECU will be a semi-regular feature of our meetings.

The final speaker for the evening was Sean Dzafovic who gave the “What’s Up?” talk for the month. Sean uses the

“Explore the Universe program to highlight items of astronomical interest for the next month. <http://www.rasc.ca/explore-universe>

Sean also reminded us of the upcoming total lunar eclipse which can be seen in the morning of April 15th.

With the formal part of the meeting completed, the group headed off to tour the Burke Gaffney Observatory. The observatory has recently been upgraded with a new instrument. For more information about the Observatory, or to arrange tours, please go to:
<http://www.smu.ca/academics/departments/astronomy-physics-burke-gaffney-observatory.html>

After the tour, refreshments were served and many members spent the next few minutes getting lost as they attempted to find their way back to the Atrium building!



Paul Heath awards Greg Dill his Explore the Moon Certificate (binoculars)

Food for the Soul—Paul Heath

Eyes are not enough

Our Eyes were not enough
To reach the depths beyond
Or delve the depths within.
Our Eyes are not enough.

We polish glass and mirror
And aim at darkest night
And gather, far distant travelled light.
Our Eyes are not enough.

Too soon the Sights are common place
And wonders now, stretch far beyond
our sight
As darkness, fades from within the night.
Our Eyes are not enough.

Polished glass now out spans our reach
As Searches rest in highest, driest air
Alters, holding fast to darkest night.
Our Eyes were not enough.

As Pilgrims, now through darkest night
We fill the depths within, with light
And yet, as time fills up our sight
We know, Our Eyes . . . are not Enough.

RV Show

Editor

I would like to thank all the volunteers who gave up their time to help out at the RASC booth at the Outdoor Sports and RV Show that was held on March 7th–9th at Exhibition Park.

Over the course of the three day event, over 24,000 visitors attended the show and by my best count we had over 500 people stop at our booth and talk to us about astronomy

We gave out over 200 star finders (we were being careful about giving out too many star finders), over 100 Moon Gazer's Guides and over 100 Halifax membership brochures. All in all, a successful show and a great chance to

educate people about astronomy, responsible lighting and the Halifax Centre.

Thanks again to: Jerry Black, Jim Millar, Sean Dzafovic, Pat Kelly, Dave Chapman, Michele Arenburg, Melody Hamilton, Paul Heath, Phil Bentley, Robin Clayton, Art Cole, Wes Howie, Megan Milner, and Ian Anderson.



Happy campers at the RV show! From left to right, Wes Howie, Megan Milner and Art Cole

For Sale

Meade 2080 LX5 8-inch (200 mm) F/10 Schmidt-Cassegrain telescope: Fork mount, 2-inch visual back, 2-inch star diagonal
9 x 60 right-angle finder scope, Motor drive and Declination motor, Piggyback camera adapter, Counterweights, Battery pack, car adapter, AC converter (110V AC to 12V DC.), Equatorial wedge and tripod, Storage trunk and all original documents **\$600**

Eyepieces (1.25-inch):

Meade Super Plossl 40 mm	\$20
Meade Super Plossl 26 mm	\$20
Meade Super Plossl 15 mm	\$20
Meade Super Plossl 9 mm	\$20
Televue wide field 19 mm	\$50

Filters

Thousand Oaks 8-inch, full aperture, glass solar filter with aluminum cell	\$45
Lumicon Deep-Sky filter	\$40
Orion SkyGlow filter	\$40

Accessories:

Lumicon Easy Guider (F6.2 focal reducer)	\$50
Spectra Duo-view and SureSharp ronchi screen/knife edge astrophotography focuser	\$50

Contact Mary Lou Whitehorne at: mlwhitehorne@eastlink.ca

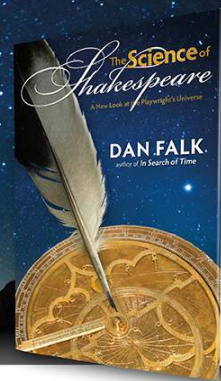
Science has given us
a new world and
Shakespeare
illuminates our place within it.

Thursday, April 17, 7:30 p.m.

Saint Mary's University
(Atrium Building, Room AT101)
923 Robie Street, Halifax, NS

Explore the changing conceptions of the cosmos through the works of Shakespeare and the eyes of author DAN FALK.

This is a free event and open to the public. Books will be available for purchase.



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Cosmic Debris

Odds and Sods from the world of astronomy and astrophysics

Ripples in Space-Time?

The following is a partial reprint from an article by New Scientist. For the complete article please go to:

<http://www.newscientist.com/article/dn25235-first-glimpse-of-big-bang-ripples-from-universes-birth.html#.UzsVnqJnBP0>

Waves in the very fabric of the cosmos are allowing us to peer further back in time than anyone thought possible, showing us what was happening in the first slivers of a second after the big bang. If confirmed, the discovery of these primordial waves will have rippling effects throughout science. It backs up key predictions for how the universe began and operates, and offers a glimmer of hope for tying together two foundational theories of modern physics. It might even net the discoverers a Nobel prize.

The waves in question are called gravitational waves and are produced when a massive object accelerates through the fabric of space-time, causing ripples. They appear in Einstein's highly successful theory of general relativity although they have never been directly detected.

Today, scientists working with the BICEP2 collaboration at the south pole announced the first clear sign of gravitational waves, found in maps of the earliest light emitted after the big bang. The distinctive swirls made by the waves are more pronounced than the team expected, because models had suggested that gravitational waves from this early era would be incredibly weak and perhaps even undetectable.

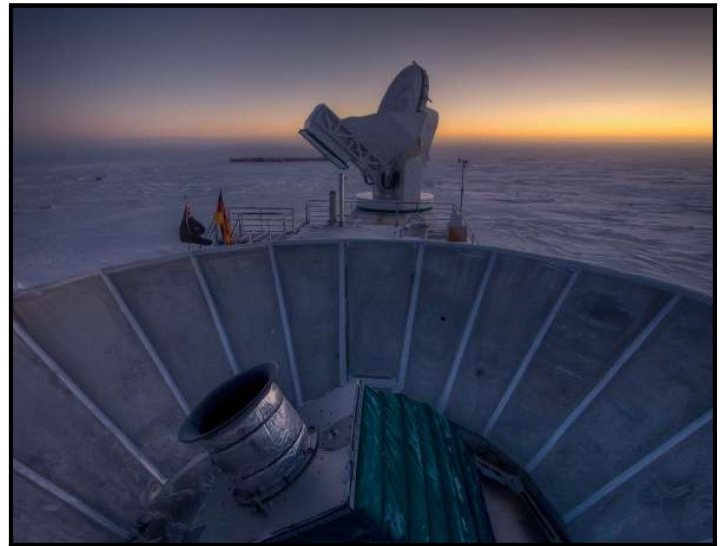
The team has spent three years ruling out alternate explanations, such as dust in our own galaxy, distortions caused by the gravity of more distant galaxies

and errors introduced by the telescope itself. In a pair of papers they report a confidence level greater than 5 sigma. In other words, the odds of seeing this signal by chance are less than 1 in 3.5 million.

"It is absolutely mind-boggling that we've actually found it," says team member Clement Pryke at the University of Minnesota in Minneapolis. "In my heart, I did not expect it. I thought we would do this because there's good physics to be done, and we'd prove that the signal was so small that it wasn't worth trying any harder. Instead, it is loud and clear."

The papers have not yet been formally reviewed for publication in a journal, although they will appear on the widely used physics preprint server arxiv.org and then will be submitted for publication. The results also still need to be confirmed by other experiments. But physicists who have seen the papers say that so far, the results look convincing.

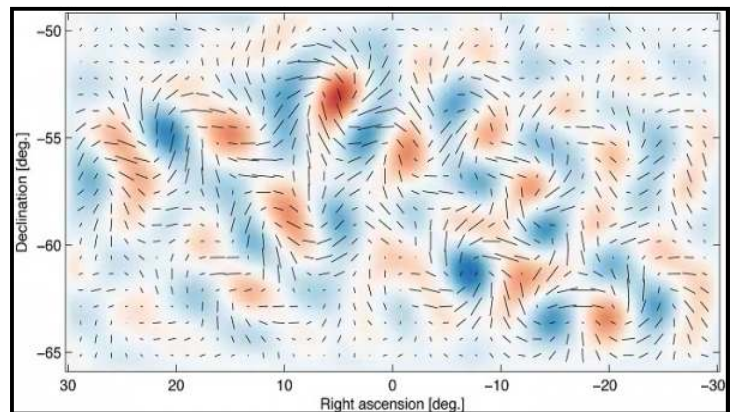
"No experiment should be taken too seriously until there's more than one that can vouch for it," says Alan Guth at the Massachusetts Institute of



The Bicep2 telescope, in the foreground, was used to detect the faint spiraling gravity patterns — the signature of a universe being wrenched violently apart at its birth. Credit Steffen Richter/Associated Press

Technology. "But it does seem to me that this is a very reliable group and what they've seen is very definitive."

Marc Kamionkowski at Johns Hopkins University in Baltimore, Maryland, is even more effusive. "This is the greatest discovery of the century," he says. "If it sticks, which I think it will, it's Nobel-prize material."



Pictured is the actual B-mode pattern observed with the BICEP2 telescope, which is consistent with the pattern predicted for primordial gravitational waves. The line segments show the polarization strength and orientation at different spots on the sky. The red and blue shading shows the degree of clockwise and anti-clockwise twisting of this B-mode pattern. (Photo : BICEP2 Collaboration)