# 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: Wayne Mansfield

Image taken at the September Observe the Moon night at Liverpool N.S. Due to cloud cover on September 22nd this photo was actually taken on September 23rd 2012

## From the editor *Quinn Smith*

I had a strange sense of déjà vu this summer. I found myself awake, late at night, watching a NASA broadcast of a "live" landing of a spacecraft on another member of the Solar System. The first landing was, of course, the landing of Apollo 11 on July 20, 1969, and subsequent moonwalk (I was in England at the time). The second was the landing of the Curiosity spacecraft on Mars at a similar hour (local time). There were many similarities and many differences.

I was struck that despite the passage of some 43 years my excitement was still as great. I was also struck by the shear magnificence of both technological achievements. But oh the differences! In 1969 the final decent was controlled by a skilled test pilot, a human controlling a machine. In 2012 the entire decent and landing was controlled by an on-board computer. The quotation marks around the "live" landing were intentional. Whereas in 1969 the signal only took 1.25 seconds to travel the distance from Apollo 11 to Earth, in 2012 Curiosity's signal took over 15 minutes to reach the Earth. How far we have travelled in 40 years! What really brought home the technological advances was the realisation, that the smart phone in my pocket had vastly more computing power than the entire Apollo 11 spacecraft had in 1969.

In closing I would like to acknowledge the death of Neil Armstrong—you will be missed. It was a giant leap for Mankind. And finally, with great sadness, I must also say farewell to my friend Richard Vanderberg who passed away in July.

## 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 437mm dobsonian telescope and 100mm 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 guests. If you are not a key holder and would like to become one, or need more information please contact the Observing Chairman, John Liddard (for contact info, see below).

### Upcoming Observing Nights:

| | | |
|---|---|---|
| October | 12th | 2012 |
| November | 9th | 2012 |
| December | 14th | 2012 (subject to change) |

**Meetings begin at 8 p.m. at Saint Mary's University**

**Our usual room is AT 101 although check the web site (www.halifax.rasc.ca) for room changes.**

### Oct. 19th 2012

**Guest speaker Dr Roy Bishop - "Celestial Navigation". Roy's presentation will navigate the technology of finding one's position, from the astrolabes and cross-staffs of the 15th century to the GPS receivers of today.**

### Nov. 16th 2012

**Guest speaker: Philip Bennett - "Epsilon Auriga" .**

**"What do we really know about the long period eclipsing binary epsilon Auriga?". Come and find out!**

### Dec. 14th 2012

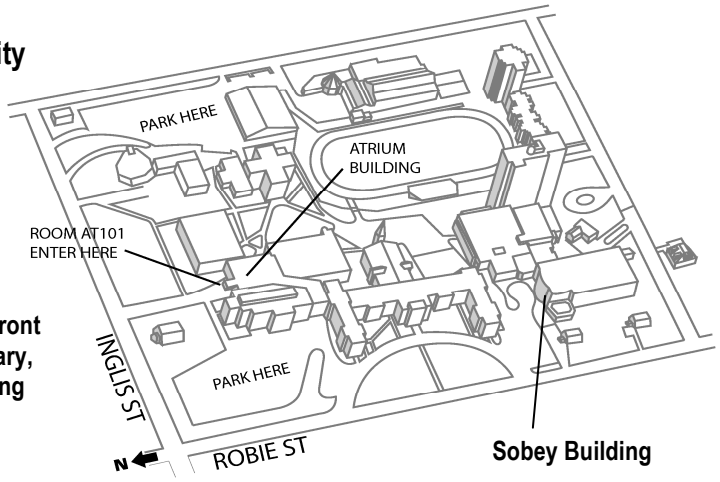
**Our Annual General Meeting plus: "Who Wants to be a Gazer?"**

**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.

The NOVA program (an introductory course in astronomy) will not be held this year.

Executive meetings begin at 7:00 p.m., in room AT 306, and all members are welcome.

## Halifax RASC Executive, 2012:

| | | | |
|---|---|---|---|
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| Councilor | Sean Dzafovic | 902 430 9062 | sdzafovic@gmail.com |

## Richard Vanderberg —1940–2012

**Chris Young**

It is with great sadness that I must report the passing of our past Halifax Centre President, Richard Vanderberg. Richard passed away from cancer on the 27th of July 2012.

I got to know Richard when he stepped in to fill the President's position at the Halifax Centre in 2009. Most of us knew he had taught at University, was active in the NDP, and loved music. A few of us knew Richard came to Halifax to be close to his son after his wife died in (I think) 2006. My impression was that he was an academic, knowledgeable, and well spoken. Some anecdotes he shared with me over coffee made it evident that I had underestimated his interests, and what he had accomplished in his life. I would like to share what I know.

Richard was not always a quiet academic. He played trumpet, had a passion for music and a wall of CD's. Early in life he had worked as a jazz musician playing in Stan Kenton's band. Richard had many passions other than music and astronomy. One room of his apartment was devoted to his model railroad layout, with cars he had built himself.

He had worked for the US Forestry Service as a summer student, dressed in uniform, riding a horse all day in the steep terrain of the Teuton mountains, looking for forest fires.

In Alberta Richard had been an NDP candidate and had run against Stephen Harper (and regrettably lost). A Wikipedia entry for the New Democratic Party candidates lists his degrees from universities in the US, UK and Canada. This entry also tells us he was born in Nebraska in 1940 and ran the Wyoming headquarters for John F. Kennedy's campaign in 1960, at age 20. His socialist and humanist views are evident in his publications. I have found titles such as "Fundamentals of Economics: A Manual for Working People" and "Immigration in the 21st Century, The Need for an Ethical Approach, The Canadian Experience".

***Richard at the DSP presentation at Keji***
***Both photos: Sherman Williams***

Richard's papers were presented at conferences and at one, his biography notes "...major interests are investor relations, economic development, and Middle Eastern politics". He had taught at two universities in India, two in the United Kingdom and four in Canada. Politically, he served as an advisor to a Vice President of India, and a shadow Minister of Labour in the United Kingdom..."

Regarding astronomy what I particularly remember was his interest in globular clusters (conveniently visible during western summer nights) and how his friend Friar Lucien Kemble (of Kemble's Cascade), as senior monk, could turn out all the lights at a religious community outside of Calgary so they could both observe. Richard served as president at the Edmonton Centre and also as their representative to National. An article he wrote in Stardust, the Edmonton Centre's newsletter, mentions 1999 as his 30th year in the RASC. In the same publication I found some book reviews he had written and they read just like he is speaking with you.

There is to be a service for Richard next spring which his son Ian will advise us of. He has touched a number of people and it was a pleasure for me to have known him.

## 2012 GA Report

### Pat Kelly—National Council Rep.

The 2012 General Assembly in Edmonton (Thursday, June 28 to Sunday, July 1) was well attended with lots of interesting papers, lectures, and workshops. We even got a lot of business done! I'll review the events in chronological order, or at least as close to that as I can! The only event on Thursday was an evening barbeque which allowed for a lot of newer representatives to meet the rest of the council and for catching up with old friends. At the national level, there is amazing sense of family, given that most of don't get a chance to meet in person except at the GA.

Most of Friday was devoted to the first National Council meeting. I'll first go over the highlights not related to the constitutional changes and then cover them separately. The Discover the Universe Program is working well and this fall will be offered to school teachers. A new mailing house has been chosen for the delivery of SkyNews, etc. which will mean lower costs and quicker delivery. Updated monthly membership reports will now be going out to all Centres. While the society does get new members, the best way to increase overall society membership is to keep the members that we already have. Total national membership is up about 50 from last year at the end of May. That is a pleasant change from the slow steady decline we had been seeing. Only about one third of the speaker's exchange fund has been used so it might be time to consider looking at a possible exchange for our centre.

As a new benefit of membership, First Durham, the company through which the society is insured is offering group home and auto coverage to all RASC members. Brochures are being mailed to all members. You may find that the savings will pay for your membership! On the subject of finances the society is expecting a small deficit this year (about $25,000) mostly due to lower than normal income from the investment fund.

A lot of time was spent discussing the constitutional changes that are required by the new federal Canadian Not-For-Profit Corporation Act (the Act). While some of the changes are major, the intent is to try to keep as much of the flavour of the existing system, where possible. A lot of the existing By-Law #1 will not be needed as it is part of the Act. Other parts will be moved to a new policy manual. The most significant change is that the actual Board of Directors can no longer consist of an elected Executive and National Council representatives. Under the Act, the Directors must be elected by the entire membership, and the elected directors then form the Executive Committee from within themselves. This will make for a much smaller board, nine is the proposed number. Members cannot run for specific positions, but in their biography they can express an interest in a particular position. Proxy votes are also out and it is hoped that the election of directors can be done via the internet where possible. Another requirement of the act is that elections have to take place annually for all board positions.

Under the Act, membership fees are set exclusively by the Board of Directors. One of the proposals is that there will be a separate body, a "National Council Advisory Council" similar to the existing one that could advise the Board of Directors, but would not have any actual authority. The Act also allows for the opportunity to redo our membership types, as they have to be clearly defined, and divided into voting and non-voting types. This would allow, for example, for corporate memberships, institutional memberships, affiliated memberships, etc. The Act also requires that all members of Centres (family, affiliate, etc), must be members of the National Society. There are two other major changes relating to by-laws; the first is that changes to the national by-laws no longer require approval by Industry Canada, they are in force once approved; secondly, centre by-laws no longer need to be approved at the National level.

These changes were all approved in principle. All members can view the committee reports, etc. They are located at: *http://www.rasc.ca/documents-regarding-new-bylaw-1*, and you will need to log in to view them. I think that if you review them you will get a much better appreciation for all of the work that goes on at the National level. The presentations and material related to the constitutional changes will also be found there. If anyone has any questions about anything in the report, please feel to contact me.

The Council meeting even finished up in time for Council members to attend a colloquium session of pulsars and neutron stars that was lead by Dame Jocelyn Bell Burnell. There have been a lot of interesting developments in the study and understanding of these objects, and recent observations have helped to eliminate many of the more esoteric models for their internal composition. Another interesting titbit, due to the strong gravitational field at the surface, if you could actually stand on a neutron star, you would be able to observe about two-thirds of its surface! That would be like looking south from Halifax and seeing Buenos Aires on the horizon.

Friday evening started with a presentation by Dr. Martin Connors on Earth's own Trojan asteroid 2010TK7 . Its orbit is very peculiar as it resembles a Slinky toy that has been stretched into the shape of a horseshoe. It literally flips randomly back and forth between the usual Lagrange points associated with Trojan asteroids, but also hangs out at the "anti-earth" point for periods of time. As Dr. Connors stated, its orbit appears to be a case of "stable chaos". The talk was followed by a wine and cheese reception which was also the venue for the song contest and Murphy's slide show. Orla Aaquist did a number of his astronomy songs, and

the slide show even feature some hilarious footage that was done in the style of the news-reels that were shown in movie theatres before televisions were commonplace.

Saturday was devoted to paper sessions, which I have listed below. While they were all quite interesting, I do have to give a bit of a nod to Denis Grey, who was one the development team for the GA registration web site, and who now knows that if you make up a talk just to test data entry, one should delete it before it actually ends up in the official program!

***Group photo of the 2012 GA held in Edmonton (photo from the GA web site)***

Charles O'Dale: *Identification of a Cosmic Impact Site.*
Denis Grey: *Discovery of a Large Emission Nebula.*
Bruce Rout: *The Work of the Society of Amateur Radio Astronomers.*
R. A. Rosenfeld: *What to Do When the Mayan Astrologer Crashes Your Star Party: Strategies for Surviving Popular Fallacies*
Robert Dick: *Night Vision and LEDs*
Chris Gainor: *Canada's Space program: Still Lost?*
Sharon Morsink: *The SkyScan Science Outreach Program.*
Ray Khan: *Thomas Johnson, Jr., Founder of Celestron Telescopes.*
Richard Huziak:*The Benefits of Dark-Sky Preserves.*
Matt Nagy: *Research Potential of a 0.5-m Telescope.*
Greg Sivakoff: *Snapshots of the Universe: A Multi-Lingual Astronomy Art Book.*
Orla Aaquist: *Cosmic Rays: Earth's Smallest Extraterrestrials.*
Mike Noble: *Sky Quality Measurements Project Extended Photographically.*
Krista Stefan: *Astronomy in Pop Culture.*

Abstracts of the papers can be found in the GA program book which is at *http://tinyurl.com/2012GApapers*.

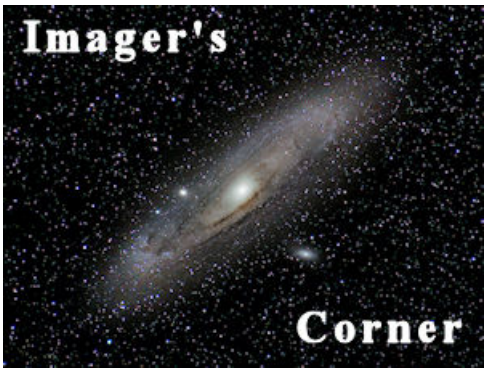
Saturday evening was the Helen Sawyer Hogg Lecture, which is a public lecture. The speaker, Dame Jocelyn Bell Burnell drew a large crowd, in part because of her reputation as a great speaker, and also the title of her talk: "Will the World End in 2012? — The Astronomical Evidence". She promised to elaborate on the one-word version of the answer, "No". She reviewed a lot of astronomical events that could end life on the Earth, but showed why none could do it by the end of the year. The follow-up questions from the audience covered a wide range of topics and she handled them all with style and humour. An amazing performance!

Sunday morning was the Annual General Meeting, which went smoothly, including the concluding singing of Oh, Canada! as it was Canada Day. The second National Council meeting also went quickly as its main task is populate the various National Committees. The afternoon started with a session on light pollution abatement and there were a number of interesting presentations on the subject. One thing which I brought back was an 18-page colour glossy publication called Strathcona County's Dark-Sky and Energy-Efficient Lighting Community Handbook. They have really jumped on the light-pollution abatement bandwagon!

There may have been an east-west game, as one was scheduled, but as I still get the odd ache in my right heel from the soccer game at last year's GA, I decided to pass this year. The last event of the most GAs is the banquet. This year the speaker was Dr. Christopher Herd (a handbook contributor) who gave a great talk on meteorites as probes of other planetary bodies. The banquet even had a partial view of the Canada Day fireworks!

There were other events, poster session, dealer displays, observatory tours, door prizes, the terrazzo floor of the CCIS building (which was the main venue), the planets in the atrium of the CCIS building (I learned that Uranus is on its side because it hangs that way from a large eye-bolt in its equator), not the mention the moving of lounge furniture via elevator (for the purposes of the security cameras in the elevators, the trick is to make sure the others are still wearing their name tags…)

The 2013 GA will be held in Thunder Bay, and the Victoria Centre has put in a bid to host the 2014 GA. Given that 2015 would mark the 60th anniversary of the formation of the Halifax Centre (and the 45th of its reactivation, along with the long-overdue *need for a GA on the east coast, has already started discussion about Halifax hosting in 2015. Let's do it!*




**Part #12 in a series by Blair McDonald**

In this edition we will take a look at some new equipment in the DSLR market, in particular the Canon 60Da. The 60Da is Canon's latest foray into the specialty niche market of astrophotography and is the first camera aimed at astrophotographers since the 20Da was discontinued several years ago. Like its predecessor, the 60Da builds on the strengths of a current production model and modifies the spectral response of the IR cut-off filter to provide substantially more Hα sensitivity.

The camera, like all DSLRs, represents the quintessential compromise. It does many things well, but there are better choices for each individual use. Where the 60Da excels is that it can do them all in a reasonable manner. For DSLR astrophotography, there are less expensive solutions, including simply modifying a stock 60D. The problem with that approach is that it means that using the camera for daytime work, from nature photography to snapshots of your kids, is more difficult, requiring additional filters and custom white balances. Then again there are more sensitive cameras, most of SBIGs lineup of cooled, dedicated, astro-only CCD cameras come to mind, but try taking a shot of a deer in your backyard with one of those if you want an exercise in frustration. And of course there are better video cameras that have continuous autofocus, but try to image a dim galaxy with one and the 60Da starts to look like a very good compromise indeed.

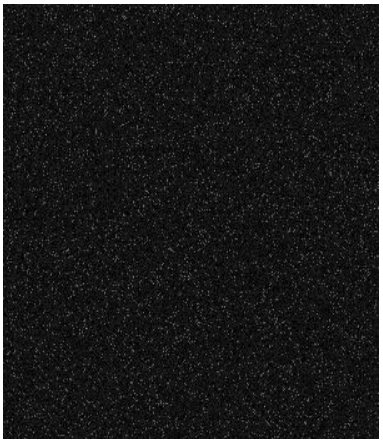
Now for some data and example images. The table below shows the camera read noise of both a Canon 60Da and an older Canon Rebel XT. This data was measured from five minute dark frames taken at room temperature with an ISO setting of 1600. The upper left portion of the images was used to measure the mean and standard deviation so that the amp glow of the Rebel XT did not interfere with the comparison.

| Camera | Mean | Standard deviation |
|---|---|---|
| Rebel XT | 253 | 53 |
| 60Da | 2052 | 48 |

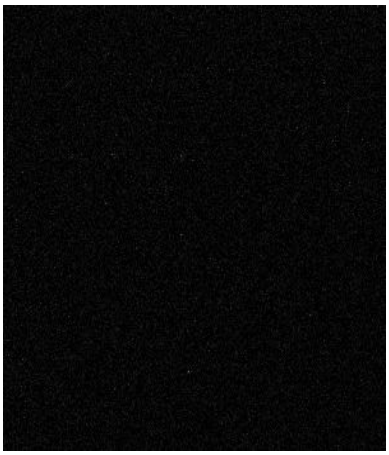
**Table 1 - Noise comparison**

As you can see the 60Da noise (standard deviation) is lower than the level of the older camera. The numbers only tell half the story though. The 60Da noise has a completely different spectral content dominated by high spatial frequencies. The older XT has far more low frequency noise that is more difficult to remove in processing. The mean value is corrupted by some in-camera processing done on all raw images, more on that in a bit.

The upper left of both dark frames are shown below at 100 percent, scaled to the same maximum level to make up for the different in-camera bias subtraction, and it is clear which is the quieter.

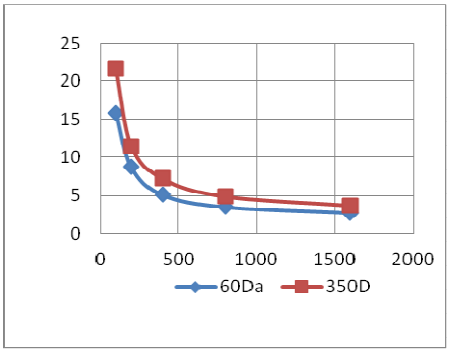


*Rebel XT dark frame*



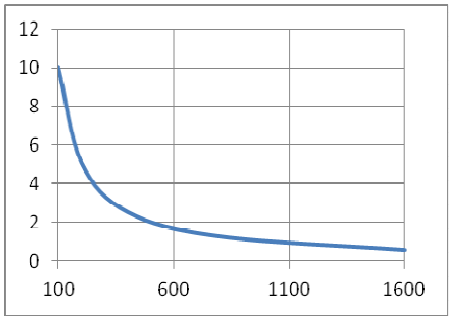
*60Da dark frame*

Using the two flat, two bias frame technique, the gains and read noises for both my Rebel XT and a 60Da were measured for ISO settings up to 1600 (the highest the Rebel could do) and the results are plotted below. If anyone is curious, check out http://www.cloudynights.com/item.php?item_id=2001 for details on how to do this with your own camera.



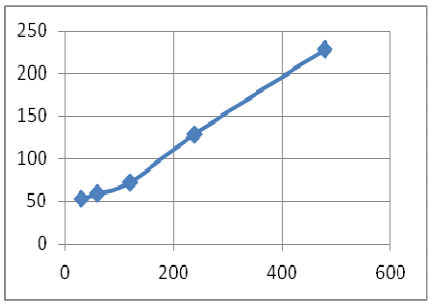

***Read noise in electron versus ISO***

The gains were the same for both cameras as shown below.



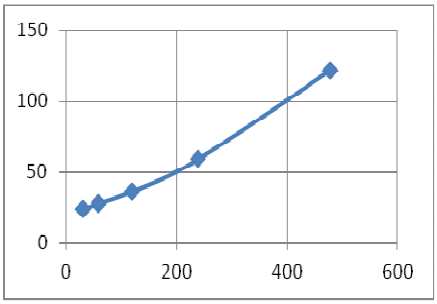

***Gain versus ISO***

DSLRs do some processing even on raw data. In particular the raw data is scaled or more correctly shifted by some bias value to preserve dynamic range for typical day time work. The scale factor is recorded in the image data and has to be applied to the data in order to compare darks of different times. If this is not done you will find that as exposure increases the average value of the dark frame remains unchanged while the standard deviation (the noise) increases which is not physically possible. After removing the effect of bias shifting from darks of doubling integration times, ranging from 30 seconds to eight minutes we get to see the linearity of the system to dark current.




***60Da average dark level versus exposure time***

Due to the in-camera processing, I needed to enable white balance to get the correction for bias shift so the vertical axis is scaled in the above. In order to get a more realistic estimate of the camera dark current we can examine the standard deviation of the dark frames. Keep in mind that the dark current noise is, on average, equal to the square root on the number of dark current electrons collected by a pixel so by examining the standard deviation we can arrive at a more realistic version of the dark current. Plotting the standard deviation against exposure time shows a the normal result with the dark current noise increasing as a function of exposure.




***Standard deviation versus exposure time***

The table below shows the exposure time, standard deviation, average dark frame level (calculated by squaring the standard deviation) and the dark current (calculated by taking the system gain into account).

| Exposure time | Standard deviation | Average dark frame value | Dark current |
|---|---|---|---|
| 30 | 23.7 | 561 | 11.2 |
| 60 | 27.5 | 756 | 7.5 |
| 120 | 36 | 1296 | 6.4 |
| 240 | 59 | 3481 | 8.7 |
| 480 | 122 | 14884 | 18.6 |

***60Da dark frame data***

The standard deviations are affected by read noise at the low exposure end and temperature increases at the longer exposure end so the dark current shows a dip in around 120 seconds that is likely an artifact of the measurement technique. Using the average of all of the measured exposures we arrive at a value of 11 electrons per second (rounded to the nearest electron).

Now let's take these values and the quantum efficiency of 35% (I looked that one up on the web for a 7D which uses the same sensor as the 60Da) and compare them to a one shot colour CCD camera from QSI, the 540C. The room temperature data shown for the 540C comes from the data sheet of the sensor used in the camera, the Kodak KAI-04022, found on the QSI web site at http://www.qsimaging.com/docs/KAI-04022LongSpec.pdf.

| Parameter | Canon 60Da | QSI 540C |
|---|---|---|
| Read noise (electrons) | 2.7 | 9 |
| Dark current at room temperature (electrons/s/pixel) | 7 to 11 | 25 |
| Quantum efficiency (%) | 35 | 40 |
| Sensor size | 5200 by 3462 | 2048 by 2048 |
| Pixel size (microns) | 4.3 | 7.4 |
| Full well depth (electrons) | 25000 | 40000 |

***Comparison data***

The next time someone tells me how bad a CMOS sensor used in a DSLR is, I'll have to pull out that data. These sensors compare very favorably to a CCD camera costing twice as much. The real difference is the cooling system of the QSI camera and its totally unprocessed data. It allows the sensor to be cooled to 38 degrees below ambient reducing the dark current by a factor of about 80. This makes the dark current noise vanishingly small and the unprocessed data allows direct dark frame subtraction without any scaling.

Now don't tell anyone that I'm saying that a DSLR is better for astrophotography as that simply isn't the case. The QSI unit will most definitely out perform the Canon, it's just that it is not a function of the sensor - it's a function of the cooling.

Summer vacation has given me a chance to give the 60Da a full workout under dark skies, the images on the next page, give an indication of both the sensitivity and low noise performance of the camera.

*M51: 25 minutes*

*Pelican: 2 hours*

*M57: 22.5 minutes*

As for daytime performance, here is a shot of the transit of Venus as not seen from Nova Scotia. The image is an HDR combine taken with the 60Da of the Peggy's Cove lighthouse as the Sun an Venus set behind it on transit day.

*HDR shot of the transit of Venus from Peggy's Cove*

For the best performance in astrophotography there is no doubt that a dedicated CCD camera is still the way to go, but the performance of the 60Da and its ability to be used as a regular daytime camera makes it a very tempting choice indeed.

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.

## September Meeting Report

### Chris Young

Our president, Robert, introduced the "...4th meeting before the end of the world.." to the audience of 33 including 1 visitor (a young lady from the Okanagan Centre attending SMU).

Robert introduced the Executive members (those who were present) and in his usual good humoured description of the benefits of membership which (as he noted) has few requirements ".. all you need is a brain..."

Robert notified the members of the passing of Richard Vanderberg this past July, whose presence will be missed (see page 3).

New to those arriving at the meeting were astrophotos, taken by the membership, and displayed as a slide show on the large front screen.

Blair expressed his thanks to all the organizers of Nova East, which had been a great success (there is more info and pictures on this year's Nova East on page 10).

Robert then introduced the main speaker for the evening, Tim Doucette. Tim is a computer programmer by day and an astronomer/astrophotographer by night. His talk was titled "Deep Sky Eye"

Tim has the disadvantage of being legally blind since birth, but has overcome a number of obstacles in his life, the main one he said was his own lack of belief in his own potential.

Tim provided a well done presentation with many images including examples of what he sees compared to what we typically see. Tim does not have the eye lens which would normally filter out UVA and UVB and he sees into those wavelengths (he sees a "blacklight" as very bright). To protect his eyes from UV he must always wear sunglasses outside.

***Tim being interviewed after the meeting (photo: Frank Hendsbee )***

He has been interested in space and astronomy since childhood and has always enjoyed looking at the night sky where the lights were seen as friendly. At 21 he saw Comet Shoemaker-Levy 9 hit Jupiter on TV and read David Levy's book. At 31 his wife insisted he get a hobby and he revived his astronomy interest and joined the Moncton RASC. With his pupils fixed open at 12 mm in an operation he was able to see more subtle detail in the sky than many observers. Tim met David Levy, one of his heroes, at the 2010 GA and was invited to visit him in Arizona, which he has done. He also got to the Kitt Peak Observatory while there.

The numerous astrophotography equipment set-ups and take-downs led his wife to approve of his setting up the "Deep Sky Eye Observatory". A personal goal was to get one of his photos published and it has happened in both the Journal and in Sky News. He showed us photos of the ISS taken with manual tracking, while his wife Amanda, turned the observatory dome!

The Transit of Venus took Tim and his friend Frank by car (Tim cannot drive) in search of clear skies all the way from Moncton to Cornwall Ontario where he took photos and video of the Transit which we saw.

Tim supports charities, including biking across PEI with his wife (also legally blind) as a fund raiser. Public outreach and speaking allows him to reach people and inspire them with his story so they may follow and achieve their dreams. You can accomplish anything you set your mind to he said – the sky is not the limit. Tim received much applause.

Paul Heath provided a "What's Up" of what was going to happen behind the clouds we are living with, and summarised some sights to look forward to. The evening closed with treats brought by our National Rep. Pat Kelly, and the members spent some time talking before the meeting finally wound down.

## Nova East 2012

### Quinn Smith

When I woke up on Friday August 17th, the first day of Nova East, it was raining (again)! It reminded me of last year—but this time with no hurricanes in the forecast. And like last year the weather was supposed to improve. I checked the Clear Sky Chart and it predicted nothing but blue skies from 11a.m. onwards—and it was correct. The weather for NE turned out to be (mainly) great.

Most of the 61 registrants arrived Friday afternoon in beautiful, warm and sunny weather. The field had completely dried, and camp set up was a pleasure. After supper our guest speaker David Levy gave a very personal talk about his life and experiences as an astronomer and comet hunter. Some of his anecdotes were both fascinating and funny. I must say, some of his experiences were inspirational and reminded us all to never give up! The evening was warm and very pleasant and there was not a mosquito to be seen (OK I lied about the mosquitoes!).

After David's talk Paul Heath gave a beginner's guide to the sky, before we settled into a night of excellent star gazing. As it happened I had brought several telescopes to Nova East but actually never set them up. For me the event was about sharing the view through other peoples 'scopes, and socialising with members and guests, some of which I only see once a year.

Saturday was a beautiful day, hot and clear. The group photo started the events (getting 61 astronomers together in one spot is like herding cats), but eventually the photo was taken.

The morning and afternoon were taken up with talks and workshops and the daytime events would down as people headed off to supper. I would like to say that this year's Nova East was rain free—but I can't. Over the supper hour the skies opened up and we were treated to a good old thunder storm.


***Top: NE group photo Bottom: David and Kathryn***
***All photos by Blair McDonald***

The rain did delay the evening's activities a little but the auction got underway only half and hour late and was great fun and a huge success. Thanks to Tony Schellinck for organising and running the auction.

The evening wound down with our closing speaker—Katheryn Gray who told us about the events in her life, and the people she has met, since discovering a supernova back in 2011. It was a great talk and a great way to close out the evenings formal events.

Although the sky was, for the most part, clear it was very "soft" Saturday night. That didn't stop many members from using their scopes and the public was treated to another evening of star gazing.

Most people packed up early Sunday morning, with rain threatening. In fact the Sunday was another hot and sunny day. I joined David and Roy for breakfast and a tidal bore tour.

A great end to a successful Nova East. Thanks Blair, the NE committee, and all who volunteered and participated.

HALIFAX CENTRE

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

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## Int. Observe the Moon Night

### Wayne Mansfield

Liverpool celebrated International Observe the Moon Night a day late but just as much fun. Saturday evening was a write-off, due to the weather, so I trusted the Clear Sky Chart for Sunday evening which showed a clearing trend around 7:00 p.m. Boy, did it come through or what.!

I set up about 6:15 at the Park in Liverpool and the skies started to clear up immediately. I even managed a look at some sunspots, one near the western limb that reminded me of Cassiopeia.

People out for their evening walks started to show up around 7 p.m. and the "games" began. There was lots of interest shown in the craters and mountains along the terminator. I also had the opportunity to point out the area Apollo 11 landed. It turned out that quite a few of my guests developed an interest in astronomy during the Apollo years. Two people brought their own scopes and once we got them set up, that tripled the fun. All in all, it was a great turn out with 20 guests of all ages enjoying the night.

## Keji Dark Sky Weekend

### Quinn Smith

On the weekend of August 10th–12th Kejimkujik National Park celebrated their second (annual) Dark Sky Weekend. This event was supported by members of the Halifax Centre.

The weekend actually began on Thursday night when Dave Chapman, Andrea Misner and myself spent a wonderful night observing from Peter Point with Park interpreters. After the Moon came up we spent the rest of the night conducting an audit of the lighting at the Park (a requirement of their DSP application).

Paul Heath joined us on Friday, and the main events began on Friday night with a wonderful Mi'kmaq sky lore story at the fire circle. That was followed by a laser sky tour by members of the Halifax Centre at the Sky Circle. The weather co-operated and after the sky tour we had a good two hours of telescope observing for the 200 people present.

Saturday was damp and Paul Heath's "Solar System tour" and Dave Chapman's photography workshops were held inside.

The weather was dry (but cloudy) for Andrea's main talk at the outdoor amphitheatre in the evening. After Andrea's talk we returned to the Sky Circle for another Mi'kmaq sky story. Unfortunately the clouds did not dissipate and the second observing session was cancelled and we conducted an "Ask an astronomer" question and answer session in its place.

Thank you Andrea Misner, Dave Chapman, and Paul Heath and all those at Keji who made this event such a success. See you next year!

## Cosmic Debris

### Odds and Sods from the world of astronomy and astrophysics

**August 6, 2012: NASA**

An image from the High Resolution Imaging Science Experiment (HiRISE) camera aboard NASA's Mars Reconnaissance orbiter captured the Curiosity rover still connected to its 51-foot-wide (almost 16 meter) parachute as it descended towards its landing site at Gale Crater.

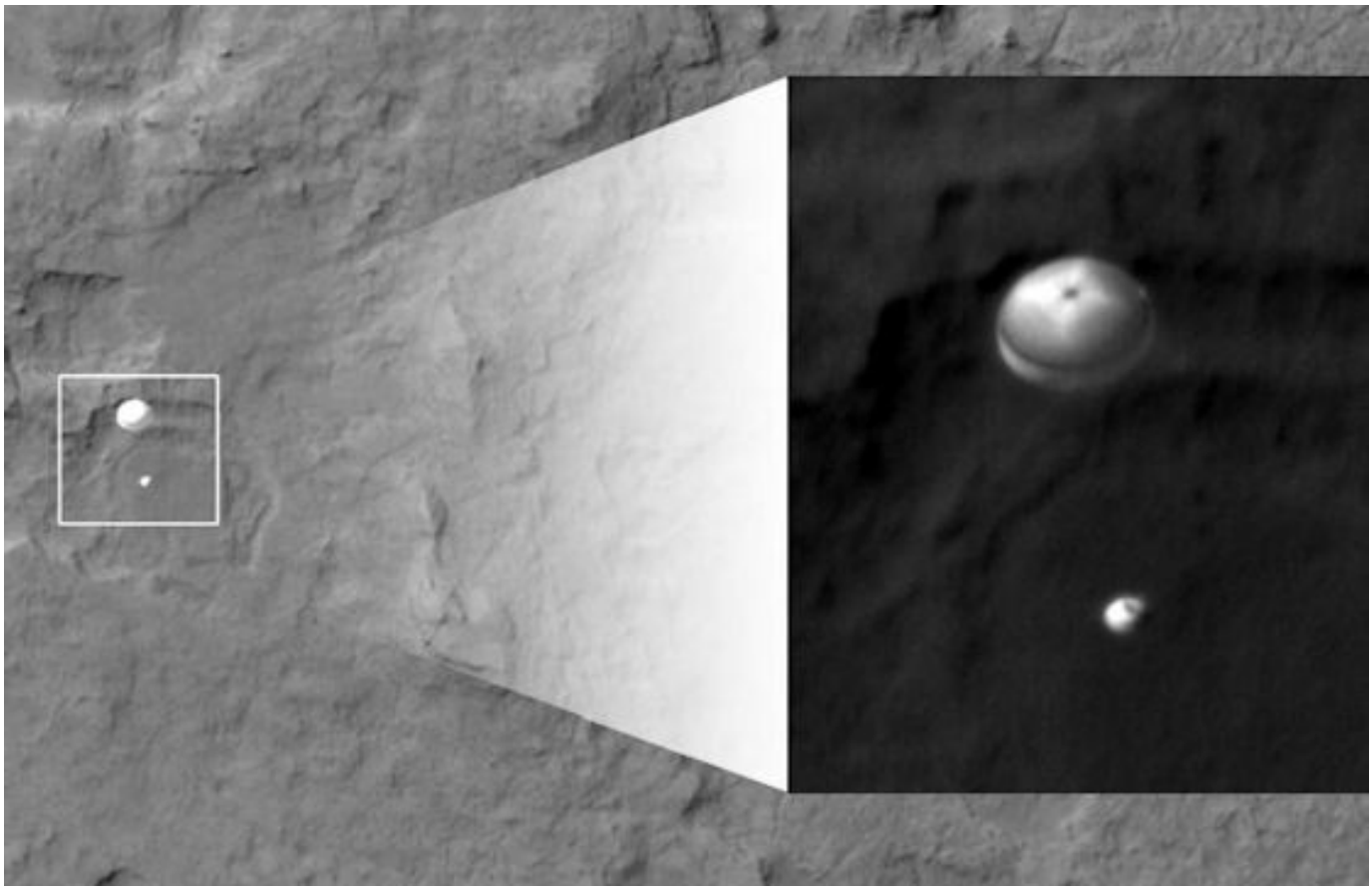
"If HiRISE took the image one second before or one second after, we probably would be looking at an empty Martian landscape," said Sarah Milkovich, HiRISE investigation scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "When you consider that we have been working on this sequence since March and had to upload commands to the spacecraft about 72 hours prior to the image being taken, you begin to realize how challenging this picture was to obtain."

The image was taken while MRO was 211 miles (340 kilometers) away from the parachuting rover. Curiosity and its rocket-propelled backpack, contained within the conical-shaped back shell, had yet to be deployed. At the time, Curiosity was about two miles (three kilometers) above the Martian surface.

"Guess you could consider us the closest thing to paparazzi on Mars," said Milkovich. "We definitely caught NASA's newest celebrity in the act."

Curiosity, NASA's latest contribution to the Martian landscape, landed at 10:32 p.m. Aug. 5, PDT, (1:32 on Aug. 6, EDT) near the foot of a mountain three miles tall inside Gale Crater, 96 miles in diameter.

In other Curiosity news, one part of the rover team at the JPL continues to analyze the data from last night's landing while another continues to prepare the one-ton mobile laboratory for its future explorations of Gale Crater. One key assignment given to Curiosity for its first full day on Mars is to raise its high-gain antenna. Using this antenna will increase the data rate at which the rover can communicate directly with Earth. The mission will use relays to orbiters as the primary method for sending data home, because that method is much more energy-efficient for the rover.



***Curiosity and its parachute are in the center of the white box; the inset image is a cut-out of the rover stretched to avoid saturation. Image credit: NASA/JPL-Caltech/Univ. of Arizona***