

Orbit

The Official Publication of the
Hamilton Centre



Royal Astronomical Society of Canada

Volume 45, Issue 3: January, 2013

Issue Number 3, January, 2013

Roger Hill, Editor

You're going to be hearing a fair bit about the NOVA program this month, and there's a number of good reasons why.

Over the years it's been noted that we have a number of people who have become members of the Centre, but who have not stuck around. We've wondered if it's because the Centre does not offer enough facilities...so we built an observatory that is the envy of many astronomy clubs. This produced a short term rise in memberships, but it tailed away again. We thought that maybe we didn't offer some cutting edge equipment, so we built a CCD camera. That turned out not to be the answer, either. Next came the addition of a large, sophisticated, telescope, with much the same result.

By now it was fairly clear that investing in equipment was not the answer. Or at least, not the best answer.

Harkening back to the times when the Centre had 120 to 150 members in the mid '80's and later in the mid '90's, it was clear that we had members because there was lots going on. It was events that people wanted.

Fair enough. Over the last couple of years we've managed to provide more events, and a wider variety of events than we've managed in years. And sure enough, membership started to rise.

It was not the complete answer though, but enough of a hint for us to have a look at something that had not been done in years. About 10 years ago, a fellow, new to the Centre, started an informal gathering that he termed the Beginners Group. He figured that a collection of people similar to himself should gather together and lift each other up. To a large degree, it worked, and a number of people who frequented Ken Lemke's sessions are still members.

I have been in this hobby for almost 50 years, and I've grown up with it...having seen the changes over the years, and being intimately familiar with the terminology, the equipment, and there are times when I'm talking to people and I have to stop and realize that the sorts of things that are second nature to me are mysteries to many, and while I have thought that people who join the Hamilton Centre are interested IN Astronomy, that does not always translate into a knowledge OF astronomy.

In many ways I guess I, and others, had expected that people, having found the Centre, would get involved to try to learn all they could. Could it be, however, that the difficulty was that there seemed to be no way to increase the level of knowledge through any other process than osmosis?

So, looking back on over 40 years in the Centre, I remembered Ken Lemkes gatherings and decided that perhaps we should have something a bit more formal than his free-wheeling (and fun!) sessions. I had thought of putting something together using, as a base, the workshops I'd run for the City of Burlington at Discovery Landing. However, one of the great things about the RASC as a whole is that there are 28 other Centres, and they have frequently faced the same difficulties. I found just what I was looking for in something the Prince George Centre in BC had done. The NOVA (New Observers in Visual Astronomy) program was so good, that a number of other centres had already started offering it. Some Centres gave it to the general public, charging over \$100 for it (but including a one year membership), while others offered it strictly to new members...which meant that there was a significant price drop for renewing members.

We're not doing that...we're offering it first to ANY member. We've got a class set of books, a nice certificate for those who do all the homework, a great place to hold it, and we're only asking for a donation of \$5 a night to cover the cost of course materials.

So, sign up quickly because space is limited! Oh...and we're going to keep the FUN factor from Ken's sessions, too!

Roger Hill

Obituary: Sir Patrick Moore (March 4 1923 to December 9 2012)

On December 9, I was saddened to hear of the death of Sir Patrick Moore, the British presenter of *The Sky at Night*. The Hamilton Centre has a mild connection to the late Sir Patrick, as both he and Ken Chilton were firm friends. Patrick had offered to take Ken on a trip to visit every pub in London. Patrick was also supposed to visit Hamilton and open up the 1973 meeting of the International Union of Amateur Astronomers, a brainchild of Sir Patrick. Ken started a two year term as it's president that year. Ken patterned his show *The Sky Tonight* after Sir Patrick's BBC program.

Sir Patrick was also responsible for my own life-long interest in astronomy, and my parents would allow me to stay up to watch his monthly show. The obituary below is from *The Economist* of December 15, 2012.



IN THESE days of ever more specific expertise, astronomy is one of the few sciences in which the enthusiastic amateur can still hope to make a contribution. Among the most enthusiastic of these self-taught folk was Sir Patrick Moore, the presenter of a BBC astronomy programme called “*The Sky at Night*”, who died on December 9th.

Once a month for 55 years, as regular as the new Moon, Sir Patrick’s monocled face would appear on the nation’s TV screens. He and his guests would tell viewers about a spectacular constellation they might be able to see with their garden telescopes, or discuss results from an interplanetary space probe. It was, for the programme’s fans, exactly the sort of highbrow television that the BBC was created to provide, and which its commercial rivals would never have commissioned. (In fact, “*The Sky at Night*” was so popular that Mr Moore reportedly turned down offers from other TV stations, remaining loyally with the BBC.)

Despite his determinedly eccentric habits—he was rarely without his trademark monocle, and was a keen xylophone-player—Sir Patrick insisted that it was the beauty of the universe that drew his viewers, rather than any personal magnetism he might have possessed. Nevertheless, to many he was a national treasure on a par with Sir David Attenborough, the indefatigable presenter of the BBC’s big-budget nature documentaries.

Nor was he a dilettante or a lightweight: the study of the Moon was his passion, and he made several contributions to lunar science. Over his half-century on the air, he secured interviews with many notable figures, including Werner von Braun, the ex-Nazi designer of NASA’s Saturn V Moon rockets; Dame Jocelyn Bell Burnell, who discovered pulsars, rotating neutron stars; and Neil Armstrong, a media-shy astronaut. His reputation crossed the Iron Curtain: he was invited to Russia to meet Armstrong’s counterpart, Yuri Gagarin, and became the first Westerner to see results from the Soviet Luna 3 probe, which mapped the Moon’s far side in 1959.

Some of his attitudes struck audiences as odd and even offensive. Sir Patrick disliked Germans and did not care who knew it (his fiancée had been killed in a German bombing raid in the second world war, and he never married). In the 1970s he became president of the short-lived, virulently anti-immigration United Country Party; later he supported the anti-EU United Kingdom Independence Party. He said he had abandoned watching “*Star Trek*” when a woman occupied the captain’s chair.

These days science is confident and cool. Comedians such as Dara O’Briain and Robin Ince entertain with science-friendly routines. Telegenic stars including Alice Roberts, an anthropologist, and Brian Cox, an astronomer (and ex-member of D:Ream, a 1990s Britpop band), host lavish, popular-science programmes on television. The front-runner to fill Sir Patrick’s shoes is probably Chris Lintott, an Oxford University astronomer, populariser of science and regular guest on the programme. Another candidate might be Brian May, who, in addition to playing the guitar for Queen, a rock band, holds a PhD in astrophysics and is a “*Sky at Night*” stalwart. Whoever it proves to be, those shoes are big.



Created by Brian Battersby and the Prince George Centre

The objective of the NOVA Program is to provide information and instruction to new and beginner level amateur astronomers.

All NOVA sessions will be held at the Hamilton Centre Observatory. This site offers a couple of advantages, including darker skies, a heated clubhouse and access to the 16" RC. Meetings will be once or twice a month, and the schedule will be published as soon as all the dates are finalized with respect to the instructors work schedule and other observatory events.

Each session will begin with classroom instruction and group discussions. There will be many opportunities for participants to ask questions and to prepare for the evenings observing session. Participants can take advantage of the on site library for reference material including sky atlas', star charts, etc.

Once the classroom activities are complete the group will head outside for observing, weather and time permitting! This will be a great opportunity to get hands-on instruction and guidance, whether you are looking for help in setting up your scope, or trying to learn your way around the sky.

Each participant will also be given a list of items to observe during the time between the sessions. This will allow members to practice some of the things that they have learned during each session.

Come on out and join us in this unique opportunity to enhance your knowledge and skills in the ever changing field of amateur astronomy.

Here is an outline of the lessons planned:

- Observing (Monday, January 21st)
- Motions of the Sky and Seasons (Monday, February 4th)
- The Solar System (Monday, February 18th (Family Day...subject to change)
- Telescope and Binocular Types and Using Them (Monday, March 11th)
- The Moon and Eclipses (Monday, April 1st)
- Charts, North, Distance, Position and Brightness (Monday, April 15th)
- Star Designations, RA, Dec. and Deep Sky Objects (Monday, May 6th)
- Stars (Monday, May 27th)

The intent is to have the program finish PRIOR to our annual banquet in June, where course completion certificates and the Explore The Universe certificates will be awarded.

There is a suggested donation of \$5 per night to cover the cost of handouts, binders and other course materials. We have purchased a class set of the BOG, one of which will be entrusted to you for the duration of the course. If you wish to buy it at the end of the program, it'll cost \$20.

The course is open to all members of the Hamilton Centre regardless of age, experience or knowledge level. Seating is limited.

Partnering to Solve Saturn's Mysteries By Diane K. Fisher

From December 2010 through mid-summer 2011, a giant storm raged in Saturn's northern hemisphere. It was clearly visible not only to NASA's Cassini spacecraft orbiting Saturn, but also astronomers here on Earth—even those watching from their back yards. The storm came as a surprise, since it was about 10 years earlier in Saturn's seasonal cycle than expected from observations of similar storms in the past. Saturn's year is about 30 Earth years. Saturn is tilted on its axis (about 27° to Earth's 23°), causing it to have seasons as Earth does.

But even more surprising than the unseasonal storm was the related event that followed.

First, a giant bubble of very warm material broke through the clouds in the region of the now-abated storm, suddenly raising the temperature of Saturn's stratosphere over 150 °F. Accompanying this enormous "burp" was a sudden increase in ethylene gas. It took Cassini's Composite Infrared Spectrometer instrument to detect it.

According to Dr. Scott Edgington, Deputy Project Scientist for Cassini, "Ethylene [C₂H₄] is normally present in only very low concentrations in Saturn's atmosphere and has been very difficult to detect. Although it is a transitional product of the thermochemical processes that normally occur in Saturn's atmosphere, the concentrations detected concurrent with the big 'burp' were 100 times what we would expect."

So what was going on?

Chemical reaction rates vary greatly with the energy available for the process. Saturn's seasonal changes are exaggerated due to the effect of the rings acting as venetian blinds, throwing the northern hemisphere into shade during winter. So when the Sun again reaches the northern hemisphere, the photochemical reactions that take place in the atmosphere can speed up quickly. If not for its rings, Saturn's seasons would vary as predictably as Earth's.

But there may be another cycle going on besides the seasonal one. Computer models are based on expected reaction rates for the temperatures and pressures in Saturn's atmosphere, explains Edgington. However, it is very difficult to validate those models here on Earth. Setting up a lab to replicate conditions on Saturn is not easy!

Also contributing to the apparent mystery is the fact that haze on Saturn often obscures the view of storms below. Only once in a while do storms punch through the hazes. Astronomers may have previously missed large storms, thus failing to notice any non-seasonal patterns.

As for atmospheric events that are visible to Earth-bound telescopes, Edgington is particularly grateful for non-professional astronomers. While these astronomers are free to watch a planet continuously over long periods and record their finding in photographs, Cassini and its several science instruments must be shared with other scientists. Observation time on Cassini is planned more than six months in advance, making it difficult to immediately train it on the unexpected. That's where the volunteer astronomers come in, keeping a continuous watch on the changes taking place on Saturn.

Edgington says, "Astronomy is one of those fields of study where amateurs can contribute as much as professionals." Go to <http://saturn.jpl.nasa.gov/> to read about the latest Cassini discoveries. For kids, The space Place has lots of ways to explore Saturn at <http://spaceplace.nasa.gov/search/cassini/>.

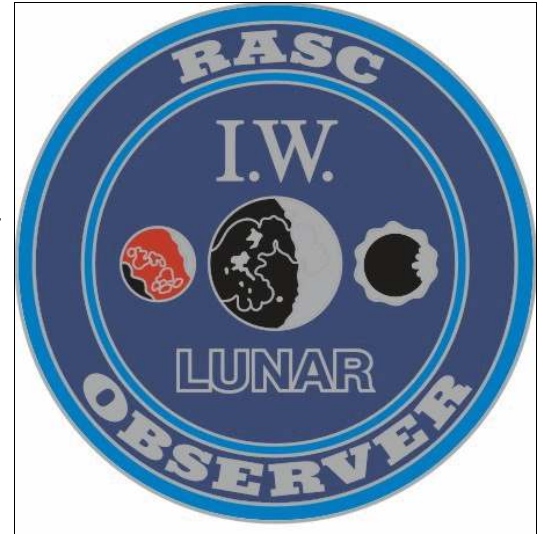
This false-colored Cassini image of Saturn was taken in near-infrared light on January 12, 2011. Red and orange show clouds deep in the atmosphere. Yellow and green are intermediate clouds. White and blue are high clouds and haze. The rings appear as a thin, blue horizontal line.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



The Isabel K. Williamson Lunar Observing Certificate

This is a certificate program that was designed by the RASC Observing Committee. The Moon is by far the most detailed astronomical object to observe through a telescope and this comprehensive new program will guide you through a complete tour of our near neighbour's incredible surface. The list contains many outstanding craters, mountains, valleys, scarps, dorsa, and more. A sixty page printed booklet has been prepared for the Isabel Williamson Certificate Program by the Observing Committee and information about how to get a copy can be found below. The Isabel Williamson Lunar Certificate was adopted as a national program at the 2005 General Assembly held in Kelowna, British Columbia. We have also completed work on detailed observing forms that were custom made for the Isabel Williamson Lunar Observing Program. They are available from a link near the bottom of this page.



Lunar Program Guide Lunar Booklet

The Isabel Williamson Lunar Observing Program has been designed to be an educational experience and we have created a detailed program guide containing key information about the lunar surface and how to observe it. The booklet begins with an overview of the program guidelines, which outlines the observations that are required to obtain the certificate, and additional optional activities such as challenge features, lunar surface drawings, imaging, and more. It then provides a detailed overview of the history of the Moon and the various geological eras that have shaped its surface. From there you will find each type of lunar surface feature explained and what unique characteristics to look for in them. In addition you will find information about libration, key observing tips and acknowledgments of the team that put this program together.

How to Obtain a Program Guide

Copies of the Program Guide for the Isabel Williamson Lunar Program are currently available through National Office at the toll free number listed below. The booklet comes in a coil binding and within Canada the cost is \$9.95 + GST and postage. USA and International orders are welcome, although the postage and handling may cost a little more. You may phone the National Office of the RASC toll free during business hours at 1-888-924-7272 to place an order. RASC Centres may also purchase the booklets at a special reduced price for distribution to members.

In addition, RASC members may download the PDF file by clicking on this Isabel Williamson Program link (note this is a Members Only resource; a password for the Member's Only Section will be needed). The PDF file is sixty pages long and may require a few minutes to load. We also have new Deluxe Observing Forms (PDF 271 KB) for the Isabel Williamson program that you are welcome to download and use to keep all of your lunar observations in one organized file. These forms are in PDF format and can be printed and photocopied as needed although they are copyrighted by the authors and the Royal Astronomical Society of Canada. The file may take a few moments to load.

How to Apply for the Certificate

If you have completed the required number of observations for the Isabel Williamson Certificate please click on this PDF (portable document format) Lunar Program Application Form. Observer's may present their lunar observation records to their local Centre Executives or they may send photocopies of them to the address given on the application form. If the records are approved by Centre Executives and/or by designated local Observing Coordinators, two of their signatures will be required on the application form. For Unattached or International Members please send photocopies of your lunar observing records, or a CD containing the scanned GIF, JPG, PDF, or document files to the address given on the application form. Sending an original logbook is OK as well, but the RASC does not recommend that method due to the remote possibility of mail getting lost in the postal system.

Imagers Corner, by Blair MacDonald—Halifax Centre

This edition's question centers on how much processing is applied to astro-photos and is it based in science or art. Where do you guys come up with these? (Keep them coming!) The answer the first part of the question is simple – lots! There is much more time spent at the computer than there is at the guiding eyepiece (anyone remember what one of those looks like?). Once you figure out the quirks of your imaging system and master polar alignment, setup takes about half an hour and alignment about another 20 or 30 minutes. Focusing takes about five minutes and you're in business.

If you are guiding then setting that up can take another 20 minutes, but it is well worth it. From there on in the equipment does the work and you can enjoy the view of a star filled sky through other telescopes, binoculars or even with the unaided eye.

The processing is another story altogether. The usual calibrating, stacking and producing the image ready for post processing is pretty standard stuff and there are several packages that automate the whole process. If you stop there the results are rather disappointing. Here is a stacked and calibrated 30 minute image of NGC 7000 (the North American Nebula) as an example.

It rather boring and the nebula is just barely there! After about two hours of setup and exposure the result leaves you a little flat. But this is where the fun starts. After many hours (about 10 in all) of trying different techniques to squeeze out as much detail as I could, I ended up with what I consider an acceptable image.

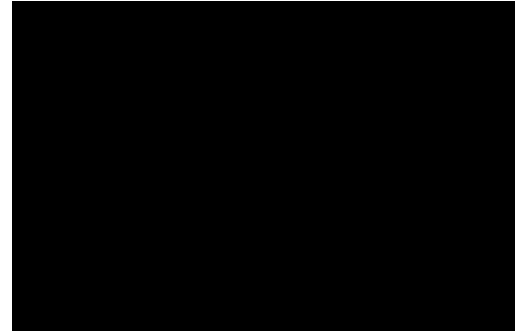
So if you have just taken your first astro-image and are disappointed with the result, have some patience and some coffee, roll up your sleeves and start processing! Plan on spending three to five times the time spent acquiring the image in the processing. There will be lots of false starts, but after a while you will develop a workflow and use many of the same processes over and over again. At that point the processing will get shorter, but still take longer than acquiring the data in the first place.

Now for the second part of the question, is it science or art? The answer here is a bit of both. The foundations of image processing and astrophoto processing in particular are rooted in signal processing. All the same processes that I use in my day job to design software radios and tracking systems are generalized to two dimensions and used in image processing. Those nifty kernel filters that are available in almost every image processor are just 2D implementations of a FIR (finite impulse response) filter common in all signal processing. Much of the image calibration and stacking relies on well developed signal processing techniques and engineering knowledge of the sensors used.

Many amateurs do solid scientific work and limit their processing to that which preserves the integrity of the data for things like photometry. Personally I capture and process images with the end goal of making a pretty picture. That means that I will take liberties with the data to get the final effect that I want. If there is noise in one area then I'll use a layer mask and turn up the filtering on just that area. Or if something I want in the image is dim, I'll stretch the brightness more in that area than others. Take the following Horse Head shot as an example.

If I had simply applied linear processing, the bright stars would so overwhelm the image that it would be a very boring shot. Instead, several stretches were used with mask layers to block out the brighter areas. Is it what it looks like in reality – absolutely not, but this is one area where reality should imitate art!

The real view makes for a terrible shot that I would not even put in my digital picture frame let alone on my wall. Colourless, dim nebulae and overly bright stars are not what I was after in the processing so that is where the art comes in, bringing out the parts that you want to see and suppressing sections of the image that are not so interesting.



RASC Book Review by Joseph Pipitone

Hubble's Universe: Greatest Discoveries and Latest Images

By Terence Dickinson. Firefly Books 2012

This book is a celebration of Hubble's contribution to imaging the universe. It is a mix of over 300 of Hubble's best previously and recently released images, with others appearing in scientific journals and unknown to the public. The book initially covers the amazing Hubble telescope and its repair and then concentrates on some of the best images it has produced with accompanying commentary.

The author, Terence Dickinson is perhaps the best-known popular Canadian Astronomer and science writer who has made astronomy accessible to the public through his easy to understand 15 publications and as the editor of the amateur astronomer magazine, SkyNews.

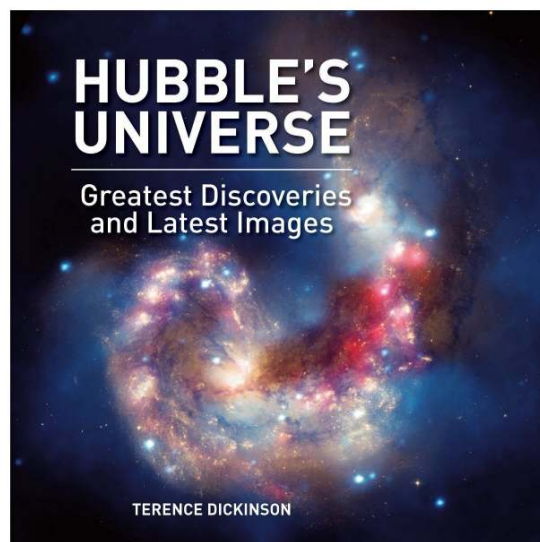
In Chapter 1, Dickinson provides a metaphor to describe the acuity of Hubble's vision as being similar to our ability to see the side by side glow of a couple of fireflies from New York in Tokyo. Other interesting data includes Hubble's vision as being at least 10 times better than any earth telescope and that it has taken the equivalent of half a million images and enough data to fill 50 million books since 1990 . With this as the background, the book goes on to reproduce and describe some of Hubble's best and stunning images.

A nice feature of the book is a quick summary of Hubble's top discoveries with beautiful illustrations such as: galaxies evolved from smaller structures, super massive black holes are common in galaxies, dark energy exists, dark matter matters etc. The book is very well thought out and organized into clear themes with a sufficient description of each photograph. As a result, the book is an easy accessible, very informative and a captivating book that can be used either as a good reference work or just for eye candy. One great use for astrophotography club members is to compare Hubble's detailed pictures with their own photographs. It will serve to inspire and to gain a deeper understanding of our universe.

I first saw this book on a coffee table as a gift by the author to one of our members prior to it being released. I could not wait to review it as soon as it came out. In reviewing this book I was looking to find something to criticize in order to give a balanced view but I could not find anything material to criticize. Well, perhaps one minor one, that it was printed in China instead of Canada. However, this book remains a very good value for the price and it is definitely something to keep or to give someone as a gift. I highly recommend this recently released book.

This book is now in our library.

List Price: CDN\$ 49.95
Price: **CDN\$ 25.19** & this item ships for **FREE with Super Saver Shipping** from Amazon.ca



Pocket Sky Atlas Challenges for January—John Kulczycki

With the New Year starts another orbit around the Sun. There are 365 potential stargazing nights, and if we make an effort to plan ahead, maybe we can be more successful this year than last.

On those cloudy nights, take some time to draw up observing plans for a few weeks or even a month or two in the future. When you plan ahead, you can take full advantage of a clear night by already having an observing plan ready. Planning also lets you dig a little deeper into the atlas, past the usual 110 suspects and any wanderers that may be in the celestial neighbourhood.

But let's face it, going out to observe on a January night comes down to just one thing: motivation.

For some, a whole truckload of motivation (or more) will be needed before they wander out into bone-chilling cold, clear January nights.

If you are one of these types, you can still do a little “Winter Training Camp” from time to time just to keep keen. If you have astronomy programs, use them and figure out all the features they have, make sure you know how to print off charts when the next new comet comes around during warmer months. You can also go to the library and go through some of those books you didn't have time to look at during busy months. This time of year is also a good time to set out some goals for objects you'd like to see during the year and make plans on how you would do that.

Or, you could just get a new parka and some warm boots so you can get out there and observe.

Naked Eye:

- Propus, page 14.
- Aldebaran, page 15.
- Mirzam, page 16.
- Arneb, page 16.
- Nihal, page 16, can you see the Throne of Jawz?"?
- Menkar, page 17.
- Procyon, page 25.
- Sirius, page 27.

Small Scopes and binoculars:

- NGC 2215 (Open Cluster), page 16.
Ra 06:21 Dec -07:17
- NGC 1582 (Open Cluster), page 12.
Ra 04:32 Dec +43:51
- M 67 (Open Cluster), page 24.
Ra 08:51 Dec +11:49
- NGC 2182 (Nebula), page 25.
Ra 06:10 Dec -06:20

Larger Scopes:

- vdB-26 (Reflection Nebula), page 15.
Ra 4:14 Dec 10:13
- Ced 34 (Reflection Nebula), page 15.
Ra 4:27 Dec 23:00
- NGC 1535 (Planetary Nebula), page 17.
Ra 4:14 Dec -12:44
- Lower's Nebula (HII region), page 25.
Ra 06:10, Dec +15:48

Bonus objects:

- NGC 1817 and NGC 1807 (Open clusters), page 14.
Ra 05:12, Dec +16:41
- NGC 1554 (Nebula), page 15.
Ra 04:22, Dec +19:31
- NGC 1407 and NGC 1400 (Galaxies), page 17.
Ra 03:40, Dec -18:35
- NGC 2403 (Galaxy), page 21.
Ra 07:37, Dec +65:36

Canada is Physics Powerhouse by T.I. Meyer

In a groundbreaking report released this morning by the Canadian Council of Academies, Canada's six world-leading fields of research were identified. Not only did "physics and astronomy" rank among the top 6, but the subfield of "particle and nuclear physics" was recognized as one of the key drivers for Canada's strength.

Read the full report at the Council's website.

The Council says about the report, "An authoritative, evidence-based assessment of the state of science and technology in Canada has found that Canadian science and technology is healthy and growing in both output and impact. Over the past five years, real improvements have occurred in the magnitude and quality of Canadian science and technology."

The report found that the six research fields in which Canada excels are: clinical medicine, historical studies, information and communication technologies (ICT), physics and astronomy, psychology and cognitive sciences, and visual and performing arts. With less than 0.5 per cent of the world's population, Canada produces 4.1 per cent of the world's research papers and nearly 5 per cent of the world's most frequently cited papers.

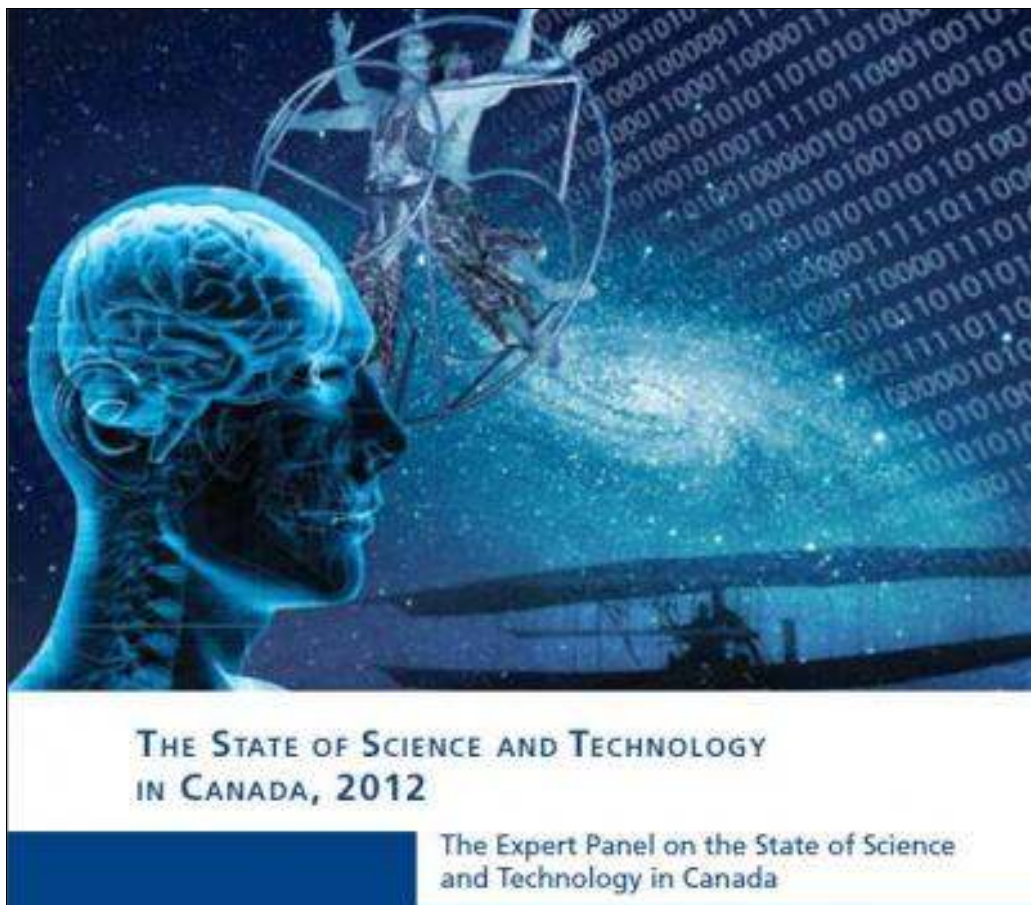
TRIUMF (the Tri-University Meson Facility at headquartered at UBC) director Nigel S. Lockyer commented, "Without question, Canada has great research universities and great research institutions. The findings of this report are, in that sense, not surprising. I know my peers are extremely talented!"

Lockyer went on to say, "Speaking as a physicist and a student of public policy, the acknowledgment of Canada's physics & astronomy accomplishments in terms of quality publications is also not surprising. SNO distinguished itself by solving the solar-neutrino problem and SNOLAB is now hunting for dark matter. The Perimeter Institute is pursuing the deepest questions in theoretical physics with the world's greatest scientists such as Stephen Hawking. And TRIUMF helped Canada play its role in finding the Higgs boson at CERN and is a leader in using accelerators to advance isotopes for science and medicine."

In reference to the observation that Canadian physics ranks slightly higher in peer-reviewed scientific journals than in surveys of top scientists around the world, Lockyer said, "When I look at the report carefully, I see the usual lag time between accomplishment --- and recognition. Canada is producing the quality research in physics and astronomy (and even particle and nuclear physics), and it will take more hard work and investment to maintain our relative position and be recognized for it by leaders around the world."

The report is entitled, "The State of Science and Technology in Canada, 2012," and provides a thorough analysis of the scientific disciplines and technological applications where Canada excels in a global context. In 2010, Industry Canada via the Minister of Industry, asked the Council of Canadian Academies to assess the state of science and technology in Canada and to consider all fields in which research is conducted. As such, the Council assembled an 18-member expert panel from Canada and around the world to conduct this in-depth assessment. In particular, the panel focused on research performed in the higher education sector, as well as in the not-for-profit and government sectors.

Congratulations to the Canadian research community!



What you missed in December...!

Notes from Gary Bennett

Chairmen Reports

- Membership: 76 current members
- Web Master: Shawn gave an overview of the new website:
 - User Login
 - Members Only content
- Outreach – Volunteers Needed

Announcements:

- The lock freezes in winter so do NOT lock
- End of the world party Dec 21st at the observatory
- Announcement about NOVA program
- Banquet Announcement
- Announcement about AstroCATS Trade Show
- Astrophotography 101 Henrys School of Imaging
- Volunteers Needed for Westfield Public Nights

Librarian Report – New Book – Hubble Images and Discoveries

Discussion 16" RC - Andy spoke to the manufacturer (OGS) and described our difficulty holding collimation. Recommendation from OGS:

- Time to recoat the mirror,
- secondary mirror assembly replacement. OGS offer to do free replacement
- Cost to ship telescope & recoat the mirror \$ 2-4k. More discussion at the board meeting

The SWAP meet was held.
50/50 Draw – Winner Burt R

Guest Speaker: Brady Johnson – Amateur Differential Photometry





Hamilton Observing Sites
 Observing site in Hamilton and area.
 2 views - Public
 Created on Oct 18 - Updated Oct 20
 By pbrandon
[Rate this map](#) - [Write a comment](#)

- [Hamilton Centre Observatory](#)
576 Concession 7E, Flamborough, ON
- [Tim Hortons, Waterdown](#)
255 Dundas St E Waterdown, ON L0R, Ca
- [The Royal Coachman](#)
1 Main St N Waterdown, ON L0R, Canada
- [Dundas Street, Tim Hortons](#)
530 Dundas St E Waterdown, ON L0R, Ca
- [Tim Hortons, Brant Street](#)
2201 Brant St Burlington, ON L7P, Canada
- [Tim Hortons, Guelph Line](#)
2400 Guelph Line Burlington, ON L7P, Car

Website:

<http://hamiltonrasc.ca/>

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 N43° 23' 27" W79° 55' 20"

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Calendar for January, 2013

| | Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|------------------|-----------------------------|-----|-----|---|------|------|------|
| W K 0 1 | | 01 | 02 | 03 • 7:30pm» Public Monthly Meeting featuring Eric Briggs | 04 ☾ | 05 | 06 |
| W K 0 2 | 07 | 08 | 09 | 10 • 7:30pm» RASC Board Meeting | 11 ● | 12 | 13 |
| W K 0 3 | 14 | 15 | 16 | 17 | 18 | 19 ☽ | 20 |
| W K 0 4 | 21 8pm NOVA Session 1 | 22 | 23 | 24 • 7:30pm» Free Public Astrophotography Lessons | 25 | 26 | 27 ● |
| W K 0 5 | 28 | 29 | 30 | 31 | | | |

Front image is of Neil Armstrong and Patrick Moore, two hugely influential figures in my life who both passed away this year. I had hoped that I'd get to meet one or both of them, but no more.

All other images provided by Roger Hill, Gary Bennett or NASA.