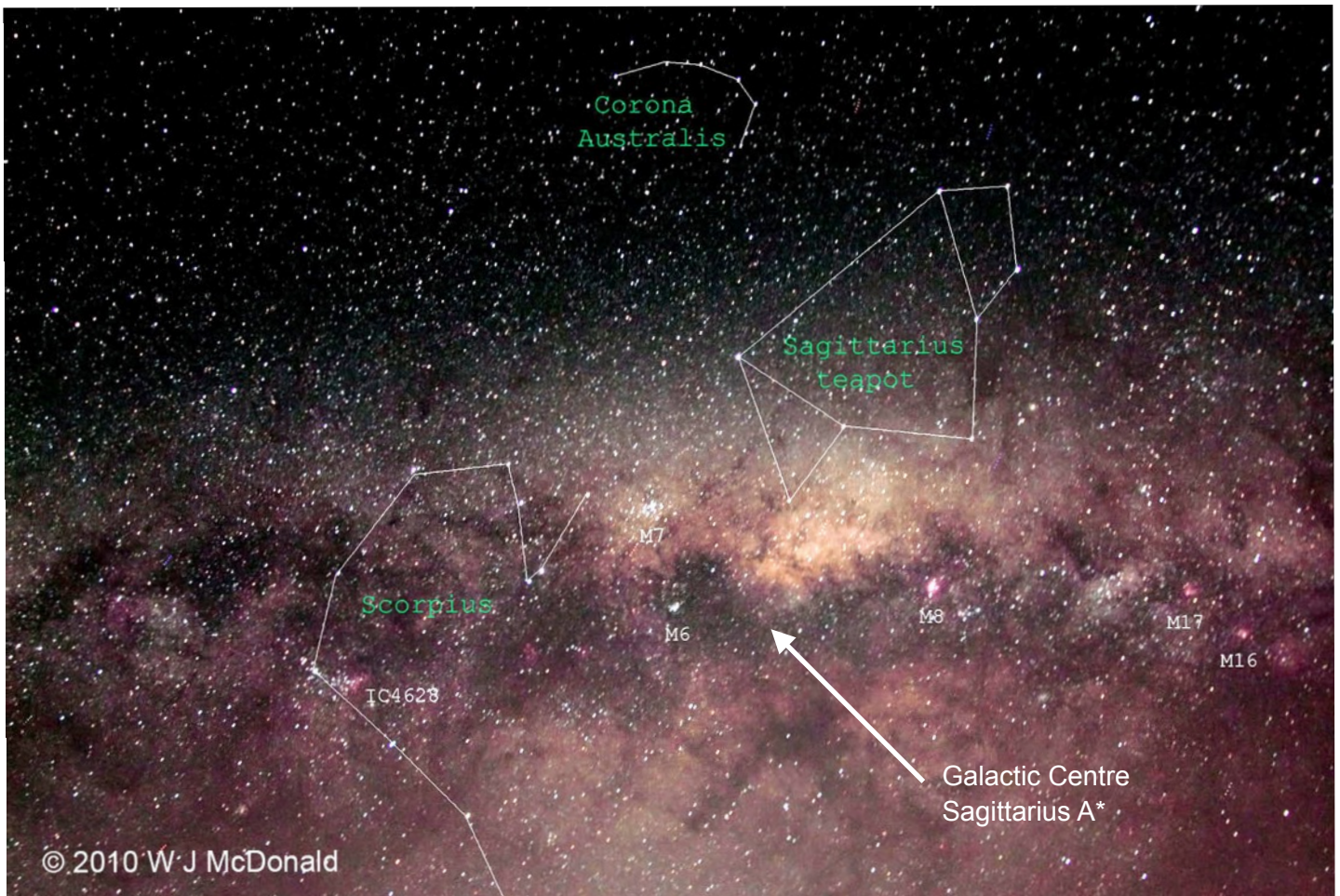


# SKYNEWS



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## Southern Milky Way Galactic Centre

By John McDonald

Learn More About Sagittarius A\*  
A Massive Black Hole at Our  
Galactic Centre on Page 4

## NEXT MEETING

Wednesday May 11th 2016  
At 7:30 PM  
Room A104  
Bob Wright Centre  
University of Victoria  
3800 Finnerty Road

[www.victoria.rasc.ca](http://www.victoria.rasc.ca)

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## On the Cover

### Southern Milky Way: The Galactic Centre

by *John McDonald*

This beautiful photo was taken at WorkWorth New Zealand on October 26 2010. The location of the Sagittarius A was added to link with this month's Galactic Centre theme. See pages 4 and 5. Tripod mounted modified Canon T1i with 17 to 50mm lens at 17mm focal length. 5 X 30 Sec Exposures at f/3.5 and ISO 400. Processed in Images Plus and Photoshop.

### Presidents Report

by *Sherry Buttnor*

Finally some nice weather! I hope you've been able to get out there and observe. I had a bunch of astrophotography targets lined up for when (or if!) we had a run of clear weather, but it was so lovely out the past few nights all, I could do was roll out a Dob and just do some good old-fashioned stargazing. It was glorious! And it isn't just me. I'm happy to report that we have had several terrific observing sessions at our own Victoria Centre Observatory (VCO), too. It's been a long and cloudy winter...we deserve some clear skies!

For our members -new and otherwise- who want to join us at the VCO, you have to be registered as an "Active Observer". Just shoot me an email, and I'll tell you how. The VCO is a very cool facility, and we're fortunate to have it. I encourage you to join us there!

I'm also happy to report that plans for International Astronomy Day on May 14th are coming together nicely, thanks to Nelson Walker and David Lee, who have been working hard at getting volunteers and guest speakers together. Thank you, David and Nelson. You have no idea how much I appreciate you taking on these tasks! Many thanks also to Kim Gough at RBCM for her assistance with IAD.

We also have reached an agreement with the National Research Council and Dominion Astrophysical Observatory to run our summer

Saturday public "star parties" for thirteen Saturday evenings, beginning on IAD, May 14. One major change this year will be the requirement for all visitors to have a free EventBrite ticket to get in. For the past couple of years, our summer public star parties at the DAO have been so tremendously popular (and with amazing volunteers like you, how could they not be?) that we have experienced traffic chaos at the main gate. So many visitors show up that traffic at the gate and on W.Saanich Rd has been uncontrollable. So this year, we have reluctantly come to the conclusion that a ticketing system for entry is necessary. So...if you are talking to friends, family, or the public, please mention they will need a free EventBrite ticket to get in. Our awesome tech guy Matt Watson (or at least, one of our awesome tech guys) is putting the EventBrite site together. Details to come.

And I'm similarly pleased to report that the District of Metchosis has finally approved our request to use their cricket field for our RASCals Star Party again this year. So that's officially a go for August 26-28.

Lots of happy stuff to report this month! And here are some other great things we have on that you won't want to miss:

-UVic observing session: Friday May13th. All Victoria Centre members welcome.

-April's monthly general meeting: Wednesday April 13, 7:30pm ROOM ELL167 . Dr Helen Kirk will be speaking about "watching the birth of stars with the James Clerk Maxwell Telescope and Herschel Space Telescope". Sounds amazing!

And just a reminder that we are still selling raffle tickets, the prize is a very cool Meade ETS-LX 6" SCT telescope on a LightSwitch goto mount with some accessories. See Sid, and buy lots!

**Clear skies!**

**Sherry.**



## April Meeting Speaker

**Dr. Helen Kirk:** *"Watching the birth of stars with the James Clerk Maxwell Telescope and Herschel Space Observatory."*

Have you ever wondered how stars are born? In this presentation, we'll dive deep into the hearts of molecular clouds, vast reservoirs of gas and dust which are the birthplace for stars. Our tour will include stunning recent results from the James Clerk Maxwell Telescope and the Herschel Space Observatory, facilities where Canadian astronomers have been making major strides in revealing clues as to how and why stars form.

**Bio:** Dr Helen Kirk is a Research Associate with the Herzberg Astrophysics program at the National Research Council of Canada. She has previously worked as a researcher at McMaster University and the Harvard Smithsonian Center for Astrophysics, and prior to that, obtained her MSc and PhD from the University of Victoria. Helen is thrilled to have been honoured with two awards associated with the RASC: in 2010, she received the Plaskett medal, a joint CASCA-RASC award for the best Canadian astronomy thesis in the past two years, and in 2003, she received the RASC Gold Award from the Toronto Centre of the RASC for high achievement as an undergraduate in astronomy at the University of Toronto.

## Scheduled Speakers 2016

**May 11: Maan Hani, TDB**

**Jun 8: Zack Draper,** *Exploring exoplanetary systems with the Gemini Planet Imager*



## ASTRONOMY CAFE



Our weekly **Astronomy Cafe** is an excellent, informal, way to meet us. New comers are especially encouraged. Bring your coffee mug and join the chat! <http://victoria.rasc.ca/events/astro-cafe/>

### Fairfield Community Centre

1330 Fairfield Rd. Victoria.

7:30pm - 10pm

Contact: Chris Purse for further details  
[vp2@victoria.rasc.ca](mailto:vp2@victoria.rasc.ca)



### Email Lists

#### Observer / CU Volunteers / Members

Contact Chris Purse to subscribe  
[vp2@victoria.rasc.ca](mailto:vp2@victoria.rasc.ca)



### New Observers Group

Hosted by Sid Sidhu - 1642 Davies Road, Highlands. Call 250.391-0540 for information and directions.



### Cattle Point observing in Victoria's own Urban Dark Sky Park:

<http://victoria.rasc.ca/events/rascals-cattle-point/>

Next Session Postponed Until September Due to Late Twilight



### Victoria Centre Observatory: Every Saturday Evening Changing to Every Friday Evening after May 14th.

*Open to those on the Active Observers list only*

Weather permitting. Dress warmly, and see you out there.

## Membership Report - March 2016

Total membership is currently **225**. There are 16 members in the grace period which means their membership has expired in the past 2 months. Please contact Chris Purse ([membership@victoria.rasc.ca](mailto:membership@victoria.rasc.ca)) if you would like to check the status of your membership.

## Exploring the Galactic Centre with *Event Horizon Observatory* by Reg Dunkley

If we cannot directly observe **black holes**, will we ever know if they really exist? That is a question that has nagged me for decades. Even if we are totally confident in the astrophysics which supports the theory that black holes *can* occur, **are they really out there?** My doubts were suddenly removed during the March Victoria Centre meeting when compelling evidence was presented that a super massive black hole was lurking at the centre of our very own Milky Way. I am now a believer!

**James DiFrancesco** gave a fascinating talk entitled "*The Secret Sits. What's in our Galactic Centre?*" He began with an historical summary and highlighted the contribution of Harlow Shapley, who used the distribution of globular clusters to estimate the centre of the Milky Way. Shapley located the centre in the constellation of Sagittarius.

This region is best viewed in the Southern Hemisphere and John McDonald's image which graces this month's cover was taken in New Zealand. It shows that the area of interest is shrouded in a dust lane. Radio wavelengths can easily pass through dust and in 1933 Karl Jansky discovered the very first radio source which he located in Sagittarius. Now denoted as **Sgr A\*** this target has been studied by numerous ground based and space borne instruments. For the past 20 years optical telescopes such as the 10m [Keck](#) and 8.4 m [VLT](#) have studied the motion of about a thousand stars near Sgr A\*. Adaptive optics and other techniques were used to refine the stellar positions and orbits. This data was compiled into a stunning video which shows stars swarming around an invisible centre. In order to explain the stellar motions it has been calculated that a **supermassive black hole weighing in at 4 million stellar masses** must be located at the invisible centre! Scientists at both the [Max Planck Institute for Extraterrestrial Physics](#) and the [UCLA Galactic Centre Group](#) received the [Crafoord Prize](#) in 2012 in recognition of their ground breaking work. The Galactic Centre lies **25,000 light years** from the Sun. In contrast, some of these orbiting stars are coming within **light hours** of Sgr A\*. The term *event horizon* is the boundary within which the black hole's escape velocity is

greater than the speed of light and nothing within that zone can leave. The event horizon for Sgr A\* is 30 times the diameter of the Sun. Viewing the Sgr A\* event horizon from Earth is equivalent to viewing a grapefruit located on the Moon! Resolving such a small target may be feasible with a new tool called the [Event Horizon Observatory](#). It consists of a network of sub millimetre telescope dishes.

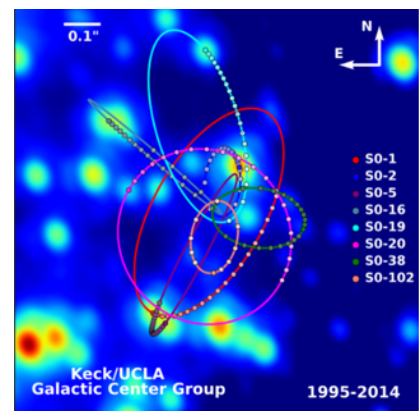
Electromagnetic radiation of this wavelength has dual virtues: the ability to penetrate the dust lanes and the ability to combine polarized signals with other instruments using a technique called Very Long Baseline Interferometry. By working in concert, the equivalent diameter of this "observatory" approaches that of the Earth!

Because millimetre wavelengths are absorbed by water vapour, the telescopes must be located at high elevations. Instruments in the network include: [ALMA](#) in Chile (5000m), [SMA](#) and [JCMT](#) on Mauna Kea (4080m), [NOEMA](#) in the French Alps (2550m), [LMT](#) on Sierra Negra Mexico (4600 m) and the [SPT](#) at the South Pole (2600m).

Matter spinning around just outside the event horizon boundary forms a flattened pancake, called an accretion disk. Interaction with the black hole's magnetic field will generate all sorts of exotic phenomena. The Event Horizon Telescope will offer a front row seat to the accretion

disk and provide new insights into this heart of darkness.

What a wonderful example of international cooperation!



**View a Stunning Visualization of  
Stars Swarming Around the Galactic Centre**  
Click on [here](#) and play the video at page bottom.  
To view an excellent 30 min program click [here](#).  
To view a scientific lecture given by Crafoord Prize  
winner Reinhard Genzel click [here](#).

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## The Galactic Centre: a Source of Highly Energetic Cosmic Rays

by Reg Dunkley with sources from [Space Daily](#), [HESS](#) and [Wikipedia](#)

Last month an analysis published in Nature revealed for the first time that the supermassive black hole at the centre of the Milky Way is likely accelerating cosmic rays to energies 100 times greater than those achieved by the Large Hadron Collider in CERN. How this was determined is a story in itself.

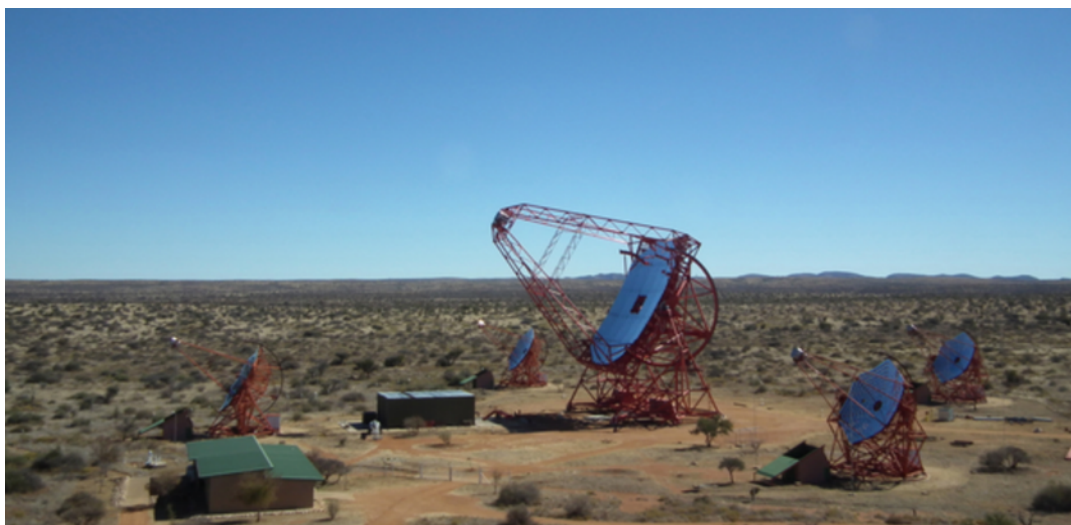
First let's revisit cosmic rays. They consist of very energetic electrons, protons and alpha particles (helium nuclei). The path of these charged particles are easily twisted by magnetic fields which makes it impossible to directly find their origin. Fortunately when they interact with clouds of gas near the source of acceleration they generate very high energy gamma rays (extremely short wavelength light) which travel in straight lines. Remember that the speed of light is slower in denser air. So when the gamma rays come barrelling in to the upper atmosphere they generate shock waves similar to that produced by a supersonic aircraft. These shock waves produces flashes of blue light called Cherenkov radiation.

These flashes can be detected on Earth by special optical telescopes hooked up to a bank of photomultiplier tubes. Perhaps the most sophisticated of these detectors is the High Energy Stereoscopic System ([HESS](#)) located in

Namibia. This ingenious device consists of an array of five reflecting telescopes which are focused not on deep space but rather at a distance of 10 km; the most likely elevation that Cherenkov radiation occurs. In order to detect these faint flashes the mirrors must be large (4 with 12 m diameter mirrors and one with a 28 m diameter mirror) but the optical tolerance is not as demanding as that for astronomical telescopes. If the flashes are detected in at least two of the mirrors at the same instant then an event is recorded. An incoming gamma ray will actually generate a "shower" of flashes and stereo view determines the "shape of the shower" and eliminates showers generated by unrelated cosmic rays. The energy of the gamma ray is related to the light intensity generated by the shower.

HESS surveys many gamma ray sources but it has been monitoring the galactic centre for over 10 years. The latest results confirm that there is an exceptionally strong source of gamma rays occurring very close to the super massive black hole Sgr A\* with less significant signals detected nearby.

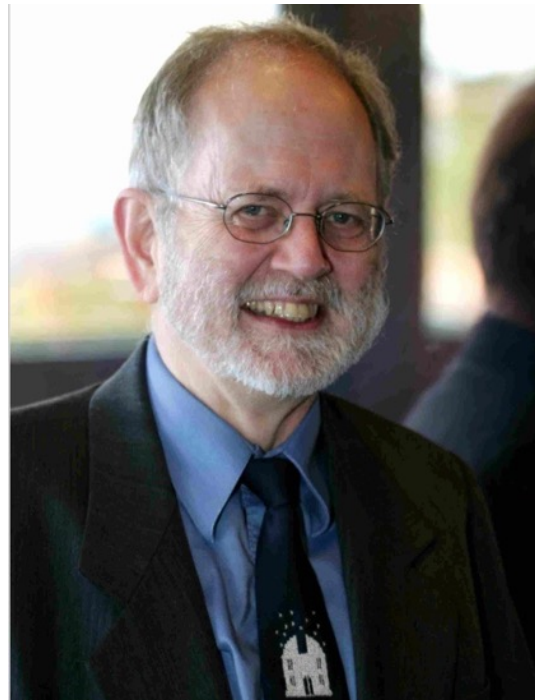
HESS and other instruments such [VERITAS](#) in New Mexico and the [Fermi](#) Space Telescope are making progress in locating the sources of gamma-rays and their cosmic ray cousins. The processes that accelerate these charged particles to enormous velocities, however, remains a mystery. Perhaps the Event Horizon Observatory will help provide an answer. The wonderful thing about Astronomy however is that answers seem to lead to more questions.





## Victoria Centre's Own Jim Hesser Honoured with NRC Schneider Medal!

Dr. Jim Hesser, long-time RASC member and past Honorary President, has been awarded the National Research Council's 2015 W.G. Schneider Medal for his inspiring decades-long contribution to the pursuit of excellence in Canadian government astronomy, both as a productive researcher, and as the Director of the Dominion Astrophysical Observatory for nearly three decades (1986-2014). The award also recognizes Jim's committed advocacy of astronomy as a integral part of our broader cultural life, both here and abroad. RASC and in particular the Victoria Centre congratulates Jim on his well-merited award!



### Weather Warning!

#### Dust Devil On Mars - March 31st 2016

Photo by **Ultimate Overachiever: Rover Opportunity**  
Still going strong after 12 years which is 38 times it's planned life expectancy!

## The VCO Astro Planner

*By Reg Dunkley*

The Victoria Centre Observatory Astro Planner for April and May are located on page 8. The main purpose of these charts is to find at a glance **Moon Free Zones** and optimize observing opportunities. It amalgamates the times of Astronomical Twilight, Moon Rise/Set and Sun Rise/Set and is valid for the location of the VCO. The **time** in PDT is located on the left axis.. The right axis relates the percentage of Moon that is illuminated for each day and it corresponds to the black sine wave curve on the chart.



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## Help get Light Pollution Abatement on the Federal Government's Radar

*by Dorothy Paul*

The **Federal Government Sustainable Development Strategy 2016-2019** is open for public comment until mid-June.

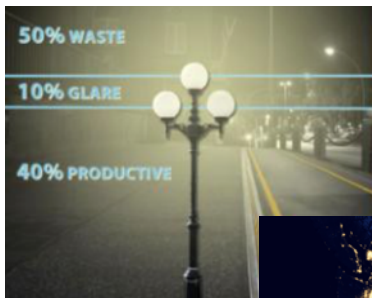
<http://www.letstalksustainability.ca/intro>

The words *Light Pollution* and *Outdoor Lighting* occur nowhere in the current draft of this document. Here is an opportunity for us each of us to help get light pollution's impact on our planet onto the government's radar! The more individual submissions addressing the destructive effects of lighting up the nocturnal environment, the greater

the chance that the message will be heard and heeded. (There will be submission from RASC as well.)

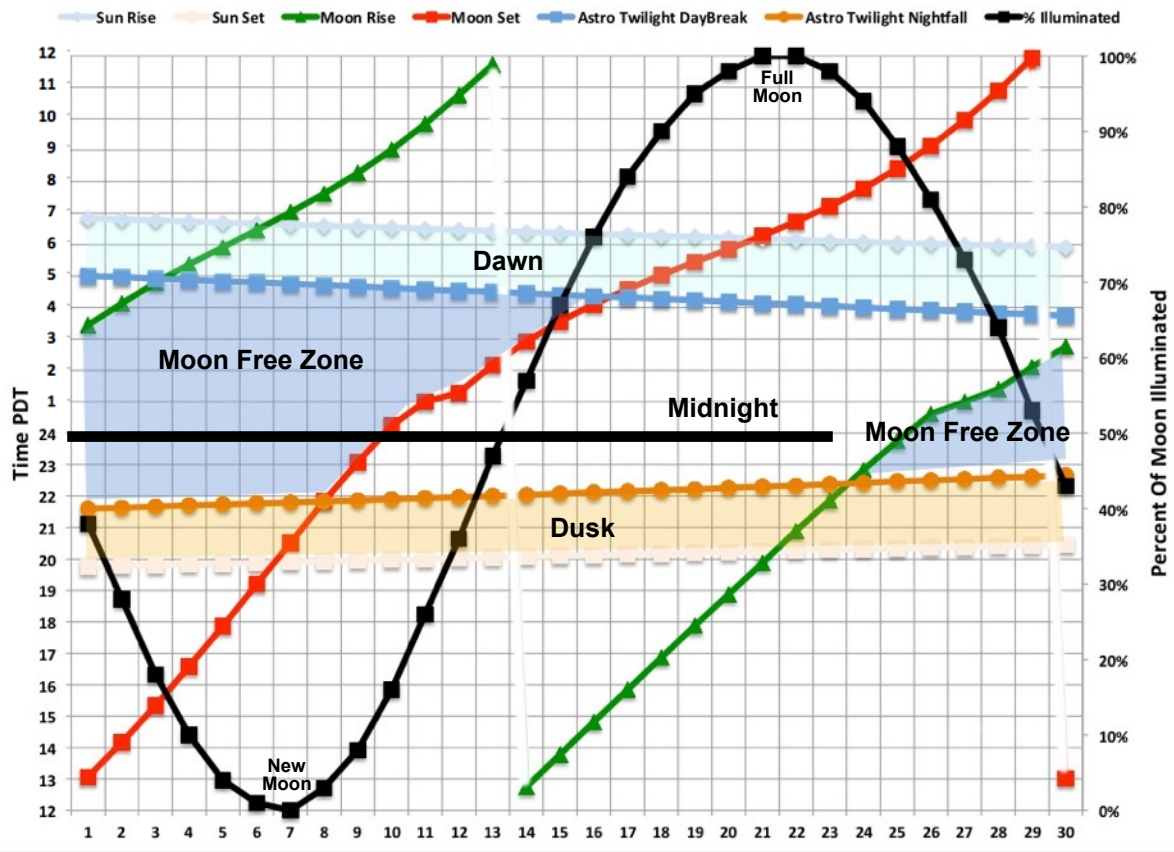
Choose your 'pet peeve' (other than in ruining the night sky) about LP – e.g., its impact on ecosystems and the environment, health (all species), quality of life, biodiversity, greenhouse gases, sustainable natural resources, climate change, Indigenous Peoples, etc. (all key words in the Fed's Development Strategy plan), go to the website, and contribute a few minutes to the planning of a sustainable future for Canada. More information and an explanation of the detrimental impact of bad outdoor lighting are at

<http://victoria.rasc.ca/night-lighting/> and <http://www.rasc.ca/outdoor-lighting>.

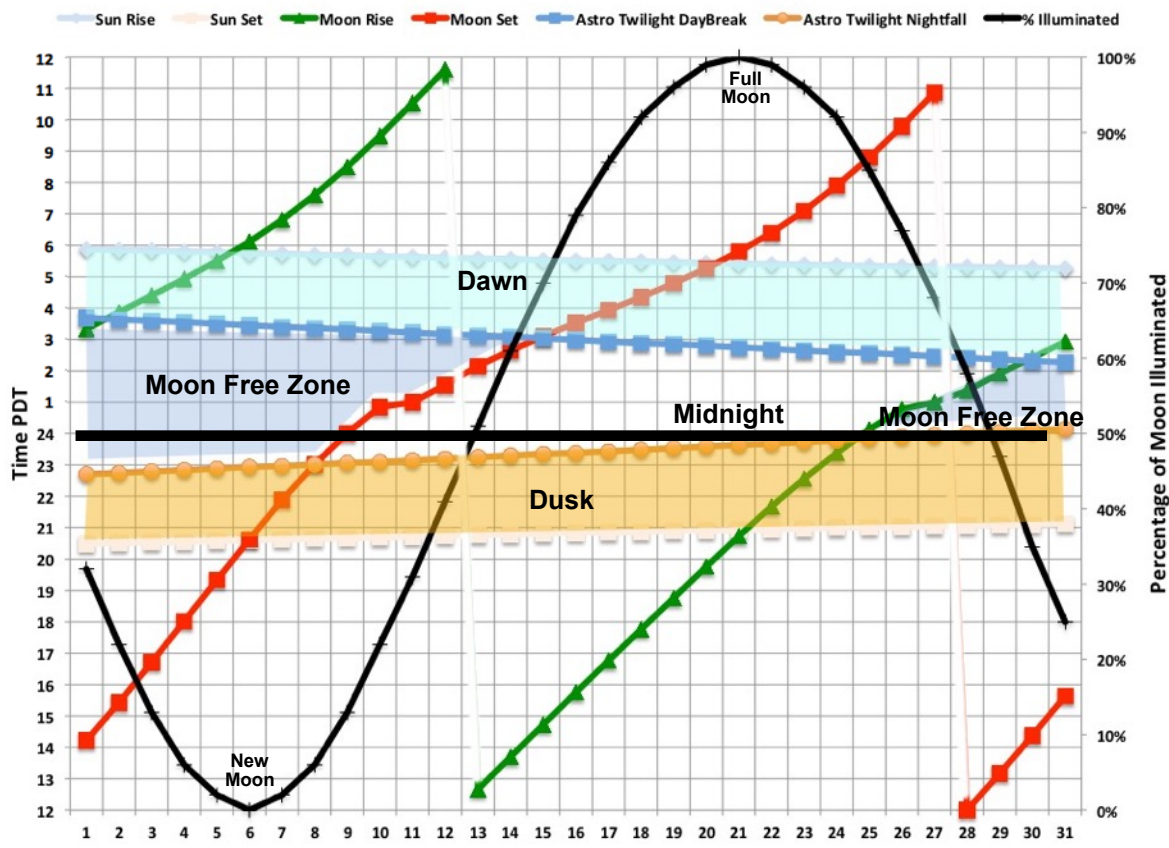




# Victoria Centre Observatory Astro Planner - April 2016



# Victoria Centre Astro Planner - May 2016





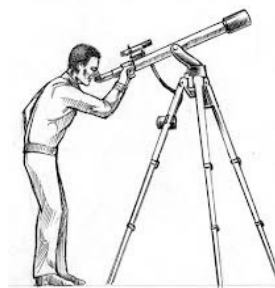
## RASC Victoria Centre Council 2015 / 2016

POSITION	NAME	E-Mail
Past President:	Nelson Walker	<a href="mailto:pastpres@victoria.rasc.ca">pastpres@victoria.rasc.ca</a>
President	Sherry Buttnor	<a href="mailto:president@victoria.rasc.ca">president@victoria.rasc.ca</a>
First Vice President	Michel Michaud	<a href="mailto:vp@victoria.rasc.ca">vp@victoria.rasc.ca</a>
Second Vice President	Chris Purse	<a href="mailto:vp2@victoria.rasc.ca">vp2@victoria.rasc.ca</a>
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Secretary	Leslie Welsh	<a href="mailto:secretary@victoria.rasc.ca">secretary@victoria.rasc.ca</a>
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National Representative	Lauri Roche	<a href="mailto:nationalrep@victoria.rasc.ca">nationalrep@victoria.rasc.ca</a>
Light Pollution Abatement	Dave Robinson	<a href="mailto:lighting@victoria.rasc.ca">lighting@victoria.rasc.ca</a>
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NRC Liaison	James di Francesco	
UVic Liaison	Alex Schmid	
Member at Large	David Lee	

### Online Resources

#### Magazines

[SkyNews](#) Our National RASC Newsletter  
[Sky & Telescope](#) Magazine  
[Astronomy](#) Magazine  
[Astronomy Now](#) Astronomy in the UK  
[Amateur Astronomy](#) Magazine  
[Astrophotography](#) Magazine



### Borrowing Telescopes

The centre has telescopes for new and seasoned observers that members can use. Contact Sid Sidhu from the email list above.