

SKYNEWS



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Next Monthly Meeting
Wed June 14th 2017
7:30 PM - Room A104
Bob Wright Centre
UVic Campus

www.victoria.rasc.ca

On the Cover

M42 The Great Orion Nebula

By Dan Posey

In last month's issue we took a wide angle overview of the Orion Neighbourhood. This month we will get much closer to M42. Dan Posey's image of the Orion Nebula captured extraordinary detail and texture of the envelope of gas and dust. He used the VCO Televue 127 mm refractor and exposures totalled 3 hours 30 minutes. This included 60 minutes with a Canon 6D using a light pollution filter, 70 minutes with a QSI CCD and an additional 80 minutes with the QSI using a hydrogen alpha filter. The gas and dust obscures the inner structure of this system but recent technological advances have enabled astronomers to peer through the veil. What they found was surprising. Some of the amazing imagery was just released weeks ago. **So do not miss this breaking news story which begins on page 4.**

Presidents Report

by Chris Purse

I will start with a riddle this month. Question: What do you call the rainy day between 2 sunny days? Answer: Astronomy day.

Although the weather did not cooperate, this year's Astronomy Day was a fantastic event. Thank you to everyone who contributed and especially Ken Mallory for getting all of us organized. I was pleased to see that there are a more organizations participating with us making it an even better. For example, Knowledge Network of BC approached us this year about showing Space Suite I and Space

Suite II. If you have not seen these short videos they are very enjoyable; both are available on their website (www.knowledge.ca). The Royal BC Museum is an excellent host so I would like to acknowledge their outstanding support.

Despite the rainy weather, we did have quite a good turnout on the hill for our first Summer Star Party so it can only get better with clear weather. As we have such a great facility on our doorstep it is wonderful that we can share it with the public. One of the goals with having more evenings this year is to have more visitors so I do hope we can achieve that goal.

At a recent Astro Café we were talking about apps and websites that we enjoy. One iOS app I shared, that is also available as a website, is called The Scale of the Universe 2 (<http://htwins.net/scale2>). Based on a continuing progression of sizes centred on 1 metre, the user scrolls in either direction to see examples of things that are that microscopic and beyond all the way to some of the largest known objects. There are a number of named astronomical objects included so this is a tool that can be used to show comparative sizes. Did you know that Jupiter would fill more than a third of the distance from the Earth to the Moon? If you look around the $10^{8.5}$ m zone you will see this comparison. The Sun appears around 10^9 m but you don't see Antares until 10^{12} m. It is quite fascinating. If you are interested in the miniature world, great examples of the very small are there as well. Check it out; it is very well done.

A reminder that we are back in our normal room, Bob Wright Centre A104, for our monthly meeting on 10 May.

ALMA

The Atacama Large Millimetre Array Chajnantor Plateau Chile
66 Dishes at elev. of 18000 ft. Large Magellanic Cloud in background.
See page 4



May 10th Meeting Presentation

Imagining Other Worlds by Benjamin Gerard (UVic)

The past 20 years has seen the dawn of a new field in astronomy: extrasolar planets, or exoplanets for short—planets orbiting around stars in other solar systems. We now know that the Universe is teeming with exoplanets, thanks largely to the help of the Kepler space telescope, which finds exoplanets by seeing their shadow on its much brighter host star. Although there are a number of different methods of finding exoplanets, my research focuses on an exoplanet detection technique called direct imaging, which as the name suggests is designed to directly image these other worlds. But this is not as simple as it sounds, and it ultimately requires the use of our most powerful telescopes and specially designed optical systems in order to distinguish an exoplanet from the overwhelming glare of its host star. In lieu of the upcoming total Solar eclipse in August 2017, I'll describe one of these instruments, called a coronagraph, which was first used to observe the Solar Corona without the help of the Moon! After outlining these challenges, both in engineering and in physics, and how they can be overcome, I will highlight the main instruments and detections in this field of direct imaging, and also compare the advantages direct imaging has over other techniques. Come prepared to see real pictures of other worlds!

Benjamin Gerard is a 1st year PhD student in Physics and Astronomy at UVic. He did his Bachelors in Physics and Astronomy at University of Colorado at Boulder and is originally from San Francisco, CA. His research, supervised by Dr. Christian Marois, focuses on optical design and image processing algorithms for instruments made to directly image exoplanets.

See Page 8 for Upcoming Speakers



ASTRONOMY CAFE



Our weekly **Astronomy Cafe** is an excellent, informal, way to meet us. New comers are especially encouraged. <http://victoria.rasc.ca/events/astro-cafe/>

Fairfield Community Centre - 1330 Fairfield Rd. Victoria. 7:30pm.
Contact: Reg Dunkley for further details
vp@victoria.rasc.ca

Every Monday at 7:30 PM



Email Lists

Observer / CU Volunteers / Members

Contact Chris Purse to subscribe
membership@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 Sessions : *Weather Permitting*
Friday October 6th at 7:00 PM



Victoria Centre Observatory: Every Friday Evening.

Open to those on the Active Observers list only

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



UVic 32 Inch Telescope

RASC Victoria Centre Session
2nd Friday of May.

Meet by the Elevator in the Bob Wright Centre at 7PM

Membership Report - May 2017

Total membership is currently **244**. There are 17 members in the grace period which means their membership has expired in the past 2 months. Please contact Chris Purse (membership@victoria.rasc.ca) if you would like to check the status of your membership.

Orion Unveiled

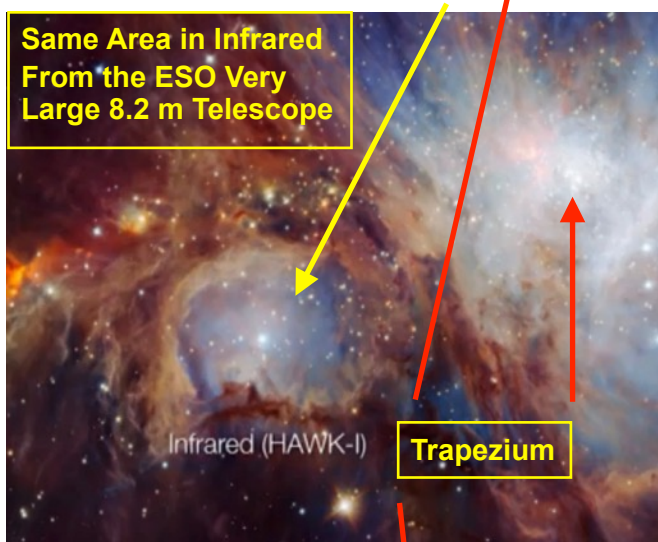
by Reg Dunkley

Compared to the crisp angular nature of the rest of the constellation, Orion's sword is on the fuzzy side. The reason for this diffuse quality is the spectacular Orion Nebula, Messier 42. As Dan Posey's cover photo attests, this object is a thing of beauty and a source of fascination. Through most of the 20th century, astronomers could only speculate about what lays beneath the shroud of gas and dust. Recent technological advances, however, have now allowed us to peer through this veil.

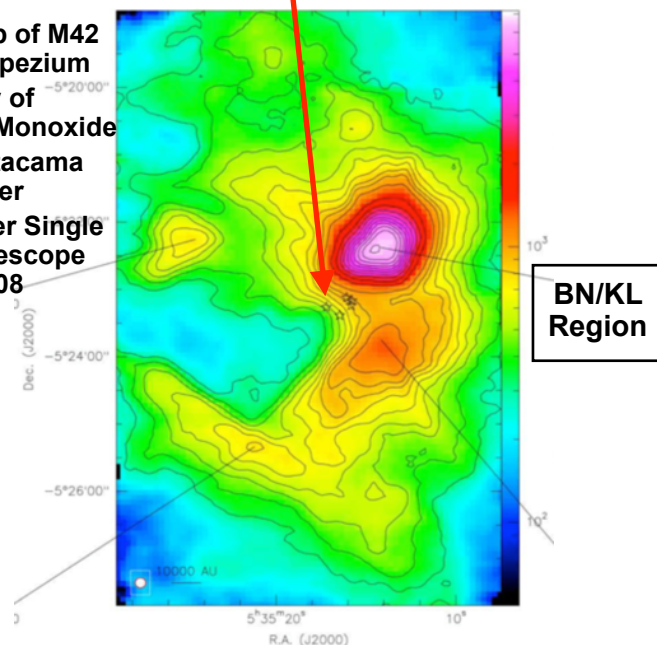
But first some background information. The Great Orion Nebula has got it all. Besides having good looks it is located a mere 1350 light years away ... which makes it our closest nebula. M42 is also an area of rich star formation and is one of the most studied objects in the sky. To top it off it is a BOGO Messier! That is right: *Buy One and Get One* free!. Yes M42's little brother M43 is located just across a narrow dark lane and is usually in the same eyepiece.

It is illuminated by a beautiful cluster of four fiercely burning OB stars called the Trapezium. Their spectra have a strong ultra violet component which ionizes the nearby clouds of hydrogen and other gases. When electrons recombine with the hydrogen nucleus they emit a stunning "hydrogen alpha" red. This colourful veil is a relatively thin "blister" that lies in front of the Orion Molecular Cloud "OMC1" which is the area of active star formation.

How do we know this? Longer wavelength infrared light is less prone to scattering and can penetrate through some of the gas and dust that blocks the visible portion of the spectrum. Compared to Dan's photo on the *top right*, the infrared image on the *centre right* is more transparent and reveals more faint stars. There is a [wonderful mesmerizing video](#) that alternates between visual and infrared imagery over various regions of the Orion Nebula. Photos were obtained with the the ESO 8.2 m Very Large Telescope. The detail that Dan captured with the modest 13 cm VCO scope compares rather well to the 820 cm monster!



Close Up of M42 Near Trapezium
Intensity of Carbon Monoxide
Using Atacama Pathfinder
Millimeter Single
Dish Telescope
Chile 2008
[Source](#)

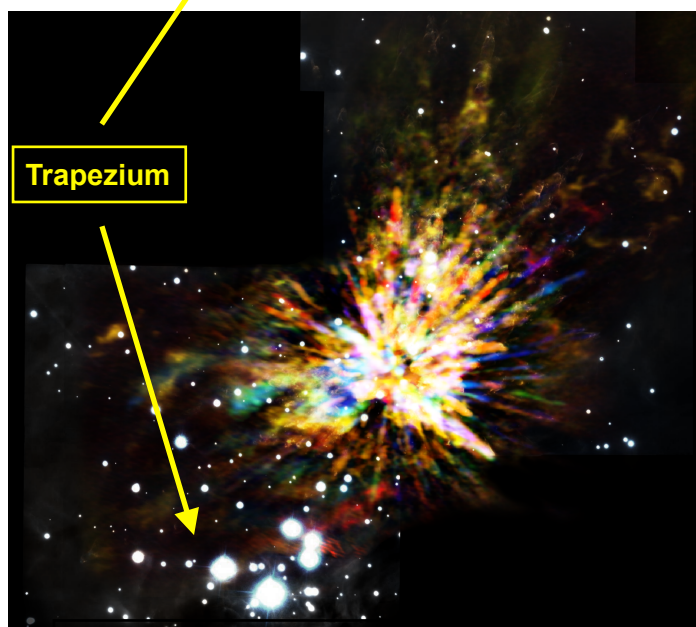


We can even dive deeper into the Orion Molecular Cloud. Many molecules emit electro-magnetic radiation in the longer millimeter wavelength range and are able to traverse the dust and gas which shrouds the stars within this cloud.

The graph on the bottom of page 4 was obtained using a single dish called the Atacama Pathfinder Experiment (APEX). This radio telescope is located at the 18000 foot level in the Chilean Andes to minimize the attenuation due to water vapour. In 2008 it measured the intensity associated with carbon monoxide molecules and detected a pronounced peak near the Trapezium. This feature, called the BN/KL region, refers to two close "infrared stars" discovered in 1965 by Becklin, & Neugebauer and Kleinmann & Low.

In April 2017 spectacular new imagery of the BN/KL region [was released](#). The recently commissioned Atacama Large Millimeter Array (ALMA) focused on this region. It also measured radiation in the millimeter wavelength that was generated by carbon monoxide molecules. On this occasion however, dozens of dishes similar to the APEX instrument worked in concert and obtained much higher resolution data. The bottom image on the right shows a burst of rays radiating outwards from an origin that coincides with the BN/KL region. By working backwards from radial velocities of these rays it appears that an explosion took place about 500 years ago. Early speculation suggests a collision of two young stars. When combined with infrared imagery, shock waves can be detected at the leading tips of these rays.

Compare the position of the Trapezium in the visual image on the top right to the position of the Trapezium in the ALMA image on the bottom right. Notice that there was no hint of a violent explosion in the visual image! The capacity of ALMA to peer through the veil of the nebula and witness the inner workings in star birth areas is astounding. Improving the understanding of star birth, however, is just one of the many fields in which this remarkable



ALMA Carbon Monoxide Data Reveals an Explosion Which Took Place 500 Years Ago Hidden Behind the Veil of the Orion Nebula
Note Colour is Not Realistic

array can be applied. ALMA's initial test images made headlines when it detected planets forming in the disk surrounding a star. And this is just the beginning! Just think when data from ALMA is integrated with imagery from other new exotic telescopes that are arriving on the scene. What a great time to be involved in Astronomy!

Vancouver Island Regional Science Fair - 2017 Awardees by Dorothy H Paul

About 150 grade 4-12 students presented their science projects to judges and the public at the 2017 Vancouver Island Regional Science Fair which took place on April 9th and 10th at the University of Victoria. David Lee and I, individually, visited projects with titles suggesting potential relevance to any aspect of astronomy or dark skies (including the multifarious evils of light pollution) and engaged the authors in discussion about their research. Two were clearly worthy of the Centre's recognition for their well-presented, interesting projects and their able discussion of both theoretical background and limitations of their studies:

George Sleen, Central Middle School, grade 6
Project: *Quelle est la meilleure façon de bloquer les rayons cosmiques?*

Ryan Anbudaiyan, Christ Church Cathedral Educ. Soc. grade 8
Project: *"Space Elevator: Reality or Fantasy?"*

Each received a copy of the RASC's new book **"Explore the Universe Guide"**, along with a family membership in The Royal Astronomical Society of Canada. Welcome to the Centre's newest members, George and Darren Sleen, and Ryan and Anandan Anbudaiyan.

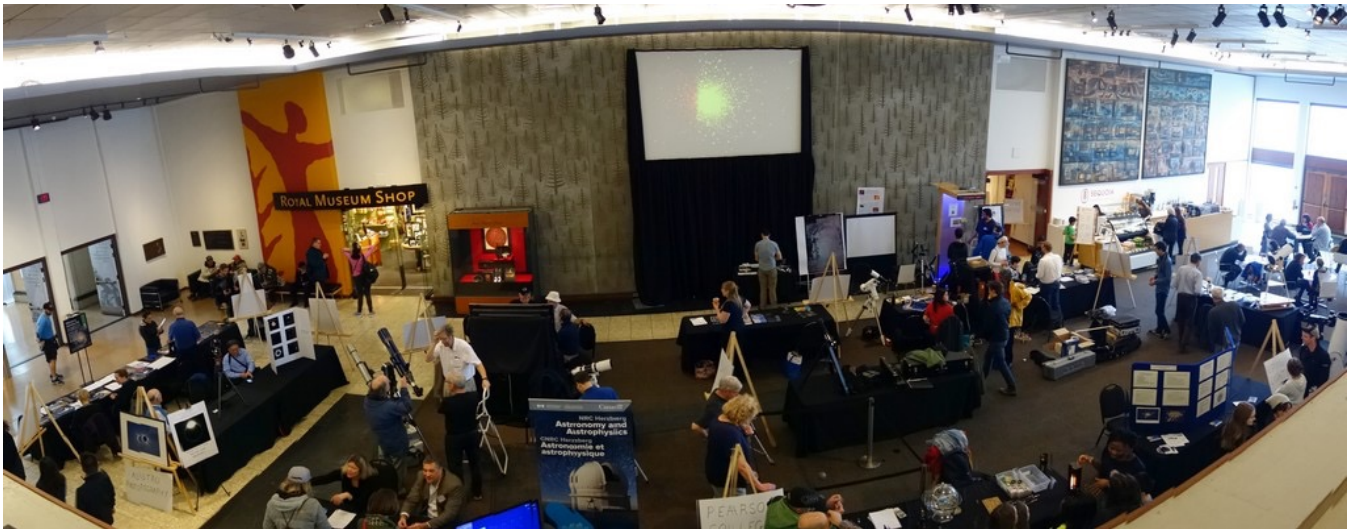


International Astronomy Day Saturday April 29th 2017

Although the weather was not the best it did not dampen the spirits of the Victoria Centre of RASC. At the Royal BC Museum RASCals shared their enthusiasm for Astronomy with the Public who were happy to stay indoors on a dreary day. The event ran from 10 AM to 4PM at the RBCM and then it was off to the DAO for the first star party of the season! Ken Mallory did an excellent job organizing the event at the Museum. The RBCM staff were very helpful. Up on the Hill the Friends of the DAO took the lead with many RASCals also lending a hand. Everything ran smoothly but telescopes were not deployed. Thanks to all the volunteers who made this a great Astronomy Day.



Astronomy Day Photos Taken by Wyman Lee
Many More are on [Zenfolio](#). You Might Be There!



RASC Victoria Centre Council 2016 / 2017

POSITION	NAME	E-Mail
Past President:	Sherry Buttnor	pastpres@victoria.rasc.ca
President	Chris Purse	president@victoria.rasc.ca
First Vice President	Reg Dunkley	vp@victoria.rasc.ca
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Librarian	Michel Michaud (Diane Bell)	librarian@victoria.rasc.ca
Technical Comm Chair / E-Mail	Matt Watson	admin@victoria.rasc.ca
Skynews Editor	Reg Dunkley	editor@victoria.rasc.ca
Public Outreach	Ken Mallory	outreach@victoria.rasc.ca
School Outreach	Laurie Roche / Sid Sidhu	
Telescopes	Sid Sidhu	telescopes@victoria.rasc.ca
National Representative	Nelson Walker	nationalrep@victoria.rasc.ca
Light Pollution Abatement	Dave Robinson	lighting@victoria.rasc.ca
Membership Coordinator	Chris Purse	membership@victoria.rasc.ca
Observing Chairperson	Michel Michaud / Jim Stillburn	obschair@victoria.rasc.ca
Website Content	Joe Carr	web@victoria.rasc.ca
Members at Large		
National Officer	Chris Gainor	
Astro Cafe	John McDonald	
NRC Liaison	James di Francesco	
Nat RASC Anniversary Wrkg Group	Dr. James Hesser	james.Hesser@nrc-cnrc.gc.ca
Nat RASC Anniversary Wrkg Group	Laurie Roche	
UVic Liaison	Alex Schmid	
Observing	David Lee	
Historian	Bill Almond	

Upcoming Speakers

Wednesday June 14th 2017

Dr. Lisa Loche. Radio and Microwave Astronomy – History, Canadian Involvement, and Interesting Tidbits

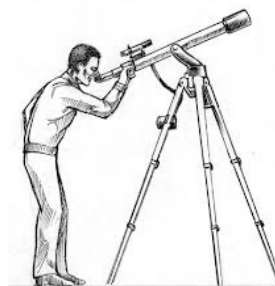
Wednesday September 13th 2017

Ted Stroman. Formation and Geology of the Moon.

Wednesday October 11th 2017

Wendell Shuster. Historical Supernovae

Borrowing Telescopes



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