ROYAL ASTRONOMICAL SOCIETY OF CANADA - VICTORIA CENTRE

SKYNEWS

IN THIS ISSUE

M1 The Crab Nebula
by John McDonald & Garry Sedun

A Winter Splendour
On Alan Whitman's List
See Pages 4 to 6

NEXT MEETING

Next Monthly Meeting
Wed February 8th 2017
Rm A104
Bob Wright Centre
UVic Campus

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On the Cover
M1 The Crab Nebula…*By John McDonald and Garry Sedun*

Messier object number one is the remnant of a supernova explosion observed by Chinese astronomers in 1054. It is included in Alan Whitman's list of Winter Splendours (See Pages 4- 6). This beautiful image was captured on February 6th 2016 at Garry's Arizona observatory using a 20 inch f/4.1 Newtonian Reflector mounted on a Paramount ME.The exposure collected by the SBIG ST2000 XM camera totalled 164 minutes using standard R,G and B filters. An additional 85 minutes date from a Hydrogen Alpha filter contributed to the stunning pink detail..

Presidents Report
by Chris Purse

Happy New Year! As this is the season for making resolutions I thought I would share one of mine. My "astronomy resolution" for 2017 is to spend more time using my telescopes. Looking back in my log, I did not do much personal observing in 2016 so I would like to do much better in 2017. And, when it is cloudy, I plan to devote time to reading and rereading the astronomy books I have in my library so I can optimize my time when I can get out observing.

That got me thinking about a common question we hear at outreach events. That question is how do I know what to look at? Most astronomers do extensive preparation before observing sessions. Part of this process is to determine what part of the sky will be visible from the chosen observing site at the planned observing time. Once that has been determined, references are consulted to see what objects are visible in that part of the sky. This leads to the compilation of a list of targets that may be found and viewed or photographed.

How can a newer astronomer make use of this approach? Perhaps the best method is to complete an observing certificate program. A number of astronomy organizations, including RASC, offer observing programs where a certificate is awarded for documenting the observation of a predetermined list of objects. The advantage of an observing program is that someone has already picked the targets so the participant's task is to find them and record observations. Specifically, RASC offers the Explore the Universe (ETU) certificate as an introductory program with the goal of learning the basics of observational astronomy while observing at least 55 objects out of a list of 110. This list has been chosen to include a selection of interesting objects that can be seen with the naked eye or binoculars from locations in Canada.

The ETU program has been enhanced by the recent publication of a book aimed at providing support to earn the certificate; the new book is called **Explore the Universe Guide**. I recently received a copy and have been reading it with interest. It is well organized and benefits from the work of Brenda Stuart, a member of our centre, who contributed the illustrations. The book starts with some "map reading" skills introducing how to navigate in the sky. It then moves into descriptions of the various targets included in the ETU including the Moon, other bodies in our solar system, deep sky objects, and stars. The text is well written and there are many illustrations to help demonstrate the points being made.

I encourage members to consider working on this certificate program especially those who are newer to astronomy or have never completed an observing list. If sufficient centre members are interested in purchasing copies of Explore the Universe Guide, we may be able to place a bulk order which helps save the shipping charge on individual orders. Please let me know by email at president@victoria.rasc.ca if you are interested in participating in a bulk purchase. The book's list price is around $19 (including GST) and the individual shipping charge is $7.25.

By the way, there are other observing programs offered by the RASC; the list is located at rasc.ca/certificate-programs
Editors Note: Speaking of lists you may want to check out Alan Whitman's list of Winter Splendours on pages 4 to 6 of this issue.

January 11th Meeting Presentation

The MASSIVE Galaxy Survey by Dr. John Blakeslee

The MASSIVE Galaxy Survey is a project to study the structure, internal dynamics, and evolutionary histories of the ~ 100 most massive galaxies visible in the Northern hemisphere out to a distance of 330 million light years. In this project, we combine 2-D "integral-field spectroscopy" on small (sub-arcsecond) and large (arcminute) scales in order to perform simultaneous dynamical modelling of the central supermassive black hole, stars, and dark matter. We also have an ongoing Hubble program to image a high-priority subsample of the MASSIVE galaxies. Goals of the survey include understanding variations in dark matter fraction and stellar mass function, the connection between black hole accretion and galaxy growth, and the assembly of galaxy outskirts over cosmic time. I will describe the survey design and observational strategy, as well as present first results on black hole mass measurements, stellar populations, and molecular gas detections in MASSIVE Survey galaxies.
Bio: Dr. Blakeslee is with NRC Herzberg Astronomy & Astrophysics Programs at the DAO. He studies galaxies and the large-scale structure of the universe using data from the Hubble Space Telescope and large ground-based observatories. He received his PhD degree from MIT and did postdoctoral research at Caltech in Pasadena and Durham University in the UK**.** He then spent five years as a Research Scientist with Hubble's Advanced Camera for Surveys project at the Space Telescope Science Institute in Baltimore. He has worked at the DAO for the past nine years.

See Page 4 for Upcoming Speakers

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

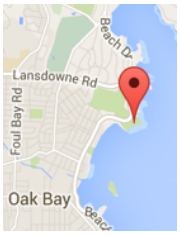
Observer / CU Volunteers / Members

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 February 3rd at 6:30PM
Friday March 3rd at 7:00 PM

Victoria Centre Observatory: Every Saturday Evening.
*Open to those on **the Active Observers list only***
Weather permitting. Dress warmly, and see you out there. Take care driving as it is the slippery season.

Membership Report - January 2017

Total membership is currently **238.** There are 13 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.

All Splendours, No Fuzzies.

On the following two pages please find the list of **Winter Splendours** that were selected by Okanagan Centre RASC member **Alan Whitman.**. Why another list? Well sometimes ***Less is More*** and that is the appeal of Alan's ***All Splendours No Fuzzies*** observing list. He has eliminated some of the more modest Messier objects and has included a number of splendours that deserve more attention. Beware that. Alan has also included a number of Southern Hemisphere targets. So if an object has a declination lower than minus 30 degrees you may want to head south. Table abbreviations are to the right. An empty column has been included to the far right of the table so that you can mark your progress. This list is is not as overwhelming as some so give it a try.

The full list can be viewed at the following link: http://www.ocrasc.ca/All%20Splendor.html The **Fall Splendours** can be found in the October 2016 issue of SkyNews

Upcoming Speakers

Wednesday Feb 8th 2017 at UVic:
Lisa Locke; Microwave Instrumentation
Wednesday March 8th 2017 at UVic
Dr. Julia Foght; "Bugs in Space!? A Microbiologist's View of Astrobiology and the Habitable Zone"
Wednesday April 12th 2017 at UVic
Kyle Oman; TBD
Wednesday May 10th 2017 at UVic
Benjamin Gerard; TBD
Wednesday June 14th 2017 at UVic
Preparing for the Solar Eclipse. … Information and Hints from Several Speakers

A	**component A of a double or multiple star**
adj	**adjacent**
B	**component B of a double or multiple star**
B	**(with number) Barnard's catalogue of dark nebula**
C	**component C of a multiple star**
CC	**concentration class for globular clusters, from I to XII**
Cl	**cluster(s)**
cn*	**central star of planetary nebula**
d	**degree**
Dbl	**double star**
dl	**dark lane in galaxy or emission nebula**
DN	**dark nebula**
EN	**emission nebula**
G	**galaxy (with type)**
GC	**globular cluster**
IC	**Index catalogue**
-in	**inch (as in "8-in", meaning a telescope of 8-inch aperture)**
inv	**involved**
LMC	**Large Magellanic Cloud**
M	**Messier catalogue**
m	**visual magnitude**
mag	**visual magnitude**
Mlt	**multiple star**
[name]	**the originator of a descriptive name**
NE	**visible with the unaided eye**
Neb	**nebula**
NGC	**New General Catalogue**
OC	**open cluster**
OIII	**An Oxygen III nebular filter is recommended**
p	**photographic magnitude**
PN	**planetary nebula**

ID	Con	Type	RA(2000)	Dec	Mag	Size(')	Remarks	
1365	For	G-SBc	3 33.6.	-36 08	9.5	14x10	The finest barred spiral	
Pleiades	Tau	OC	3 47.0	24 07	1.2	120	M45; NE; Merope RN is L-shaped	
f	Eri	Dbl	3 48.6	-37 37	4.9,5.4	8"	Yellowish st	
32	Eri	Dbl	3 54.3	-02 57	4.5,6.1	7"	Topaz, greenish	
Hyades	Tau	OC	4 20	15 38	0.8p	400	NE; very large, V-shaped	
1566	Dor	G-Sc	4 20	-54 56	9.4	13x9	Two very long spiral arms	
1851	Col	GC	5 14.1	-40 03	7.3	11	CC II	
h3752	Lep	Dbl	5 21.8	-24 46	5.4,6.6	3.5"	Gold, blue; GC M79 36' ENE	
LMC	Dor	G-SBm	5 23.6	-69 45	0.6p	432	NE; many EN and Cl inv	
M38	Aur	OC	5 28.7	35 50	6.4?	21	Difficult NE; OC 1907 and NE OC M36 adj	
M1	Tau	SNR	5 34.5	22 01	8.4	6	Crab Nebula [Lord Rosse]	
M42/43	Ori	EN	5 35.4	-05 27	4	66	Orion Neb; Trapezium Mlt inv; greenish-gray; 16-in: reddish-brown areas; DN inv; RN 1973+ adj	
2070	Dor	EN/OC	5 38.6	-69 05	8.2	40	NE; Tarantula Neb in LMC	
Sigma	Ori	Mlt	5 38.7	-02 36	3.7	---	Bluish; eight st	
2024	Ori	EN	5 41.9	-01 51	---	30	Flame Neb; with branching dl	
M37	Aur	OC	5 52.4	32 33	5.6	24	Difficult NE; Ri: 150 st	
M35	Gem	OC	6 08.9	24 20	5.1	28	NE; Ri; OC 2158 and IC 2157 adj	
8	Mon	Dbl	6 23.8	04 36	4.4,6.7	13"	Yellow, bluish	
Beta	Mon	Mlt	6 28.8	-07 02	4.7,5.2	7"	C mag 6.1 at 2.8"; three blue-white st	
2237+	Mon	EN	6 32.3	05 03	---	80x60	Rosette Neb; UHC reveals DN inv; NE OC 2244 inv	
M41	CMa	OC	6 47.0	-20 44	4.5	38	NE	
M50	Mon	OC	7 03.2	-08 20	5.9	16		
h3945	CMa	Dbl	7 16.6	-23 19	5,7	26.6"	yellow, blue	
2392	Gem	PN	7 29.2	20 55	8.3	0.2	Clown-Face Neb [Burnham]; blue-green	
Alpha	Gem	Mlt	7 34.6	31 53	2.0,2.9	5.2"	Castor: white, blue-white; C mag 9.1 at 73". Sep. changing quickly. Data 2016	
k	Pup	Dbl	7 38.8	-26 48	4.5,4.8	10"	Both white	
M46	Pup	OC	7 41.8	-14 49	6.1	27	Ri M46 has PN 2438; NE OC M47 adj	
M93	Pup	OC	7 44.6	-23 52	6.2	22		

ID	Con	Type	RA(2000)	Dec	Mag	Size(')	Remarks	
2451	Pup	OC	7 45.4	-37 58	2.8	45	Orange c Pup inv	
2477	Pup	OC	7 52.3	-38 33	5.8	27	300 mag 12 st	
2516	Car	OC	7 58.3	-60 52	3.8	30	NE	
Zeta	Cnc	Mlt	8 12.2	17 39	5.6,6.0	5.8"	Three yellow st; B mag 6.3 at 1.1". Sep. changing quickly. Data 2016	
M44	Cnc	OC	8 40.1	19 59	3.1	95	NE; Beehive Cluster; many Mlt	
IC 2391	Vel	OC	8 40.2	-53 04	2.5	50	NE; bright st	
Iota	Cnc	Dbl	8 46.7	28 46	4.0,6.6	30"	Yellow, blue	
M67	Cnc	OC	8 50.4	11 49	6.9	18		

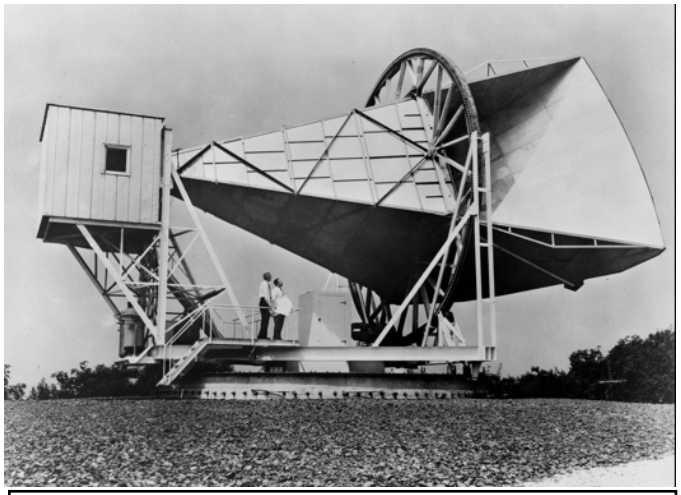
Big Bang's Thermal Footprint

by Reg Dunkley

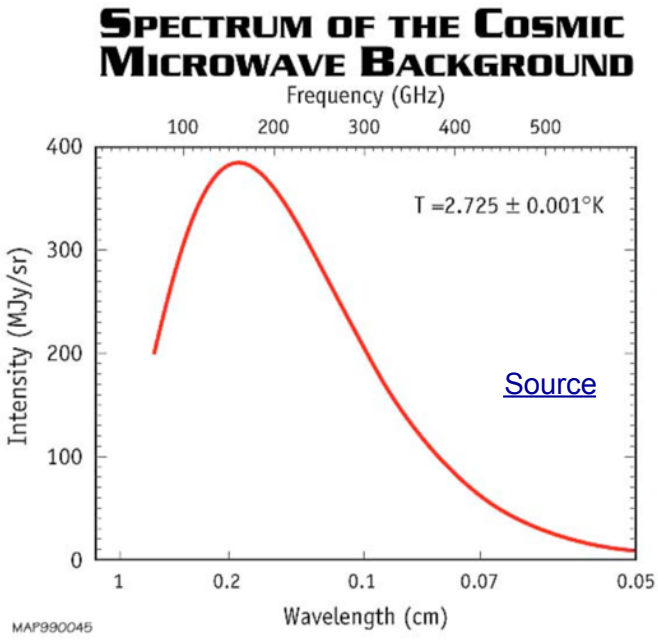
At first they blamed it on the pigeons. But after removing the bird droppings and nests from the Holmdel New Jersey microwave antenna it was still there … a weak hiss at 4.080 GHz that was the same strength in every direction. The effective noise temperature was 3.5 K higher than expected. Bell Laboratory Radio Astronomers Arno Penzias and Robert Wilson could not figure out the source of this radiation.

It just so happened that a team of cosmologists at nearby Princeton including Robert Dicke and Manitoban born James Peebles had just predicted that there should be a thermal remnant of the Big Bang with a black body background radiation temperature of about 10K. They were in the process of building their own equipment to try and detect "cosmic background radiation". When Penzias read a preprint of Peebles paper he called up Dicke and invited him over. Dicke soon realized that the Bell scientists had indeed detected the Cosmic Microwave Background (CMB) and said to his team "Boys we have been scooped".

In 1965 Penzais and Wilson published a short letter cryptically entitled "A Measurement of Excess Antenna Temperature at 4080Mc/s". Not what you would consider aggressive marketing. But the word got out and the impact of this discovery provided evidence for the Big Bang model. Penzais and Wilson received the 1978 Nobel Physics prize for this achievement.



Bell Lab Holmdel Microwave Antenna



Black Body Radiation and Temperature

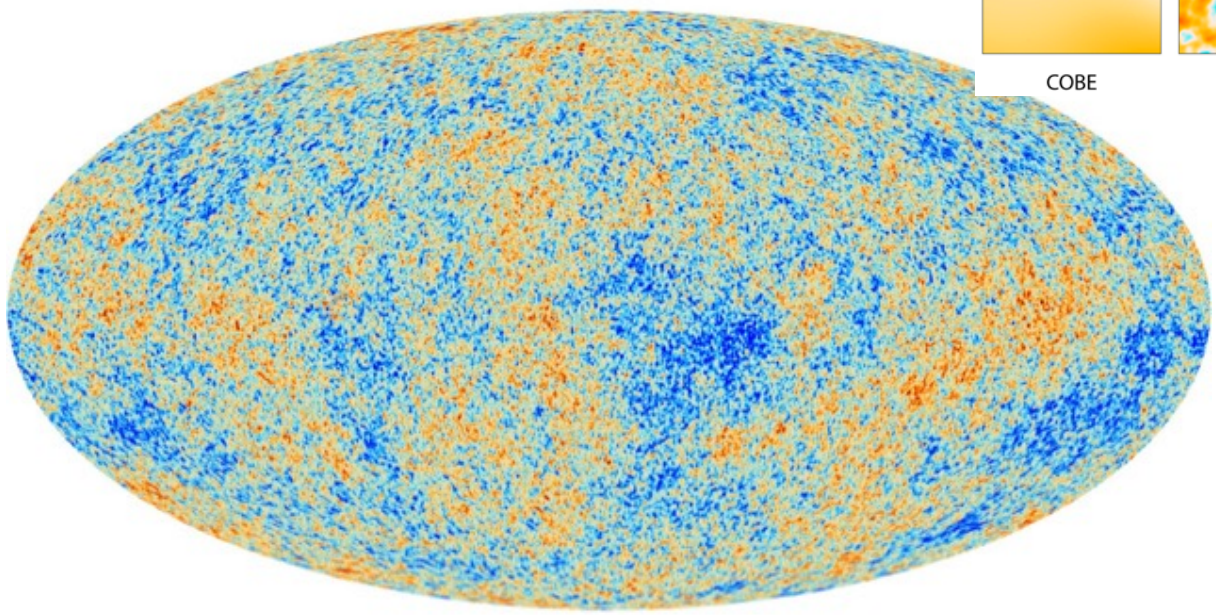
A perfect black body does not reflect any light. It absorbs all the energy and in order to maintain thermal equilibrium re-emits the same amount of energy in a continuous spectrum. There is a wavelength in this spectrum where this emission peaks and it is dependant on temperature. This **peak wavelength** gets **longer** when the black body **temperature decreases**. Cooler stars appear red (longer wavelength) while hotter stars appear blue.(shorter wave length). This also works with very cold black bodies where wavelengths are in the millimeter range. By measuring the peak wavelength we can determine the black body temperature.

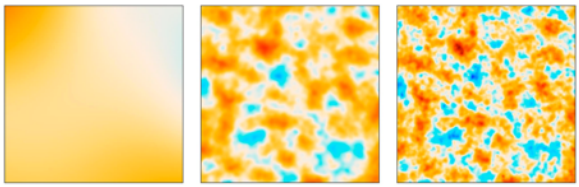
The discovery of the CMB generated great interest and a number of observation programs followed. Four space based sensors have been launched. The Russian RELIKT-1 experiment was launched in 1982. The NASA COBE (cosmic background experiment) operated between 1989 and 1993. The NASA WMAP (Wilkinson Microwave Anisotropy Probe) operated between 2001 and 2010. The ESA Planck space observatory operated between 2009 and 2013. Planck observations were a substantial improvement on it's predecessors, in the angular resolution, observed bandwidth (nine sensors) and thermal resolution. It orbited in the stable Lagrange 2 position which is where GAIA is currently operating. To reduce noise the sensors were cooled by helium to 0.1K above absolute zero … possibly making it the coldest location in the Universe!

The most striking thing about the CMB is that it is extremely uniform. Variations in temperature about the mean of 2.725 K were on the order of 0.0001K so the instruments had to be extremely sensitive. These variations or **anisotropies** are of great interest. For the anisotropic information detected by COBE, John Mather and George Smoot won the 2006 Nobel Physics prize. It also confirmed that the CMB spectrum was in perfect agreement with a theoretical Black Body.

Considerable effort is required to remove variations caused by the motion of the local group of galaxies, effects due to the Milky Way and interstellar dust. The Planck dataset is still undergoing quality control.

So why are these minute variations in the Big Bang's thermal foot print of such interest? Well remember all of those bubble like voids, walls and superclusters discovered by the cosmic redshift survey (December SkyNews). They may be the result of these ripples at the dawn of time. A new BC telescope will be studying the progression of these ripples. Stay Tuned!





Above
Resolution differences of probes.
Left
Cosmic Microwave Background as Seen by Planck.
A Snapshot of **The Oldest Light In the Universe**
13.7 Billion Years Ago!. Source

RASC Victoria Centre Council 2016 / 2017

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UVic Liaison	Alex Schmid	
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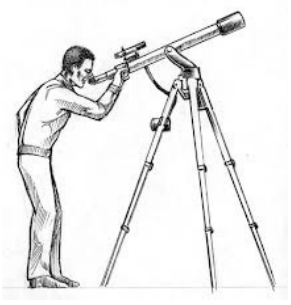
Online Resources

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