Nova Notes

The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

PO Box 31011, Halifax, Nova Scotia, Canada B3K 5T9 www.halifax.rasc.ca halifax@rasc.ca

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In this issue:

Front page photo: Comet Holmes
Blair McDonald on October 29th 2007 4.59 am

The comet was passing in front two stars that are seen shining in the background.

From the editor *Quinn Smith*

With the sudden outburst from comet Holmes, and then its' subsequent evolution, the last month or so has been a fascinating time for observing. I had just borrowed an 80mm apo the day before the primary outburst occurred, and I quickly came to appreciate the joys of an easily portable scope to follow this event.

Now, with Holmes fading, Mars is quickly approaching opposition and, this year, positioned high in the sky. It should provide some great viewing opportunities. Apparently it's going to be as big as the Moon!!!!!!!! (at least according to an E mail spoof during the last opposition). Actually, I haven't seen that particular email around much this year (but there's still time).

Speaking of time, please try to attend the December AGM, to help select your new executive. Along with the elections, Pat will probably be giving one of his famous financial statements. Will there be eclipsing pie charts? How much inventory will be placed in a fourth dimension to balance the books? Will he need to invoke anti matter again? I am breathless with anticipation!

Meeting Announcements

Meetings begin at 8:00 p.m.

Meetings are held every third Friday of the month, except for the months of July and August.

Meetings take place in room 176, Loyola Building (#3 on map) at Saint Mary's University.

All members—but especially new ones—are invited to come to the meetings 20 – 30 minutes early to participate in our new informal "Meet and Greet". It's a chance to ask questions about astronomy, the RASC, memberships, or to just say hello.

Executive meetings begin at 7:00 p.m., and members are welcome to attend.

Next Meeting Dates:

Please note that the December meeting date is the 14th and the room will be #296.

December 14, 2007 - AGM
Our annual general meeting with short talks from Centre members on light pollution.

January 18, 2008 - Regular meeting
Our regular meeting with short talks from Centre members.

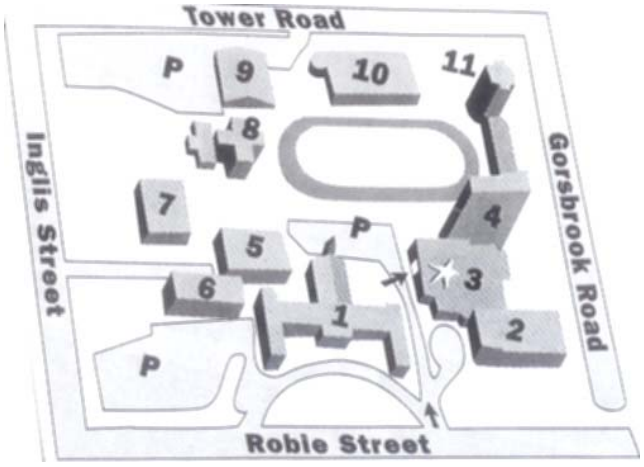
February 15, 2007 - Speakers night
John Jarvo and Paul Grey will be discussing RASC observing programs.

[The content of all meetings is subject to change]

Meeting Location:

1. McNally
2. Sobey Building
3. **Loyola Academic Complex**
4. Loyola Residence
5. Patrick Power Library
6. Science Building
7. Burke Building
8. Bookstore
9. Alumni Arena
10. The Tower
11. Rice

P Parking



Halifax RASC Executive, 2007:

Honorary President	Dr. Roy Bishop	902 542 3992
President	Paul Evans	902 827 5977
1st vice-president	Gary Weber	
2nd vice-president	Alex LeCreux	404-5480
Secretary	Wes Howie	835-3966
Treasurer	Pat Kelly	798-3329
Nova Notes Editor	Quinn Smith	852 3894
National Rep.	Pat Kelly	798-3329
Librarian	Gilles Arsenault	864 6654
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Councilor	Paul Heath	457 0610
Councilor	Jim Dorey	464-8781
Councilor	— ? —	

Daytime Venus

Dave Chapman

This year Thanksgiving weekend was a glorious three days of cool, dry, and sunny weather. The sky was particularly transparent, and a chance pairing of Venus and the Moon in the daytime made it possible to locate Venus and observe it as a daytime celestial object with the unaided eye. Next to the Sun and the Moon, Venus is the brightest object in the sky: usually one sees it in the morning or evening twilight, as it never strays far from the Sun (being on a smaller orbit than Earth). Science journalist and friend Dan Falk alerted me to this possibility by inviting me to a Facebook event "I'm going to look for Venus in the middle of the day today".

In principle, one should be able to see Venus any day, as long as the sky is clear enough. The problem is that one has to know exactly where to look. At night, one's sensitive peripheral vision aids detection of objects outside of the central field of view, but the bright daytime sky disables this faculty, as pointed out by Prof. (retired) Roy Bishop. To see Venus in the daytime, one has to look directly at it; accordingly, a pointing device is needed.

This where the Moon comes in. It is a misconception that the Moon only appears in the sky at night. That is true half the time. This weekend, the waning crescent Moon slowly passed by Venus over an interval of 3 days, and was easy to find in the daytime sky, being larger and brighter. From the Moon, one could find the way to Venus using their relative positions. (I use a program called Voyager III on the Mac, but there are several others, including Dave Lane's Earth-Centred Universe, for PC/Windows.) Once the approximate location of Venus is known, a little scanning with the eye will bring it into view. Once found, it appears as a tiny but brilliant pinprick of light, yet if one's vision is averted even a little, Venus will be lost.

I first found Venus on Friday, about 10 degrees from the Moon. (Stretch out your hand and splay the fingers apart. The angle between your thumb and little finger is about 10 degrees.) Venus was between the Sun and the Moon, a little below the line. I alerted some astronomy friends to this and they also found it. Mary Lou Whitehorne in Bayswater described it as "brilliant" (literally). Gilles Arsenault and John McPhee (in The Valley) also found it easily. I confess that I used binoculars to find it first, but others did not need this aid. It should be mentioned that the previous night had been reported as remarkably transparent and dark.

On Saturday the Moon was closer, the distance between the first and second fingers making a Peace sign (or V-for-victory, if you prefer). More viewers were conscripted, including my wife, Chris. Sherman Williams of Avonport was using it to compare the visual acuity of his left and right eyes. Roy Bishop (also Avonport) reported seeing Venus, and reports also came in from Curt Nason and Terry Trees in New Brunswick.

On Sunday, the Moon was even closer, although now the Moon was closer to the Sun than Venus. Two closed fingers between Venus and the Moon. This day, I found Venus without really trying. The temperature had taken a sharp drop and those who know about such things (Paul Gray) were attributing the improved sky transparency to a mass of cold, dry, Arctic air. More reports came in from Paul Gray, Keith Lowe, Mike Gatto, Paul Evans, Tony McGrath, Larry Bogan, and Blair MacDonald, who took an amazing photograph viewable at http://www.pbase.com/astronut/image/86816759 The detailed reports from these observers are viewable on the hfxrasc discussion archives http://crux.stmarys.ca/mm21/listinfo/hfxrasc

It is interesting that all the successful reports came from the Maritimes; none from the rest of Canada. Are we keeners? Blessed with perfect sky conditions? Ironically, neither instigator Dan Falk (smoggy air in Toronto) nor noted unaided-eye observer Dave Turner (raining in Victoria) saw Venus. Better luck next time!

Congratulations, apologies errors, and thanks

From the editor

(A short column—which will grow longer as I make more mistakes)

First things first—congratulations to our very own Dave Lane, who is one of the three nominees for "Science Champion" in the 5th Discovery Awards. On November 29, there will be a gala dinner to "honour and celebrate Nova Scotia's science and technology superstars; the originality of their ideas, the quality of the work, and contributions to our province and, indeed our world.". Way to go Dave!

Now I have an apology to Paul Gray. In the last newsletter I failed to credit him with much of the material supplied in the article about Mary Lou Whitehorne "Asteroid Queen". Thank you Paul (now, of course, we're both in trouble with Mary Lou).

To fulfill the anticipation of the title - an error (only one you ask?) In the same article about Mary Lou, it was not Clint sitting with Mary Lou on the asteroid but Norm Scrimgeor. Boy, they do look alike from a distance of several million miles! (I'm keeping the rest of the mistakes to myself.)

Finally I want to thank Pat Kelly for taking such detailed notes, and writing reports, from the last two meetings.

Monthly Meeting Report

October 19th 2007
Pat Kelly

There was a packed house for the October meeting. After the usual introductory announcements by Paul Evans, we were introduced to the main speaker, Dr. Marcin Sawicki.

Dr Sawicki is one of the newer members of the Department of Astronomy and Physics at St. Mary's University. His talk was called: “Galaxies: Structure Formation in the Universe from First Light to Red-shift Zero”.

He noted that it would be difficult to gear a talk for such a wide range of people but hoped that everyone would learn something from his talk.

He started with a quick review of our understanding of the Milky Way. It, like many other galaxies, is composed of stars, gas, dust, and dark matter. It is the complex interactions between these components that is difficult to model.

He then reviewed the history of our understanding of galaxies. Herschel's amoeba-like sketch implied that there was only one galaxy, ours. That was the prevailing thought until the early 1900’s. The Curtis-Shapley debate over whether there was one galaxy or many, was not really resolved until Hubble showed that there were other galaxies, and that the farther they were from us, the faster they were receding.

Dr. Sawicki, looked at some of the tools that astronomers use to help learn more about galaxies. One of these tools is making observations at multiple wavelengths. This requires the need for space telescopes as many wavelengths do not make it the Earth's surface.

He showed examples (such as M81) in visible light and in infrared. The infrared view showed warm dust and that the arms were much brighter than the nucleus, the opposite of the visible-light image. Similarly, M31 in the wavelength of carbon monoxide shows where this "delicate" molecule is located. It is only found in cool gas, so it is a tracer of star-forming regions.

X-ray studies of NGC1569 indicate hot gas, which is flowing from the galaxy out into the intergalactic medium. Areas with high rates of star formation typically show this type of outflow. This is the type of thing that makes galaxies so hard to model. They interact with the gas around them.

There is an exchange of material between intergalactic gas, interstellar gas in the galaxy, stars, and stellar remnants. Over time the flow will change direction between these components, requiring complex models to predict behavior.

Dr Sawicki now looked at the question of where galaxies came from. He noted that astronomers have just reached the point where they can start to answer the question. That brought us to another tool, red-shift.

Since the speed of light is finite, it means that we can use telescopes as time machines. Hubble's Law relates distance with recessional velocity, and the distance tells us how far back in time we see the galaxy. The number that is often used to measure this is z, where z = (observed wavelength/ original wavelength) - 1. At the present time, z=0. z=1 corresponds to a universe that was 6 billion years old (6 billion years after the Big Bang), z=2 to a universe that was 3 billion years old, z=6 to an age of 1 billion years. At the instant of the Big bang, z has a value of infinity.

To see galaxies at larger values for z, requires big telescopes. As a comparison, he looked at the human eye versus the Keck telescope. In terms of collection area, the Keck has an advantage of a factor 4,000,000. The detection efficiency of the telescopes sensors gives Keck another factor of 90x. Lastly, the exposure time (say one second versus one hour) gives the Keck another factor of 3600. All told, the Keck is about 1 trillion times better than the human eye. One could also say that it is better that the combined optical systems of all 12 billion human eyes on the planet.

With larger instruments, one finds that galaxies in the past looked very different than they do now. For values of z=2 and greater, the rate of star formation was about ten times greater than it is now,

We then saw a timeline of galactic formation, and Dr. Sawicki explained that we really don't know much about the period where z is greater than 6. It is suspected that galaxies and the first quasars formed in the region from z=10 to z=30. In order to see back to this period, ever larger telescopes will be required.

There are three telescope projects in which Canada is participating that will help to unravel some of these questions.

The first project is the Altiplana Large Millimetre Array (ALMA). It is already under construction and will eventually have a total of 64 13-metre dishes. This instrument will provide a huge gain in both sensitivity and resolution. The total price tag is about a billion dollars.

The second project is the James Web Space Telescope (JWST). It is the "successor" to the Hubble Telescope. It is optimized to see into the infrared. The mirror, at 6.5 metres in diameter, is presenting a challenge as it will have to be '"folded" in order to get it to fit into a launch vehicle.

We viewed an interesting animation that showed the way the spacecraft will unfold itself. Unlike the Hubble Telescope which is in low Earth orbit, the JWST will be located at the L2 Lagrangian point beyond the Moon's orbit. At this distance, it will not be possible to make service calls and repairs. It is hoped that the sensitivity and resolution of this telescope will allow us to see galaxies in the process of forming.

When Canada signed onto this project, we were committed to paying 5% of the initial cost of one billion dollars ($50 million) and were guaranteed 5% of the telescope time.

Fortunately we were not liable for any project cost overruns. The estimated cost is now closer to $4.5 billion and so our $50 million will still get us 5% of the telescope observing time. And the best part is that we will be paying in US dollars! The only drawback is that if it goes ahead it will likely not be on site until at least 2013.

The last instrument goes by the acronym of TMT. The second and third letters stand for “Metre Telescope”. The first letter stands for either Twenty, Twenty-five, or Thirty, depending on who you talk to. This telescope will operate in both visible and near-infrared wavelengths. Being a ground-based instrument it will incorporate the latest in adaptive optics. We saw a slide of a Hubble image of a faint galaxy, and an "expected" view of the same galaxy with the TMT. The TMT will also make the perfect complement to the JWST as it will be able to do spectroscopy of very faint objects. As Dr. Sawicki said, it will be one kick-ass telescope!

There are five sites currently being tested, three in Chile, one in Mexico, and Mauna Kea (Hawaii). The Hawaiian site is limited to the number of telescopes which can be placed there, and one proposal would see the Canada-France-Hawaii Telescope removed to make way for this one. Canada will be one of four partners, each of which will pay 25% of the expected billion dollar cost, in exchange for 25% of the observing time. Two of the larger universities in California are interested, as are the Japanese, if the site is in Hawaii.

The last part of the meeting was the "What's Up", presented by Roy Bishop. He noted that the "what's up" for 2008 is available to everyone in the 2008 edition of the Observer's Handbook (now out).

Roy did the talk based on what he has actually been seeing lately. In the morning, Saturn's rings are beginning to close rapidly. Mars is getting larger, and Venus is quite prominent and will be joined soon by Mercury.

In the evening sky, Jupiter is fading, getting lower in the west. Uranus and Neptune are both easy targets. Roy noted that he had recently seen Neptune's largest moon, Triton, and with his large telescope at 600x he had been able to spot Titania and Oberon of Uranus. Ariel was the same magnitude as Oberon, but so close to the planet that it was lost in the glare. He also noticed that since the plane of the Uranian system is coming closer to Earth that Uranus' moons now tend to line up like Jupiter's but at a right angle to their motion against the background stars.

The largest Full Moon of the year was coming up the following weekend, which would produce really high tides in the following days.

Lastly. there had been some recent daylight sightings of Venus which are greatly aided when the Moon is nearby. Roy noted that another opportunity will occur on November 5, when Venus will be 3.5° north of the Moon.

There was an interesting discussion after the meeting of the efficiency of the human eye versus CCDs. The factor of 90 (as mentioned in the talk) is likely too high. However the Keck is still a lot better that human eyes for seeing faint galaxies.

A lot better!

HALIFAX CENTRE

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PO Box 31011, Halifax, Nova Scotia, B3K 5T9

E mail: novanoteseditor@rasc.ca

Newsletter editor: Quinn Smith

Nova Notes is published bi-monthly in February, April, June, August, October and December. The opinions expressed herein are not necessarily those of the Halifax Centre. Articles on any aspect of Astronomy will be considered for publication.

Deadline for the next edition is January 20th 2008.

If you are a member who downloads the latest issue of Nova Notes from our website, you may be interested in taking your name off of the mailing list for the printed version. If so, please E mail me at the above address, with the subject line “Remove from mailing list”, and you will no longer be mailed a paper copy.

Monthly Meeting Report

November 16th 2007
Pat Kelly

There was a big turnout for the November meeting. After the usual introductions, Paul Evans had a few announcements.

David Lane has been nominated for one of this year's Discovery Centre Awards for Science and Technology. It was noted that it was quite an achievement to be nominated for the award, and previously both Mary Lou Whitehorne and David Chapman had been nominated. We wish him the best.

The Centre has a few new promotional items: a ball cap, a toque, and a commemorative coffee mug to mark the 100th edition of the Observer's Handbook. Anyone wanting one will have to wait for a re-order as I think that former editor Roy Bishop, cleaned out the remaining stock!

Lastly Paul wanted to thank everyone who had participated in the recent survey. There was a good return rate, and lots of good suggestions for ways to improve the Centre. If you haven't sent your in, it is not too late.

It was then on to the main presentation, which was a look at digital single reflex cameras (DSLRs) in three acts.

Up first was Roy Bishop, who claimed that he was going first because he did not yet own a DSLR! He started with a quick review of the advantages and disadvantages of digital cameras compared to film. One disadvantage of digital images is that they are subject to loss in so many ways. He noted that if you really want a digital image to last, you should get it printed as a black-and-white print.

He then gave a brief description of electronic image sensors, starting with the Charge-Coupled Device (CCD) which was originally developed in the 1970s. There are three varieties of CCD: the full-frame, the frame-transfer and the interline transfer CCD. One of the problems with CCDs is that to get the image from the chip, the charge has to be passed from pixel to pixel, which is time-consuming and uses a lot of power. In 1993 a new technology, Complementary Metal-Oxide Semiconductor (CMOS) was developed which eliminated both of these problems.

Roy then looked at image quality. He noted that in a perfect system, each point in the object would correspond to a point in the image. In practice, each point in the object corresponds to a "blob" in the image. The factors that contribute to "blob formation" fall into two types:

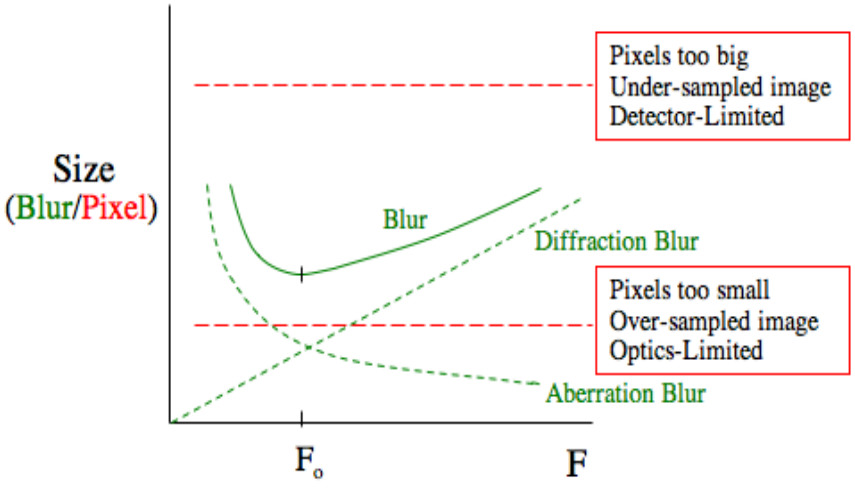
(1) aberration inherent in lens design (spherical aberration, coma, etc.) and aberration due to imperfect manufacturing tolerances, mounting tolerances, and imperfect focus;
(2) diffraction.

Design aberrations increase with lens size, and decrease as the f-number of the system increases. Diffraction is the same for all lens sizes and depends only upon the f-number, increasing linearly with f-number. Roy showed a neat graph that showed the net effect of aberration and diffraction. For a given lens size there is an "ideal" f-number where the combined effects are at a minimum. For "point and shoot" cameras it is about f/8; for 35-mm systems it is about f/11, and for large-format cameras it is about f/22.

Another item related to image quality is that a camera can be optically limited. The minimum size of the aberration-plus-diffraction "blob" is about 20 µm. Because the public thinks that more mega-pixels means better photos, manufacturers oblige, crowding more and smaller pixels into the small sensor chips of point-and-shoot cameras.

As Roy noted, there is no "new" optical image data in these cameras; a camera with larger pixels and a smaller mega-pixel rating would work as well. That is, most point-and-shoot digital cameras are optics-limited. It is similar to the 1000x claims on 60-mm department store telescopes; the public wants to see a bigger number even when they don't understand that bigger number is not an improvement. To get improved resolution and sharper pictures you need to go to a larger format. That means a physically bigger chip, which means a bigger camera.

As an example, the sensor in Canon's low-end DSLR is 15 x 22 mm, ten times the area of the sensor in a typical point-and-shoot camera, and the pixels are five to ten times larger in area, resulting in a better match to the detail available in the optical image, better resolution, greater sensitivity, and greater dynamic range.



The second part of the evening was covered by John Liddard.

John pointed out that DSLRs are the new "big market" for the camera manufacturers. There are many reasons including improved creative control, fast focus with no shutter lag, through-the-lens viewfinders, better construction and ergonomics, and lots of accessories; and astronomers are known for their love of accessories! He reviewed many of the settings that are available on most cameras.

That was followed by an explanation of the passive auto-focus system and why it is so much faster that the older contrast method. John discussed methods of data storage and covered the common types of storage units.

When it comes to the size of the sensors, he showed a diagram that showed the relative sizes of all of the ones in use. All are smaller that the traditional 35-mm frame size, although some of them come close While many DSLRs will let you use the lens from older optical SLR cameras, one can run into problems because these lens were designed to make the image cover a full 35-mm frame.

John finished up by looking at how these cameras could be used in piggy-back mode. He presented a table that showed the maximum exposure time that one could use, on a static camera, before the stars showed streaking (due to the Earths rotation). It depends on the declination of the area being imaged, and the focal length of the lens being used. Maximum exposure time increases as both declination increases, and the focal length decreases (see chart). Focal length also affects the field of view of the camera, and can vary by a factor of ten.

The final presentation was by Blair MacDonald.

Blair started by saying that the good news is that there are lots of choices for anyone getting into digital cameras. The bad news is that there are lots of choices for anyone getting into digital cameras. Blair reviewed the strengths and weaknesses of the five types of camera systems that are available: film, "point and shoot" digital cameras, webcams, CCDs, and DSLRs.

Film:
Easy to use, telescope acts as lens BUT no preview, limited processing capability, grainy.

Point and Shoot:
Good for lunar and planetary BUT limited in exposure length and at low light levels, plus you need to provide an eyepiece.

Webcam:
Best for planetary and lunar; no shutter means they take lots of pictures, you pick out the best and process them BUT not good for faint objects.

CCD:
Great for long exposures and best signal to noise ratio BUT complicated, power hungry and requires a computer in the field.

DSLR:
Easy to use like film, plus they are reasonable for long exposures, have colour, can be used at prime focus, easy to process images, and no computer is required in the field. The only drawback is that they have a low-pass filter in front of the sensor which can limit their deep-sky sensitivity.

Blair reviewed the main components of a typical DSLR. He showed how interpolation is used to "add" colour since the pixels are either red, green, or blue nd one needs to figure out, for example, what red values should appear where the green- and blue-sensitive pixels are located. He explained why RAW format is the best to use for astrophotography. Noise reduction should also be turned off as it makes stars disappear, thinking they are noise!

Focusing is critical, as is getting the correct exposure. The best way around this is to take lots of images and dark frames and then stack them with software. He then went step by step through an image of the North American Nebula, which started out with an image that required averted vision just to see it, to a final image that was spectacular.

The entire presentation was well-received by those who were there, as there were questions from the audience all the way through all three parts of the presentation.

While the meeting may have been longer than usual, I don't think anyone really minded!

Maximum unguided static exposure in seconds

Declination	Focal Length			
(north or south)	28 mm	35mm	50mm	135mm
75	138	110.5	77	28.5
60	71.5	57	40	15
45	50.5	40.5	28	8.5
30	41	33	23	8.5
15	36	29.5	21	7.5
0	36	28.5	20	7.5

Comet 17P/ Holmes

From Wikipedia

Comet 17P/Holmes was discovered by Edwin Holmes on November 6, 1892 while he was conducting regular observations of the Andromeda Galaxy (M31). Its discovery in 1892 was made because of, and during, magnitude changes similar to the 2007 outburst. 17P/Holmes brightened to an approximate magnitude of 4 or 5 before fading from visibility over a period of several weeks.

The comet's discovery was confirmed by Edward Walter Maunder (Royal Observatory, Greenwich, England), William Henry Maw (England), and Kidd (Bramley, England), and independent discoveries were made by Thomas David Anderson (Edinburgh, Scotland) on November 8 and by Mike Brown , (Wilkes) , (USA) and by John Ewen Davidson (Mackay, Queensland, Australia) on November 9.

The first elliptical orbits of 17P/Holmes were calculated independently by Heinrich Kreutz and George Mary Searle. Additional orbits eventually established the perihelion date as June 13 and the orbital period as 6.9 years. These calculations proved that the comet was not a return of 3D/Biela.

The 1899 and 1906 appearances were observed, but the comet was lost after 1906 until recovered on July 16, 1964 by Elizabeth Roemer (US Naval Observatory, Flagstaff, Arizona, USA). Aided by the computer predictions of Brian G. Marsden, the comet has been observed on every subsequent return.

On October 22, 2007 the comet, which was located in Perseus, had a “visual” magnitude of 17 and could only be seen in the largest telescopes.

Between October 23–24, 2007, Comet Holmes grew much brighter, going from magnitude 17 to magnitude 2.5 in just a few hours. The first person reportedly to notice a change was J. A. Henríquez Santana on Tenerife in the Canary Islands; minutes later Ramón Naves in Barcelona noticed the comet at magnitude 7.3. It became easily visible to the naked eye as a bright yellow "star" in Perseus, and by October 25 17P/Holmes appeared as the third brightest "star" in that constellation.

While large telescopes showed fine-scale cometary details, naked-eye observations gave a view similar to that of a star until October 26. After that date, 17P/Holmes began to appear more comet-like to naked-eye observers.

During the comet's outburst, its orbit took it to near opposition with respect to Earth, and since comet tails point away from the Sun, Earth observers were looking nearly straight down along the tail of 17/P Holmes, making the comet appear as a bright sphere.

Based on orbital computations and luminosity before the 2007 outburst, the comet's nucleus was estimated at 3.4 km. In late October 2007 the coma's diameter increased from 3.3 arcminutes to over 13 arcminutes, about half the diameter that the Moon subtends in the sky. At a distance of around 2 AU, this means that the true diameter of the coma swelled to over 1 million km, or about 70% of the diameter of the Sun. By comparison, the Moon is 380,000 km from Earth. Therefore, during the 2007 outburst of Comet Holmes the coma was a sphere wider than the diameter of the Moon's orbit around Earth. On 2007 November 9, the coma had dispersed to an area larger than the sun, briefly giving it the largest extended atmosphere in the solar system.

The cause of the outburst is not definitely known. The huge cloud of gas and dust may have resulted from a collision with a meteoroid, or, more probably, from a build-up of gas inside the comet's nucleus which eventually broke through the surface.

Angular Measurement

The Drift Method

During the early days after the outburst from comet Holmes , the growing visual size of the comet was of particular interest. Measuring that size (using a telescope) is a relatively simple matter of measuring the time it takes for an object to move across a crosshair in the eyepiece (or across the edge of the eyepiece).

The following is an extract from an E mail from Dr Roy Bishop explaining the math involved……...

“The calculation that converts drift time to an angular diameter is based on the Earth's rotation rate as given on the middle of page 32 of the 2007 Observer's Handbook, namely:
For 360 degrees = 24 h, 15 degrees = 1 h, 15' = 1 min, 15" = 1 s.

The last item on that line "(Earth turns 360 degrees in 86 164.1 s)" is to remind the reader that the other figures are not quite accurate for the rotating Earth (although the error is less than 0.3%).

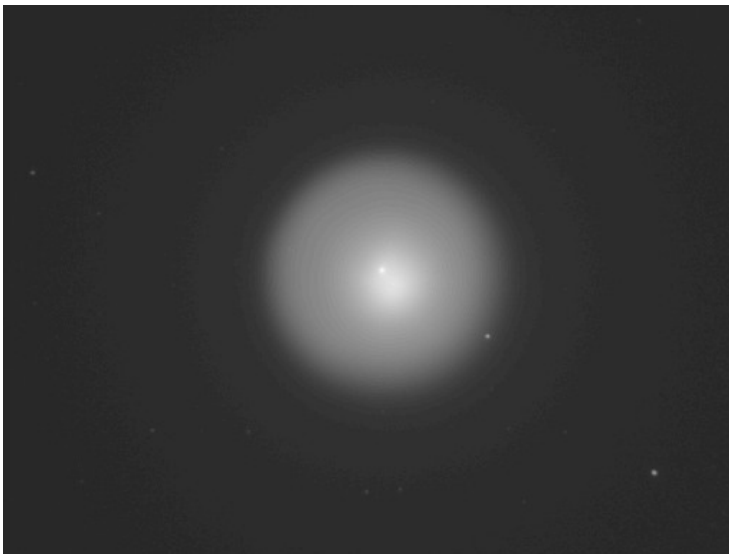
So, start with 15" = 1 s. It means that Earth's rotation will make a star on the celestial equator drift 15" (15 arc-seconds) every second of time.
In "T" seconds of time, the star will drift: 15"/s x T

For a star not on the equator the drift is slower, according to the cosine of its declination:
So in "T" seconds of time, the angular drift will be: 15"/s x T x cos (dec)
To convert arc-seconds to arc-minutes, divide by 60.

Thus, as below, for a drift time T = 14 s, and a dec of 50 degrees for Comet Holmes:
15"/s x 14 s x Cos (50 degrees declination) x 1′/60" = 2.25' for the diameter of the comet.

Or, in a more compact form: 0.25 x T x cos (dec) With T is seconds, the answer will be in arc-minutes (').”

Motion and evolution of comet Holmes (left to right above) October 31st, November 05th, November 12th
Photos: Dave Chapman



Comet Holmes on October 27th, 2007 (morning)
Photo: Dave Lane
A log-stretched image with the C11 and ST9 camera (15x2s exposures unfiltered).
The comet nucleus cane be clearly seen. As this time the comet's size was 4.7 arc minutes with a visual magnitude of 2.7 (two days before it was magnitude 17!)

Comet Holmes on November 17th
Photo: Pat d'Entremont
The comet has grown to a size larger than the Sun. Although significantly dimmer, the expanding tail is easily seen

Halifax Centre Membership Survey - Initial Impressions

Paul Evans

Recently the Halifax Centre Council distributed a survey to the Centre Membership. This was the first survey of membership undertaken in six years – the last being done in 2001. The format of the survey was to ask several questions and leave room for responses to be written in instead of a multiple choice type format. We had 40 respondents representing approximately one-quarter of the membership.

In the following comments, I am going to try and provide a general overview of the type of feedback we received. Over the next couple of months, the Centre Council will review the results carefully and incorporate the feedback into planning activities.

Why did you join the Halifax Centre of the RASC? How long have you been a member?

The majority of people indicated their motivation was an interest in astronomy and the desire to learn and share information. Several people indicated more specific reasons such as attending meetings and receiving publications. Responses to the 2nd question ranged from a few weeks to 37 years. The survey yielded good coverage of new, medium-term and long-term members.

What sorts of Centre activities and services are important to you (Library, St. Croix Observatory, Centre Meetings)? Are there any services that could be improved? Are there any services that you would like to see added?

By far the most popular responses are Centre Meetings and the St. Croix Observatory. The next most popular are the Library and Nova East. Several respondents indicated Nova Notes and the other publications, Email, and collaboration with other members. There was also mention of public observing activities, member observing activities, and loaner equipment. Several members indicated they live too far away to access most services. Specific suggestions for improvement included:

- More investment in the library.
- Formal training for new members.
- More social events.
- More engagement of new members.
- Try to get out to more communities with star parties and information lectures.

How do you receive news about Centre activities? Is there any way we can improve the way you receive news about the Centre and its activities?

Most respondents indicated Email and Nova Notes. A fewer number of respondents indicated the website, and a couple indicated Centre meetings. Generally speaking respondents seemed satisfied in this area, however there were several suggestions for improvements:

- Have a separate announcements email list in additional to the regular email list (suggested more than once).
- Switch to using an online forum hosted at a website rather than using an email list (suggested more than once).
- Consider investigating the use of Facebook.
- Create and distribute Nova Notes more frequently.

What sort of activities would you like to see the Halifax Centre take part in (light pollution abatement, public outreach, membership observing activities, etc)?

Perhaps as can be expected, the three examples within the question were the most popular responses by far: Light pollution abatement first, membership observing activities very closely behind and public outreach a very close third. Some members indicated all three, but many had a preference for a specific one. Several respondents indicated they thought we do enough (with a split in tone between 'our plate is full enough' and 'doing a great job'). There were several other ideas indicated including focusing on International Year of Astronomy activities, social events, speaker exchanges, science collaboration projects and production of a cable access television program. It should be noted that within the topics covered, a number of members indicated more specific ideas which the Council will take note of and incorporate into planning.

Do you have suggestions regarding talks at the monthly meetings, either the one-hour variety by a single speaker, or mini-talks by a few members on alternate meeting nights? Topics. Speakers, advice to speakers, etc?

Generally speaking the respondents indicated a lot of satisfaction with the current approach and quality of our meetings. In terms of specific feedback, some wanted to see more long talks but others wanted more mini-talks. Some wanted more science oriented talks and some wanted more product reviews. One theme that did come through fairly strongly is a desire for more material oriented at beginners. There were also a number of specific topic suggestions that will be very helpful.

Other comments or suggestions

This open ended question brought a diversity of responses. There was a lot of positive feedback which is encouraging. There were some specific suggestions which are valuable. The most common constructive suggestions were the need for improved services for new members and finding ways to ensure new members feel welcome and engaged in the society.

Concluding Remarks

On behalf of the Centre Council, I would like thank all the members who took the time to respond to the survey. This survey is helping us stay connected with the general impression of

how the membership believes the society is doing. There were also many specific suggestions that we will incorporate into planning. Though the overwhelming majority of surveys indicated a lot of satisfaction with the Centre, we did receive a small number that expressed some disappointment and frustration with some aspect of their experience with the Centre. This is important feedback and is appreciated. We would rather hear this feedback from members rather than never hear it from those who are now previous members.

In order to incorporate and benefit the Centre with this feedback, the Council members are reviewing the results and we will have discussions as part of upcoming Council meetings.
Finally, I would like to emphasize that the number one impact on the volume and quality of Centre activities is the effort volunteers put into the Society.

One of the key areas of feedback resulting from the survey is the need for improving the experience for new members. There are many of you who are beyond the beginner stage but may not yet feel comfortable taking on an ongoing responsibility as a committee member or presenting a topic aimed at beginners at a Centre meeting. One of the results of this survey will probably be the incorporation of more short talks on topics important to beginners. However, we can not always defer to the few long term members who we already depend on for so much.

We will need more members who have already gone through the initial learning curve. You may not be the person who knows the most about a given topic (be it collimating a telescope, reading a sky chart, cleaning optics, or any one of dozens of others) but only you will have your unique perspective, experience, and enthusiasm which the beginner will benefit from and our veterans will enjoy as well.

If you think you are ready to help out some of our newer members I very much want to hear from you. My contact information is included on the 2nd page of the newsletter

Once again, thank you to everyone for their feedback and the Council members who contributed to the creation and distribution of the survey.

Cosmic Debris

Odds & sods from the world of Astronomy, and Cosmology

An update on SN 2006gy

By Staff Writers - Space Daily
Paris (AFP) Nov 14, 2007

Astronomers analysing the brightest supernova ever detected say the titanic flare has reshaped thinking about the death struggle of gigantic stars.

Supernova SN2006gy, located 240 million light years away in galaxy NGC 1260, entered the record books in September 2006 when it dramatically brewed into an explosion 50 billion times brighter than the Sun.

It was about 100 times brighter than the flash of a typical supernova.

Poring over this extraordinary event, US stargazers said on Wednesday that the SN 2006gy was probably caused by a truly enormous star, a behemoth at least 100 times more massive than the Sun.

And, they theorise, the star did not blow up just once -- but several times.

"We usually think of a supernova as the death of a star, but in this case the same star can blow up half a dozen times," said Stan Woosley of the University of California at Santa Cruz, who led the study published in the journal Nature.

Woosley's hypothetical model starts with what happens when an exceptionally big star -- something 90-130 solar masses -- nears the end of its life.

The temperature in the stellar core gets so hot that some of the star's gamma radiation converts into electrons and their anti-matter counterparts, called positrons.

The conversion causes the blast of radiation to suddenly fall, and the star begins to shrink.
"As the core contracts it goes deeper into instability until it collapses and begins to burn fuel explosively," Woosley said.

"The star then expands violently, but not enough to disrupt the whole star. For stars between 90 and 130 solar masses you get pulses.

"It hits this instability, violently expands, then radiates and contracts until it gets hotter and hits the instability again. It keeps going until it loses enough mass to be stable again."

Eventually, the star shrinks to about 40 solar masses, but even then the celestial fireworks aren't over, said Woosley. It contracts to an iron-rich core that collapses, ending with a searing gamma-ray burst

Stars that are between 90 and 30 times the mass of the Sun are rare beasts, especially in our own galaxy, the Milky Way. But Woosley believes they may have been more common in the infancy of the Universe.

A rival theory, meanwhile, is offered in "Nature" by Dutch astronomers Simon Portegies Zwart and Edward van den Heuvel of the University of Amsterdam.

They suggest that SN 2006ga could not have been created from a single star, but from two very large stars that collided.

Their calculations are based on what happens in a young, dense cluster of stars that are commonly seen at the centre of galaxies.

St. Croix Observatory

Observing Chair: Tony McGrath 463-4018

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, 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.

Members' Night:

Every weekend closest to the new Moon, there is a Members' Night at St. Croix. The purpose of Members' Night is to attract members from the Centre to share an evening of observing with other members. It's also a great night for beginners to try out different scopes and see the sky under dark conditions. For more information or transportation arrangements, please contact the Observing Chair.

Future dates for Members' Nights:

7th December 2007
4th January 2008
8th February 2008
7th March 2008

These dates are all Fridays. If this is a meeting night, or cloudy, the alternate date will be the following Saturday.

Directions from Halifax:

1) Take Hwy 102 (the Bi-Hi) to Exit 4 (Sackville).
2. Take Hwy 101 to Exit 4 (St. Croix).
3. At the end of the off ramp, turn left.
4. Drive about 1.5 km until you cross the St. Croix River Bridge. You'll see a power dam on your left.
5. Drive about 0.2 km past the bridge and take the first left (Salmon Hole Dam Road).
6. Drive about 1 km until the pavement ends.
7. Drive another 1 km on the dirt road to the site.
8. You will recognize the site by the 3 small white buildings on the left.

Become a St. Croix Key Holder:

For a modest "key fee", members in good standing for more than a year, who have been briefed on observatory , may gain access to the St.Croix facility. For more information on becoming a key holder, contact the Observing Chair.

Rules for using the SCO equipment:

There are several pieces of astronomical equipment available for members (and guests) to use, including a 17.5" dob and a magnificent pair of tripod mounted, 100mm binoculars.
If you are unfamiliar with the use of these pieces of equipment, please ask for assistance—any knowledgable member would be more than willing to help you out. Please share the equipment with other members; and treat the equipment, the facilities, and the site with respect. …… Enjoy!