Nova Notes

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

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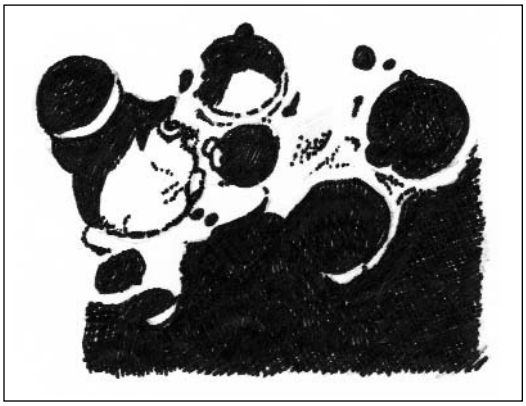
Astro photo of the Month *Blair MacDonald – Looking for the "X" on the Moon*

On the night of March 6 Dave Chapman predicted that the "X" on the Moon would be visible *(see Nova Notes Feb 2006)* and requested any one observing the event with the ability to record it to please do so. Several members were out to observe but given the difficulty in predicting the exact time of the event the occurence began after the moon had set in our area. Blair managed to create this moon image that night. Details: Four frame mosaic, 1/100 second exposure through a variable polarizing filter to reduce the light level. Processing: Mosaic of 4 frames put together with Maxim DL. High pass filtered and slight log stretch. ✯ I produced this sketch the same night at approx. 10:20 p.m. in the area that the X was to appear. ✯ *Michael G.*



Astro Images

Michael Boschat

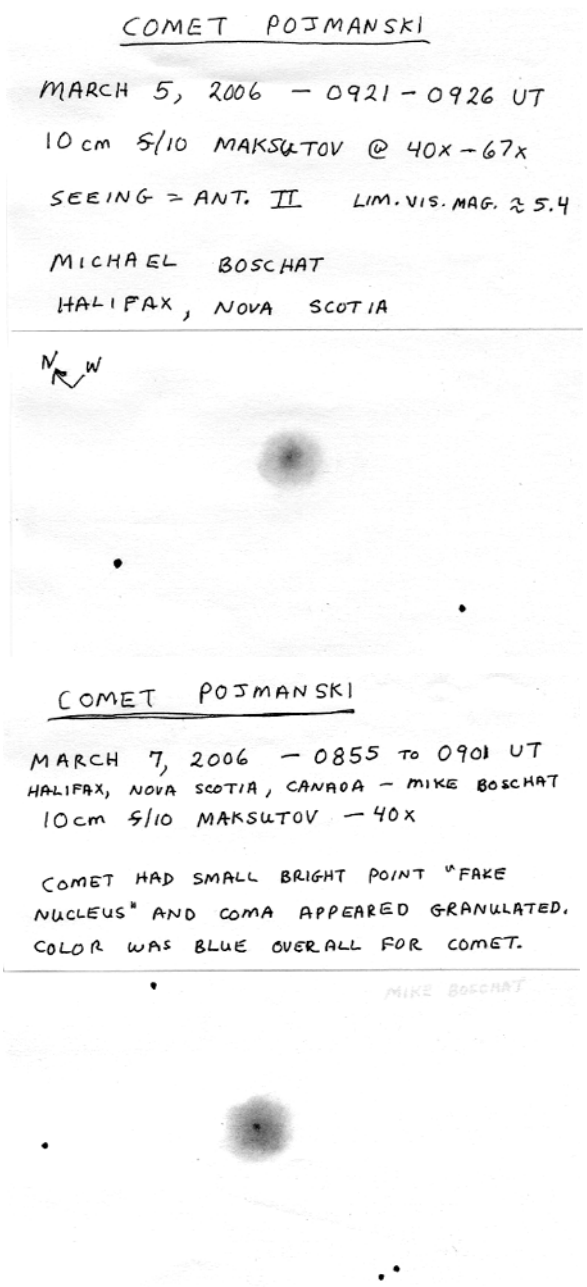
Mike sent me these sketches of Comet Pojmanski and Saturn, as well as these two digital images of the Moon and Venus. See details below.

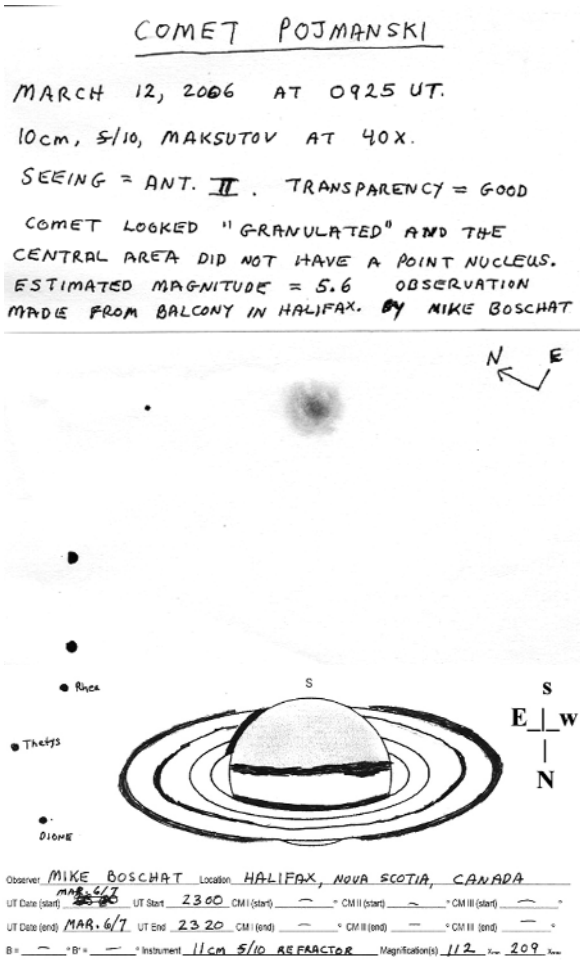
Crescent Moon:
March 1, 2006 @ 2300 UT. Olympus C-750 digital camera set at 1.3 seconds, f/3.5, ISO 100. Max. digital zoom 40x. Messed with 4 of the images using Registax.

Venus:
Magnitude: –2.7,
Diameter: 37.1"
Illuminated Fraction: 0.304
Date: Feb. 23, 2006

Time: 1105 UT
Telescope: Runibar 10cm, f/10, Maksutov @ 40x

Olympus C-750 Digital Camera handheld over eyepiece. Exposure 1/50 sec at f/3.5, ISO 100





HALIFAX CENTRE

Nova Notes
The Newsletter of the
Halifax Centre of the RASC

PO Box 31011 Halifax, Nova Scotia B3K 5T9
Articles on any aspect of Astronomy will be considered for publication.

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.

Material for the next issue should reach the editor by May 22/06

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Nova Notes is also available as a PDF file on our Centre's website at **www.halifax.rasc.ca**

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Meeting Report September 2005

By Roy Bishop

This report is not really a "meeting report" because no one was assigned to record the events of the September meeting. Also, as I write this, it is five months after the meeting and I do not recall the events that preceded and followed the main talk. Moreover, I am not qualified even to report on the main talk because I did not hear it! I was the speaker. I can, however, summarize what I intended to say. My title was:

"The Very Small and the Very Large: Atomic Nuclei and Stars"

I have had requests for copies of my talk, and it was a few weeks after the September meeting that Michael Gatto asked if I would prepare this summary. I was then packing for a trip so I told Michael that I would respond to his request after my return. Here, somewhat late, is my summary.

Steps to the very small.
I began by asking the audience to venture into the world of the very small by considering four successive divisions by 2000. Firstly, a two-metre distance divided into 2000 parts yields one millimeter, an easily visualizable step. Then divide 1 millimetre into 2000 parts and you arrive at the wavelength of light. Repeat this process and you reach the diameter of an atom. Divide an atomic diameter into 2000 parts and then subdivide one of these into 20 pieces and you reach the diameter of an atomic nucleus.

Atomic nuclei are extremely tiny, even compared to an atom
A scale model of an atom the size of a large house (40 metres) has a nucleus 2000 x 20 = 40 000 times smaller, or 1 millimetre, the size of the ball in a ballpoint pen. If you lived in that atomic model house all your life, very likely you would never notice that tiny sphere, the nucleus of the model atom.

The mass of ordinary matter is nearly all nuclear mass
There are about half as many electrons in an atom as there are protons and neutrons in its nucleus. Also an electron is very light, about 2000 times less massive than a nuclear particle. Thus, except for 1/2 of 1/2000 = 0.03% of the mass of an atom, the remaining 99.97% resides in its nucleus. The electrons filling out the spatial extent of an atom are only "fluff". All of the electron fluff in an adult person weighs about the same as a cotton handkerchief. Bathroom scales display essentially your nuclear mass, two-thirds of which happens to be contributed by the nuclei of the isotope oxygen-16.

Nuclei are very dense
Ordinary matter, composed of atoms, has a density of roughly 1 gram per cubic centimeter, or 1000 kilograms per cubic metre. Since practically all of this mass resides in the atomic nuclei, a nucleus has a density 1000 x $(40{,}000)^3 = 6.4 \times 10^{16}$ kilograms per cubic metre, or 64,000 tonnes per cubic millimeter. Therefore, to appreciate nuclear densities, think of an aircraft carrier crushed into a sphere the size of the ball of a ball-point pen.

Without electron fluff you would be both invisible and dangerous
Your atomic nuclei occupy a minuscule part of your volume. If all your atomic nuclei were assembled into a single lump, this lump would be too small to see without a high-quality microscope. And it would be difficult to place such a nearly invisible speck on the microscope viewing stage because, containing nearly all of your mass, its weight would smash the microscope stand. Also, without the oppositely charged electron fluff, your nuclear matter would have a net electrical positive charge in excess of a billion coulombs, which would likely vaporize the microscope and the surrounding building in a blinding ball of lightning!

Why does electron fluff look and feel so solid?
The reason you, buildings and boulders look so solid is that visible light interacts strongly with electron fluff. The reason you, buildings and boulders feel so solid is because electrons interact strongly with one another and are restricted in the way they can cluster around atomic nuclei. This clustering restriction is a quantum-mechanical effect described by the Pauli exclusion principle, and results in a pressure, called "electron degeneracy pressure", that makes the electron fluff of atoms resist compression. Your bones are strong, the floor can support you, and boulders are hard because of electron degeneracy pressure.

Reaction energies
Chemistry and biology comprise interactions of the outer electron fluff of atoms and molecules, involving a few electron-volts (eV) of energy per reaction. Some examples: an electron gains 1.5 eV when passing through a typical flashlight battery; a photon needs about 2 eV to excite your retina and thereby be visible; 4 eV is involved in the oxidation of a carbon atom to carbon dioxide. In comparison, the interactions of atomic nuclei involve much higher energies, many millions of electron-volts (MeV) per reaction. Some examples: 26 MeV for hydrogen fusion to helium; 200 MeV for the fission of a uranium nucleus.

Binding energy
When energy is released by any process, the source of the energy becomes more tightly bound. The energy released in the binding process is called the "binding energy". This energy is missing from the bound system. For example, a mousetrap spring becomes more tightly bound when it is tripped; a mouse receives the released binding energy.

Nuclear binding energy per particle (proton or neutron) peaks at iron. Protons and neutrons are bound tightly together in atomic nuclei by the strong nuclear force. This force has a short range, so its attraction is more like sticky candy than clinging magnets. The protons in these sticky nuclear clumps are electrically charged and repel each other with a weaker but long-range electrical force. Each proton sticks tightly to its adjacent neighbours, but is repelled by all the other protons in the nucleus. This weak repulsion is of little consequence for nuclei having few protons, so the binding energy per particle increases rapidly from hydrogen through helium and carbon, etc. However, near the middle of the periodic table, at iron, the weak but cumulative electrical repulsion of the protons causes the binding to stop increasing, making iron nuclei the most tightly bound (per particle).

Above iron the weak but long-range electrical repulsion of the increasing

numbers of protons becomes more effective than the strong but short-range nuclear attraction. This causes the binding energy per nuclear particle to decrease through the heavier elements, and makes the number of stable elements finite (81) rather than infinite!

Stars exist because nuclear binding energy per particle peaks at iron.
Stars are thermonuclear fusion reactors, not wood stoves. Stars on the main sequence (and hydrogen bombs) release binding energy by approaching iron from the low mass side, via fusion of hydrogen to helium. When stars leave the main sequence to become red giants, they move further in this direction, fusing helium to carbon and heavier nuclei. Very massive stars continue this process all the way to the most tightly bound nucleus, iron. Nuclear reactors and so-called "atomic" bombs release binding energy by approaching iron from the high mass side, via fission (splitting) of uranium or plutonium nuclei. In all these reactions, the protons and neutrons involved are becoming more tightly bound, and the released binding energy makes stars shine, reactors hot, and nuclear bombs explode.

Supernovae can decrease nuclear binding energy
Part of the immense gravitational binding energy released in the core collapse of a supernova explosion is used to drive nuclear synthesis toward less-tightly–bound nuclei, from iron toward the heavier nuclei, all the way to uranium and beyond. About 16% of the world's electrical energy now comes from nuclear reactors; before the solar system formed this energy was generated by supernovae and stored for our use in uranium nuclei.

A common misconception
Many people claim that the famous equation $E = mc^2$ is the key to stellar energy and nuclear bombs. However, $E = mc^2$ is not specific to nuclear reactions. It is universal. This equation is no more the key to stellar energy and nuclear bombs than it is the key for the energy available from chicken nuggets, or the energy released by the spring of a mousetrap.

It is the strong nuclear force that is the key to stellar energy and nuclear bombs, the reason for the large binding energy associated with nuclear reactions, and why our Sun will shine for 10 billion years. ✯

Meeting Report February 2006

David Tindall

President Craig Levine opened the meeting at 20:02, in front of about 40 people who had braved howling winds and rain in order to attend.

Craig referred to the fact that a new idea was being tried with meetings: Basically, we will alternate between having a guest speaker one month and a series of short, more informal talks the next.

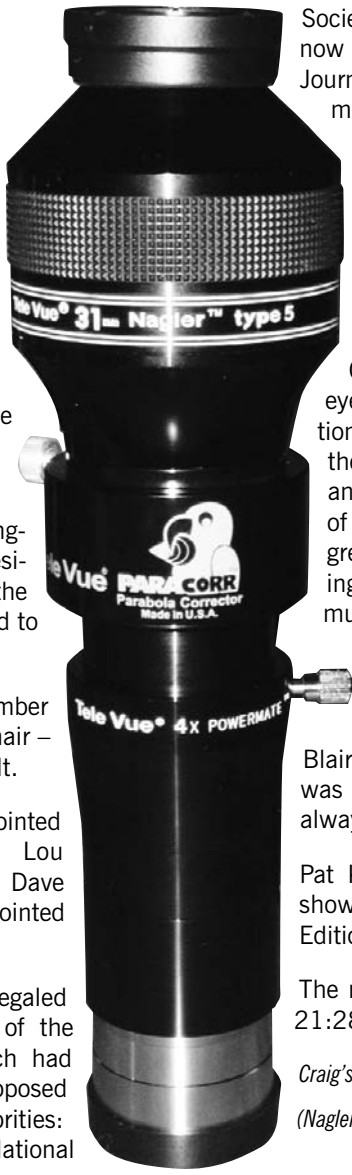
In response to a request from Craig, two people identified themselves as new members, three as non-members – all were welcomed to the meeting.

Mary Lou Whitehorne interrupted to note that long-lost Halifax Centre President Kathy Oakley – president 19 years ago – was in the audience … and the few old timers who were present were very pleased to see her again.

Craig went on to inform the audience about a number of new positions of Centre Members: Observing Chair – Anthony McGrath and Councillor – Gilles Arsenault.

On the National RASC scene: Pat Kelly – appointed Editor of the Observer's Handbook, Mary Lou Whitehorne – nominated for 2nd Vice-President, Dave Lane – nominated for 1st Vice-President, and appointed as Observer's Calendar Editor.

Craig then turned the floor over to Pat Kelly who regaled us with news of the special General Meeting of the Society and the National Council meeting which had recently taken place in Mississauga. The two proposed by-law changes had been passed by large majorities: these were that the 60/40 fee-split between National Society and the Centres had been removed (each can now set its own fees separately) and a paper copy Journal of the RASC will, in future, only be mailed to members who request (and pay for) it. Pat promised that a full report would appear in the next issue of Nova Notes.



Wes Howie was up next. He showed his new 7.5 mm eyepiece, that he was very pleased with, and a lively discussion took place about the merits of various eyepieces.

Craig Levine followed, with a photograph of his eyepiece collection or, rather, a portion of his collection. The consensus of those who know Craig was that the camera lens had not been of sufficiently wide angle (or he had not stood back far enough) to get all of them properly in the picture. Anyway, Craig gave a great review of the major points to look for when buying an eyepiece. At one point, Craig was asked how much one would expect to pay for a particular eyepiece – there was great amusement when a member revealed that Craig had recently sold him one for twice that amount.

Blair Macdonald's Image Processing 101 this month was all about image filtering, with helpful tips like always apply a filter before re-sizing an image.

Pat Kelly rounded off the evening's presentations by showing two board games: Monopoly (Night Sky Edition, 2004) and Solar Quest, dating from 1986.

The meeting broke for refreshments and social time at 21:28. ✯

Craig's Televue "6.5mm Nagler": 5.5 Lbs, 14 lenses, and 1 foot tall!

(Nagler 31mm, Paracorr, 4x PowerMate).

Web-only Nova Notes?

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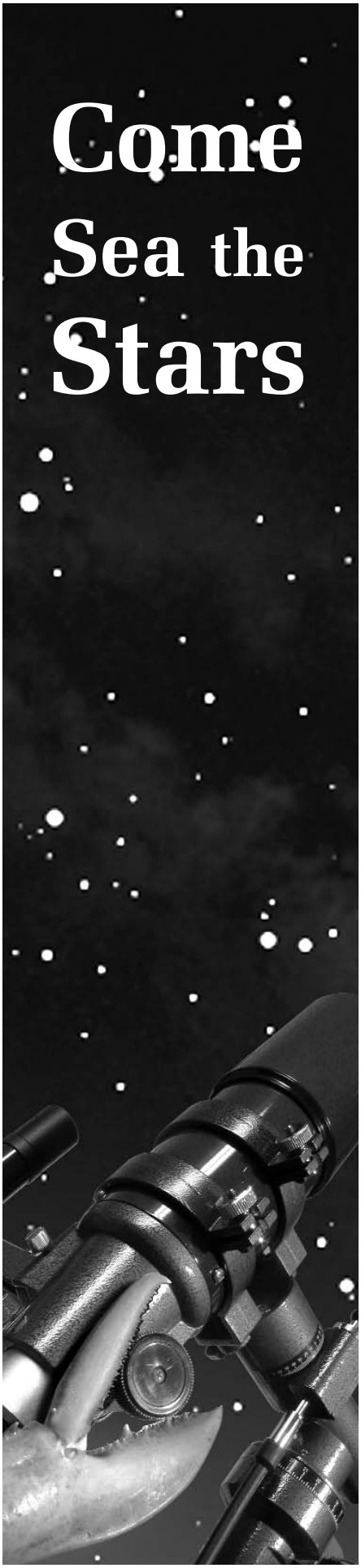
Meeting Report Jan 2006

Andrea Misner

Honorary President Dr. Roy Bishop kicked off the evening with his main talk, "The Mad Idea". A Mad idea indeed, for roughly $930 US, Dr. Roy Bishop and his friends found themselves on a 16-day trip in Northern Chile to visit some of the largest observatories in the world – and six hotels. Talking enthusiastically, Dr. Bishop told us within the 16-day trip they trekked across Argentina and finally into Chile. Dr. Roy Bishop got to know the Volvo tour bus very well, as it was their main source of transportation. Throughout their trip they took in sites such as the foothills of the Andes. Dr. Bishop commended on how central Argentina was very much like the flat prairies in Canada, with old style-windmills. After arriving in Santiago, Chile, the group spent some time at the European Southern Observatory. While visiting the Paranal Observatory, Dr. Bishop and his friends got a chance to view the Canadian built telescope, Gemini South, nearly at 900ft. Dr. Bishop enlightened us by saying that the Paranal Observatory had some of the most advanced optics, known as "active optics". In addition, the European Southern Observatory is supported by an international effort by 12 countries worldwide. Once again, thank-you Dr. Bishop for engaging us in another fascinating discussion. We look forward to hearing more of your Astronomical adventures! ✭



Nova East 2006 News

NOVA EAST 2006 August 25-27

The Nova East 2006 Committee is comprised of Daryl Dewolfe, John Jarvo, Irene Moore, Dave Parsons, and Ron Mills. Contact any of the Committee members if you have questions, suggestions, or want to help out in some way at the next great Nova East Star Party.

Email Daryl at qscope@hotmail.com or John at jjarvo@tru.eastlink.ca with your input/questions.

Nova East Family Camping

This year space has been set aside for "family friendly" camping. Have a spouse that is not interested in observing all night – or sitting in the dark alone with no lights and no campfire? Then our new family campsites might be for you – camp sites set away from the observing field where white lights are allowed.

Nova East T-Shirt Design

The traditional Nova East T-shirt has gotten a refreshing shot in the arm. This year's exciting design features an astro photo from the Halifax Centre's own Shaun Lowe and promises to be a keepsake item for years to come. Watch Nova Notes next month for a sneak peek. Don't miss out as shirts must be ordered in advance with your registration, there will not be any available at the event.

Nova East Bookmarks

The idea was born to produce a bookmark to promote Nova East, and be distributed to participants at the Winter Star Party in Florida. Several Halifax members were planning to head down, so the Nova East committee armed them with several handfuls of the bookmarks shown here. Will we see some members travel up the coast to see us at Nova East – we'll see!

Nova East Website Redesign

Visit http://halifax.rasc.ca/ne/home.html for more up-to-date info, and check out the smart new look! ✭

The Ongoing Beginner's Guide

John Vandermeulen

Over the last year I have read through an increasing stack of magazines, books, and web articles. And acquired a small 4.5" Orion reflector on a dob mount, the forerunner for something larger. A good plan, although I had not expected that the dob mount would prove so awkward for me. As it must be manually oriented and focused it is not dead-steady and shakes a bit any time that the tube is moved, but I will deal with that problem as soon as the weather improves. I do not favour shivering in triple layers of wool and goose down, while potentially freezing my eye-lids to the eyepiece. As for the shakiness, advice from the near professional members ranges from "all scopes vibrate a little" to "you need a more solid base then your sundeck". So as soon as the weather turns decent, I plan to pour an 8" diam. concrete pier under the sundeck, with a 24" diameter circular top that will protrude smoothly through the deck planking. And that part of this strange hobby will be under control.

"Strange?" you say. Yes, off-hand I can not think of another amateur hobby that is driven by and is linked so tightly to a very tough science as ours is. The closest parallels may be in paleo-anthropology where amateurs are fully involved in studying human evolution. Egyptology and Aztec-Mayan civilizations come to mind. Amateurs have contributed significantly to our knowledge of early man or beast through fossilized remnants (remember Lucy, the orangutan-sized hominid in the Rift Valley?). Perhaps what makes astronomy-cosmology such an odd beast is its rigorous mix of mathematics and physics, combined with the fact that we can not clasp the subject in our hands. You can drive up to the Great Pyramid of Gizeh, or trek through forests to a Mayan temple, or just drive up to Parrsboro to see dino trackways 'au naturel', but to see any detail of even the nearest stellar object we need a telescope. Yes, I think it a strange but fascinating hobby.

These past winter months I spent delving through the web's vast astronomical contents. This part has been total fun, but daunting, as it could easily become a very long process. And a very steep learning curve. However, I set myself the goal of being able to follow new literature, and at the very least grasp basic and major concepts. And follow seminar presentations. Fortunately, being retired, I have the time to take a little broader tack also science has been more or less my life ever since about grade 11 in an Alberta highschool.

My approach to the web's literature stores, is best described as chaotic + shotgun, i.e. I would read everything that seemed interesting as it surfaced in a google search – birth of galaxies, orbits, globular clusters, main sequence stars, H and He ratios, quantum theory, you name it. There are also the regular physics seminars at St. Mary's that frequently feature an astronomy-type speaker. To further anchor my marathon, and when stuck on something, I e-mail questions to a knowledgeable friend or a friendly prof., or pose queries to the competent guys on the <cloudynights.com> forum website. CloudyNights, by the way, is a great store of information, where even the rawest beginner can post a question without feeling ignorant or intimidated. It has several sections – beginner, scope, mount, science, etc. There is also <sci.astro>, an FAQ website larger than most government documents. I am making progress, but I still have about 3 feet of web print-offs on the bookshelf to go. Plus books and magazine articles. Today I have condensed the flock of numerous topics to four principal areas – early universe and inflationary theory, emergence and structure of black holes, structure of solar system and galaxies, and deep sky observing (in order of interest). Still a hand-ful, but I must admit to not following the maths. Them I leave to them's that are mathematically inclined. Also, as you can see, I tend to lean toward the cosmology of things, although I do yearn for an 8" or 10" reflector on a dob(!!). I have found two Halifax-centre members with 8" dob mounted scopes, and I mean to someday soon (when it is warmer) invite myself over to see how they handle the orienting, and the actual viewing. An 8" or 10" would be nice, but besides orienting and focusing, with that size mirror also means increased size and weight. Tube length has its own peculiar problem in that the eyepiece is situated near the top of the tube, which means either a very tall stool or a folding kitchen step-stool to bring the eyes up to the eye-piece. (The users of the giant classic telescopes like the Mt Palomar didn't have that problem, as they rode in a small steel cage bolted to the eye-piece). As for weight, it is limited by how much I can drag out onto the sundeck.

Still, as folks say nowadays, it has been a blast reading, as everything is so new since my own physics days an era ago. Back then were the slide-rule and log-table days, and the department's first computer occupied a 15' x 15' room in the basement. There was little mention of relativity, gravity, quantum theory, and wave/particle duality; and none at all of such things as the Higgs boson, quarks, inertial frames of reference, quantum state of electrons. Those two puzzlers – dark energy and strings – were inconceivable.

Today is a very exciting time to be in astrophysics. Up beyond the atmosphere, the Hubble space telescope has looked back in time further than ever before, and despite its age is still providing new insights into very deepsky stellar processes. In Europe, the giant CERN accelerator straddling the Swiss-Austria border, will provide the highest man-made energy conditions, when activated (~2007), necessary for cracking open the smallest known elementary particles. As for giant telescopes, despite our overlying atmosphere, there seems to be no holding back with 30-m scopes coming on in numbers. Spain has its own 30-meter radio-telescope in its mountain country. A 30-meter multi-element reflector for (North?) America has found funding, and is in the planning stages. The US and Mexico have an agreement for another 30-meter joint project. There are others, all ground-based. Why all this activity? LIGHT!! BUCKETS OF LIGHT!! Jumping up from the more or less standard 10m-mirror scopes such as Keck's up to the 30m systems means gaining some 600x in light gathered. Those sorts of numbers would have been impossible with the solid mirrors of the Palomar (200") days, but with today's computer technology a 30m mirror, composed of hundreds of individually aligned elements, is a relatively simple matter. And although ground-based, they will outperform a Hubble, even with the intervening atmosphere. All of which should bring us even nearer to those very early stellar forms and conditions that lie just beyond current reach today. Just what sort of glimpse would a 100-m scope give us of that dizzyingly distant time? It's too tantalizing.

As to my literature searches, although I still range a little widely, I do now zero in on those four main areas, and then 'drill down' into more detailed and specific articles. Interestingly, initially separate bits of information are frequently found to be inter-connected. A good example are the seemingly unrelated findings as the H:He ratio in various gasses, the 3 K cosmic microwave background (CBM), and findings of the Wilkinson Microwave Anisotropy Probe (WMAP). When taken together, they were recognized as fossil conditions from the very early universe, immediately post Big Bang. Now, this may not stir the hearts of devoted observers, but think of the sort of observations that will become the norm ten years from now. Or even sooner. Already technology exists for amateurs to build working and precise spectrophotometers that will enable analysis of light spectra emitted from near and distant sources (viz. Buil, below). Again, with the available technology there is no reason why amateurs can not use different wave lengths for other purposes. Perhaps not here, but somewhere there likely are amateurs constructing their own radio telescopes so that they can use different wavelengths for their exploration. I would think that plans for amateur-size multi-element mirrors will become available within the next five to ten years. Is all this just pie-in-the-sky (please forgive my horrible pun)? I don't think so. It is just a matter of doing it.

1. NOTES ON OBSERVING

1.1 Deepsky Observing Tutorial

www.fortunecity.com/roswell/borley/49/tutorial.htm

General notes on scopes, practical advice from dark adaptation to star-hopping.

1.2 The Art of Observing. Part 1 – Bright Objects. Part 2 – Dimmer Objects.

Epinions.com

Solar system data page – individual notes on each planet

1.3 Tips and Guides – How to Use your Telescope. Parts 1 and 2.

www.telescopesa.za.org/TGHHowTo1.htm

Compilation of articles by A MacRobert published over the years in Sky & Telescope

2. ASTRONOMY & SOLAR SYSTEM

2.1 An Overview of Astronomy.

www.astromax.org/astrocourse/history.htm

Data and description of planets and moons in the solar system. Also overview section on the make up of stars, galaxies, and a brief introduction to concepts of cosmology.

2.2 The Solar System Data Page.

www.astromax.org/planets.htm

Similar to above, but with informative tables of data, measurements, etc. for each planet and the sun.

2.3 An Atlas of the Universe.

http://anzwers.org/free/universe/

Series of schematic 1-page maps, each on an expanded scale from the previous, showing locations of stars and in specific details.

3. UNIVERSITY UNDERGRADUATE COURSES

3.1 Astronomy 162. Prof. B. Ryden, Ohio-State university.

40 lectures on "The Sun" to "Curvature of the Universe" . Easy reading. Covers the whole field.

www-astronomy.mps.ohio-state.edu/~ryden/ast162_9.html

3.2 Physics 109: Galileo and Einstein.

http://galileo.phys.virginia.edu/classes/109.mf1i.fall03

Michael Fowler, Physics, Univ. Of Virginia.

Complete set of lectures. Again, very readable. Based more on chronology and time-line of discoveries.

4 NEWS-GROUPS & WEB FORUMS

4.1 sci.astro

A newsgroup for discussion of the science of astronomy. The website comprises some 80+ pages, a compilation of frequently asked questions with extensive answers. This is a dandy source for anything from Earth to Early Universe.

4.2 cloudynights.com

Excellent forum site, with several sections – Beginner, Mounts, Telescopes, Science and so forth. Knowledgeable forum monitors.

5 AMATEUR INSTRUMENTATION

5.1 A Personal Story of the CCD Astronomy. Christian Buil

http://astrosurf.org/buil/us/story/story1.htm

An interesting and entertaining personal account of how one amateur in France formed a group to build a spectrophotometer, coupled to a CCD. Lots of photos.

5.2 Directory of Amateur AstroSpectroscopy

http://users.erols.com/njastro/faas/pages/directry.htm

6 MAGAZINES

6.1 Scientific American.

6.2 New Scientist

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Yearly Report for the Halifax Centre of the RASC, 2005

Andrea Misner, Secretary

Centre and Events:

2005 was a year filled with a diverse range of speakers and rising attendance at the main meetings. Our membership has dropped a little from 211 to 184. This could be due to people not updating their memberships in time for the "official count" date.

Society events ranged from the casual work parties at St. Croix observatory, Astronomy Day events, and Nova East. At our observatory at St. Croix, there have been an increasing number of observers, and key holders. The Centre marked April 16th, Astronomy Day, with a public outreach session at the Keshen Goodman Library in Clayton Park, Halifax, organized by Ron Mills. Over one thousand people of all ages passed by to get their dose of sidewalk astronomy. Nova East was also a great success this year, it was one of the best attended with John Dobson as the main speaker.

Centre's Members:

Within the centre's members, Mary Lou Whitehorne received the Las Cumbres Amateur Outreach Award, for her outstanding work in astronomy education. Dave Lane and Paul Gray co-discovered a supernova (later announced as Supernova 2005B on 1AU Circular 8462).

Speakers for 2005:

January	– Roy Bishop
February	– Dr. Bill Stoegre
March	– Dr. Joe Hahn
April	– Peter Jedicke (National RASC President)
May	– Andrea Misner
June	– Blair Macdonald
September	– Dave Lane and Mary Lou Whitehorne
October	– Alan Whiteman
November	– Pat Kelly
December	– Mary Lou Whitehorne ✭

The Exeligmos and Four Maritime Solar Eclipses

Roy Bishop

On 1970 March 7, a few months before the Halifax Centre was re-activated, a rare total solar eclipse swept northeastward along the Atlantic coast of Nova Scotia. Most of the province, including Halifax, was under heavy cloud that day, but two RASC members, Sherman Williams and the author, saw the eclipse in a perfectly clear, deep blue sky at White Point Beach, near Liverpool. As daylight rapidly faded in the seconds before totality, prominent shadow bands fluttered all around us. Then a deep twilight descended as an inky-black Moon suspended in front of a rayed, pure-white solar corona appeared in the heavens. In that pristine setting, with only a few people present, with ocean waves rolling in on the beach and an orange sunset-like glow circling the horizon, we were awe-struck. It was the most spectacular natural event we had ever seen.

Eighteen years and 11 days later, on 1988 March 18, a total solar eclipse having a track with a similar shape and latitude range occurred one-third of the world westward, over the Pacific Ocean off the coast of Japan.

Eighteen years and 11 days after that, on 2006 March 29, a total solar eclipse having a track with a similar shape and latitude range occurred another one-third of the world westward, across Africa and into Asia. This spring several RASC members traveled to Libya, the Mediterranean, and Turkey to view that eclipse.

Noting this pattern, you might predict that after another 18 years and 11 days, on 2024 April 9, a total solar eclipse having a track with a similar shape and latitude range will occur yet another one-third of the world westward, placing it back in Nova Scotia! In making this prediction you would be using two famous astronomical time intervals: the "Saros" (18 years plus approximately 11 days) and the triple-Saros or "Exeligmos" (54 years plus about one month). Your prediction would be surprisingly accurate, for on 2024 April 8 a total solar eclipse will sweep northeastward across central New Brunswick. That will be the next total solar eclipse visible from our area.

If I am still visiting this planet one Saros from now, on 2024 April 8 I shall be somewhere north of Fredericton so I can again stand in the umbra of the Moon, and celebrate the memory of the White Point eclipse that Sherman and I experienced one Exeligmos earlier.

Perhaps I am being greedy in looking forward to the 2024 eclipse, for I am fortunate to already have lived long enough to have experienced an Exeligmos: I saw (and remember) the solar eclipse of 1945 July 9, although it was only partial from Nova Scotia. One Exeligmos later I saw the eclipse of 1999 August 11. Again it was only partial from Nova Scotia but this time I was in the path of totality on a ship south of Sable Island. An account of that eclipse appears in SkyNews, the November/December 1999 edition.

Incidentally, the Saros, a time interval known since ancient times, is the result of a remarkable numerical commensurability between three lunar periods: the synodic month, the draconic month, and the anomalistic month. I need not elaborate further, for you can read all about this fascinating numerology and its effect on eclipses on pages 106 – 108 of the 2006 Observer's Handbook.

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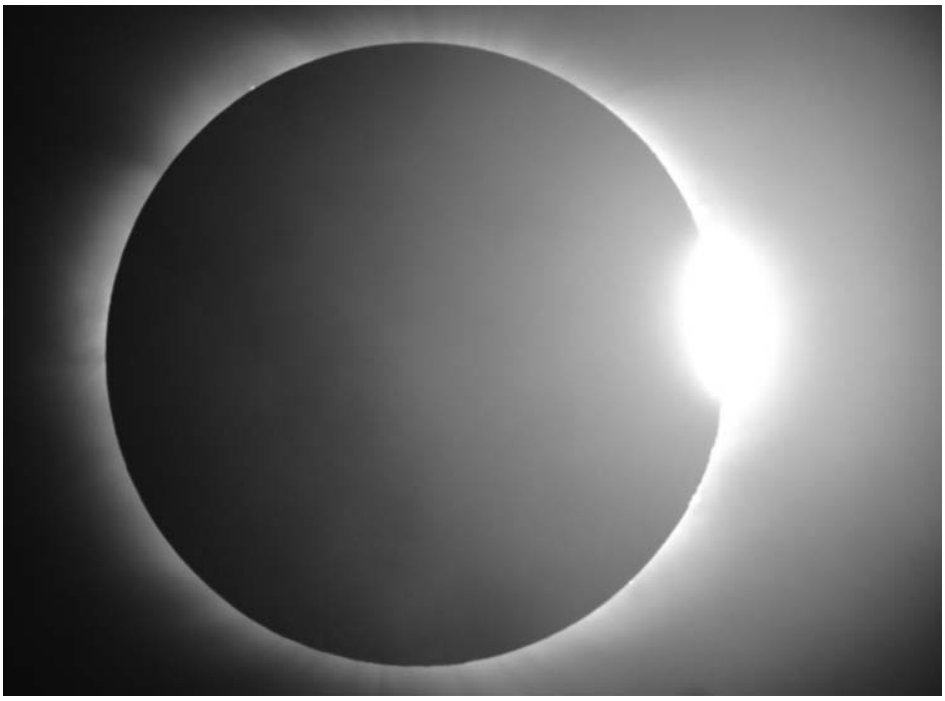
Astronomy Picture of the Day 2006 March 30

When Diamonds Aren't Forever
Credit & Copyright: Anthony Ayiomamitis

Explanation: The track of totality for the first solar eclipse of 2006 began early yesterday on the east coast of Brazil and ended half a world away at sunset in western Mongolia. In between, the shadow of the Moon crossed the Atlantic Ocean, northern Africa, and central Asia, and so came for a moment to the small Greek island of Kastelorizo in the eastern Aegean. Astronomer Anthony Ayiomamitis reports that the islanders and many eclipse-watching visitors were indeed treated to an inspiring display of the beautiful solar corona as totality lasted about three minutes. As the total phase of the eclipse ended, he was able to capture this striking "diamond ring" image. In it, the first rays of sunlight shining through edge-on lunar valleys create the fleeting appearance of glistening diamonds set in a bright ring around the Moon's silhouette.

http://antwrp.gsfc.nasa.gov/apod/



National Council Report

Pat Kelly

The National Council met at the University of Toronto at Mississauga on February 11. That meeting followed a special meeting of the society that was held to approve two changes to the society's by-laws. Hundreds of members participated using proxy votes and both changes were approved overwhelmingly. What will this mean to you?

One proposal was to divide the membership fee into a society fee and a centre fee, with each set separately. When you get your renewal notice. There will be a society fee and a centre fee, which will be added to make the total. It also means that in the future, fee increases needed at the national level need not be higher than required.

The change to an electronically-delivered Journal means that in the future, RASC membership will give you access to an electronic version of the Journal, which you can download, and if desired, print for your own personal use. If you wish to continue to receive a printed copy in the mail, there will be a place on your next renewal notice to indicate that. The extra cost is expected to be about $15 per year. Those who currently download the electronic version will see the first big difference with the April issue which will have most of the images in colour. Live links to web sites mentioned in articles will be added shortly. If you do not wish to get the printed Journal, you can opt out early and help save the society some money. Simply contact the national office, or you can pass your request on to me and I will pass it on.

A budget was approved that still had a substantial deficit ($35,000), but it is hoped the we have finally taken measures that will get the society back on track financially. It is expected that a $5 increase to the society portion of the membership fee will be voted on at the coming General Assembly. (Under the former 60/40 split, a fee increase of $8.30 would have been needed for the national society to receive an extra $5). The actual amount may change as we get further into the budget year and see how things play out.

One area where there is a great deal of uncertainty is the amount of money that the society need to set aside in order to fund life members as they comprise a significant percentage of the membership. To that end, the society will be surveying life members to try to get a handle on their demographics. The national council has also asked for a review of the life membership programme to ensure that the amount of money that the society receives for a life membership will actually sustain that person over their expected lifetime. This likely mean a large increase in the cost of a life membership. The executive has already been asked to consider an increase of $1000 in the life membership fee, changing it from $1100 to $2100. The society will also be taking a more active roll in planned giving and there will be a major article on that in the April Journal.

The membership and promotion committee has also been very active and will be using a web-based survey (www.surveymonkey.com) to look at the interests of new members as well as to do exit surveys for members that do not renew. The results for new members will be sent to the respective centre presidents.

There will be some major changes in the executive at the coming General Assembly as the terms of some national officers end. The proposed slate of candidates consists of: Scott Young (Winnipeg) for president (moving up from first vice-president and replacing Peter Jedicke who now becomes first past-president); David Lane (Halifax) for first-vice president (moving up from second vice-president); and starting on the executive as second vice-president will be Mary Lou Whitehorne (Halifax). The national council also approved Patrick Kelly (Halifax) *(yours truly)* as the new editor of the Observer's Handbook. Can you see a pattern developing? Actually Mary Lou and I weren't sure which of us was the crazier of the two!

I mentioned in my last report that the MPA system the society uses for its business is in need of replacement. As that will be a major expense, and the society does not have a lot of internal expertise in that area, the first phase will be to have a consultant look at the existing system, what we would like to do, and recommend some possible solutions. The funding for phase one will come from the society's endowment fund.

CASCA, the Canadian organization of professional astronomers, has just launched its new web site that is aimed at astronomy education and provides resources for students, teachers, as well as both amateur and professional astronomers. It is found at http://www.cascaeducation.ca.

To decrease the turnaround time of national observing certificates, like the Messier Certificate, they will now be processed at the centre and then sent off to the national office. You should also check the observing section of the national web site for the new Messier recording forms that are now available.

On the light pollution abatement front, there are two developments. One is the start of discussions with Parks Canada to try and have light pollution abatement become a focus for the national park system. The other is that the light pollution abatement committee would like the latitude and longitude of all centre and personal observatories. Information like this is being used to determine placement of cell towers, highway lights, etc.

If you want to keep up on the latest developments at the national level, I would encourage you to visit the society's electronic news site at http://www.rasc.ca/rascnews/

Advertise in Nova Notes

After some serious inquiries the Centre executive has approved a proposal to allow commercial advertising in Nova Notes. Three ad sizes are being offered, a 1/6th page (2.5" x 5"), a 1/3rd page (5" X 5") or a 1/2 page (7.5" X 5"). Prices per ad are $25, $35, or $45 per insertion/per issue. Ads will run on a space available policy and inclusion is at the discretion of the editor. Ads should be of an astronomical interest, or at least deemed of strong interest to most of our members. Please contact the editor (See page 2) regarding suitable artwork files, to submit artwork or with any questions.

What They Say and What They Really Mean:

Submitted by Michael Boshat

1) It is a difficult double star.

   If you see two stars,it is probably wishful thinking.

2) This is a test for a 4" telescope.

   Use a 10" and maybe you'll see it.

3) An experienced observer can detect the star's variability.

   If you haven't been observing for at least ten years,don't try it.

4) The color contrast is striking.

   One star is white, the other is white.

5) The spectrum is unusual.

   I can't understand it.

6) The ideal book for an amateur.

   Brush up on your math.

7) The cluster has over two hundred stars.

   I counted twenty-five with a 10" telescope.

8) The slightest haze will obscure it.

   You probably won't see it on the clearest night.

9) The telescope's optics are superb.

   They magnify atmospheric disturbances perfectly.

10) The site offers clear skies year round.

    It is two hundred miles from civilization.

11) A person with average eyesight can split this pair.

    Over half the world is blind.

12) If it is cloudy, other activities are planned.

    Let's gobble down some pizza and swill beer.

13) Observations were terminated at 2 AM because I got cold and sleepy, and of haze.

    I ran out of Vanilla Wafers.

14) "Uh, that's neat." (Spoken by your non-astronomer neighbor after being shown M31).

    "How much did you say you paid for this thing?"

15) I think it is only the wind in the trees or a cow in that field or something.

    It will probably eat me and then march on Tokyo.

16) After moonrise, members ceased deep-sky activities and enjoyed pleasant views of the moon.

    Everybody (a) cursed,(b) seared their retinas before packing up, and (c) went home.

The Farside of Astronomy - Humor of the Astronomical Kind

http://earthstar.htmlplanet.com/farside_humour.htm

Change to how the Journal is delivered to Members

Peter Jedicke, President of the RASC

Dear Member,

Both proposed changes to our by-law were accepted by a large majority of the membership at last Saturday's Special Meeting of the Society in Mississauga, Ontario. The two initiatives were:

Initiative One: Proposal to Amend Society Fee Distribution and Adoption Procedures

Initiative Two: Proposal to Enable the Print and Electronically Delivered (PED) Journal

The second initiative will have the most impact on members since it will mean that, after a phase-in period, you will no longer receive in the postal mail a paper copy of the Journal as part of your membership fee.

All members will be able to access the Journal electronically on the Internet, as you have already been able to do for the past year or so. You can also print out a single copy of the Journal for your own use on your printer. However, there will be an optional charge of $15+GST ($15US outside of Canada) if you wish to continue to receive the Journal in paper form by postal mail.

This change in the delivery method of the Journal will be phased in as follows:

– Regular and Youth members will continue to receive a paper copy until your membership expires. You will be offered the paper subscription at the time of your next membership renewal.

– Regular and Youth members who have paid more than one year in advance will continue to receive a paper copy until the August 2006 issue. You will be contacted and offered the paper subscription in advance of the October 2006 issue.

– Life members will continue to receive the paper copy until the August 2006 issue. In advance of the October 2006 issue, you will be offered the paper subscription on your annual Life Member Statement.

On the same day as the Special Meeting, the National Council of the Society approved a budget for 2006. Unfortunately, a significant deficit is again projected. In light of this, to save the Society some money I ask you to consider either of the following options, similar to what I described in my article in the October, 2005, issue of the Journal:

1. If you prefer not to receive the paper version of the Journal, please go to

http://www.rasc.ca/journal/optout.html

and choose to stop receiving the paper version of the Journal immediately.

2. If you intend to subscribe to the paper version of the Journal, please consider donating about $3 for each issue between now and when your membership expires. You can either send a cheque with a note to the National Office or donate with your credit card using the eStore ($10 or more). Access the appropriate item on the eStore from

http://www.rasc.ca/journal/optout.html

We are very excited about the future of the Journal in the electronic medium. At the same time, we are pleased that we can continue to make the Journal available on paper to those members who wish to receive it in the traditional way. I hope you will continue to share your enthusiasm for astronomy with us.

Clear skies, Peter Jedicke
president@rasc.ca

St.CROIX Observatory

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.

2006 Observing Chair: Tony McGrath 463-4018

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. *Dates for Members' Nights for the following few months are:*

April – Friday 28 or 29 **May – Friday 26 or 27** **June – Friday 23 or 24**

Directions from Halifax

(from Bayers Road Shopping Centre)

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 can gain access to the St.Croix facility. For more information on becoming a key holder, contact the Observing Chair.

RULES FOR THE 17.5" SCOPE

(OR ANY RASC SCOPE AT SCO)

On Members' Nights the 17.5" scope must be shared by all members. The 17.5" scope can be used by anyone, but all views have to be shared with anyone interested in taking a look.

On non Members' Nights the scope can be used by individuals wishing to work on personal observing projects. Members should try to limit their use to under 45 minutes when other members are waiting to use it. Preference will be given to members who send an email to the hfxrasc list, or call the observing chair on the night they want to go out. If no one else wants to use the scope then feel free to use it all night, but it would be considerate every so often to ask members there if anyone has been quietly waiting to use it.

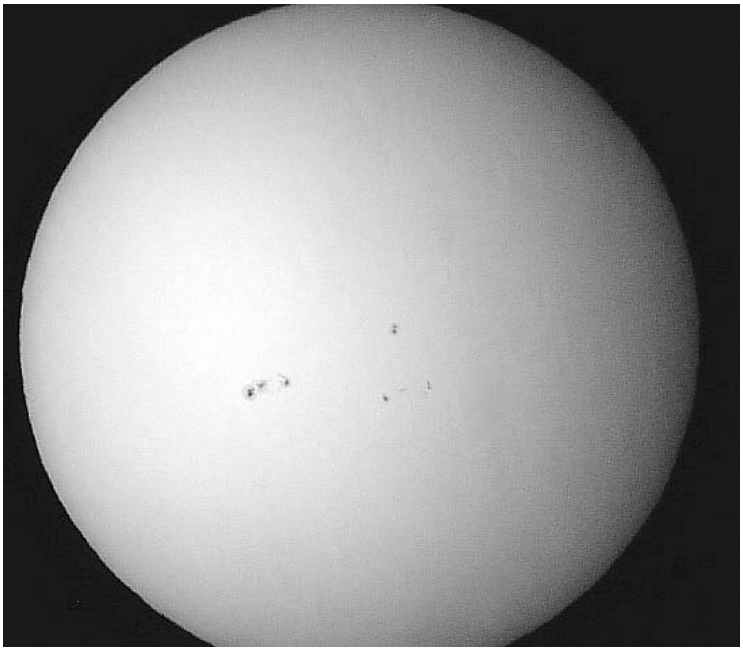
Please contact the Observing Chair for more information.

Meeting Announcements

Halifax Centre of the Royal Astronomical Society of Canada

Meeting dates for the next two months are April 21 and May 19

Details as to speakers and topics were not confirmed at time of publication, please watch the website (http://halifax.rasc.ca/) or the rasc email list for more details closer to the meeting dates.



Sunspot image-Mike Boshat
Date: April 3, 2006 Time: 1500 UT

Meetings begin at **8:00** P.M.

Members of the general public are welcome.

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.

Room 176 Loyola Building
Saint Mary's University *(See Map Below)*

The Halifax RASC Executive meetings begin at 7:00 P.M., and members are welcome to attend.

Halifax RASC Executive 2006

Honorary President	*Dr. Roy Bishop*	
President	Craig Levine	852-1245
1st vice-president	Paul Evans	423-4746
2nd vice-president	Marc Bourque	835-2589
Secretary	Andrea Misner	425-5074
Treasurer	Pat Kelly	798-3329
Nova Notes Editor	Michael Gatto	453-5486
National Rep.	Pat Kelly	798-3329
2nd National Rep.	Mary Lou Whitehorne	865-0235
Librarian	Alex LeCreux	404-5480
Observing Chairman	Tony McGrath	463-4018
Councilor	Jim Dorey	464-8781
Councilor	Wesley Howie	
Councilor	Gilles Arsenault	

Meeting Location

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.

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 Residence*

P = Parking