

Nova Notes

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



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Front page photo: Michael Boschat
Lunar Eclipse, March 3 2007, @ 23:55 UT
Scope: Antares 105mm, f/10, refractor @25x
Olympus C-750 digital camera mounted over
eyepiece, set at 20x zoom



From the editor

Quinn Smith

The Celestial gods have blessed us with some fine sights this winter. Comet McNaught, a fine Lunar Eclipse, a breathtaking one (and two) day old Moon in March, and just a few days ago, one of the highest Moons in twenty "something" years with the Werner "X" to boot. Not too shabby. Not too shabby at all!

Being fairly new to the Nova Scotia skies, I can't be sure of my facts on this, but we seemed to have a good number of clear skies to start the year (Dave Lane would know). Of course I still failed miserably to make any serious progress in my attempt to complete a Messier Marathon. Those Virgo clusters - so many, so little time. And where are the identification tags? They show up just fine on "Starry Night"! Oh well, there is always next year (famous last words).

Talking of so far so good, a thank you to all the contributors to this edition. It is great to have so many articles to choose from. Thank you all for your support of Nova Notes. Which reminds me by getting your Nova Notes on line, (and opting out of the print edition) you get your Nova Notes a week early, in colour, and save the Society \$2. Can't be bad.

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: (note new date in May)

April 20, 2007 - Speakers night

Our regular meeting with a guest speaker. This month, Roy Bishop discusses “neat things about telescopes”.

May 11, 2007 - Speakers night

Our regular meeting with a guest speaker. This month, Dave Lane talking about his Abby Ridge Observatory - “a robotic research observatory”.

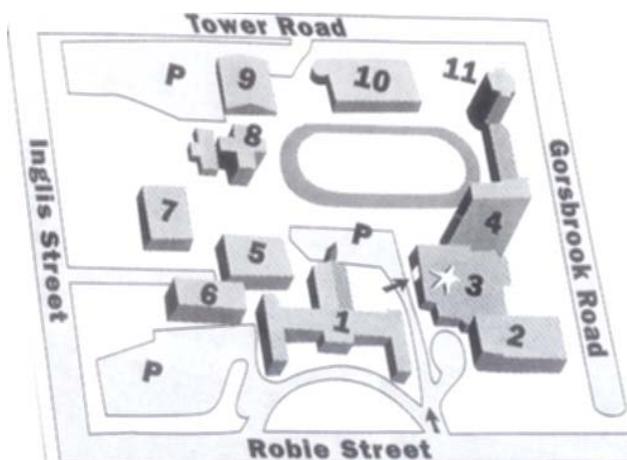
June 15, 2007 - Speakers night

Our regular meeting with a guest speaker. This month, Calum Ewing discusses “Catching beams of light - the Aurora Borealis”

[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
Observing Chairman	Tony McGrath	463-4018
Councilor	Paul Heath	457 0610
Councilor	Jim Dorey	464-8781
Councilor	— ? —	



National Council Report March 2007 Patrick Kelly

The National Council met in mid-March. Here are some of the highlights that may be of interest to members.

The council has approved a move to look at putting society funds, such as those in the endowment fund, into a balanced portfolio that will provide a higher rate of return than GICs.

The budget for the coming year is forecast to have a \$15,000 deficit, but in the past, we have usually had several factors come into play over the course of the year to increase the bottom line,

and it is hoped that this will be the case this year.

The council also approved a name change for one the centres. The Moncton Centre is now officially the New Brunswick Centre. They have three existing "units" in Moncton, Fredericton, and Saint John, and are starting a fourth one in Mirimichi.

The membership and promotion committee will be looking at setting up a national speakers bureau that would give outside organizations looking for speakers access to a list of topics and speakers.

The 2008 General Assembly is being hosted jointly by the Hamilton

Centre (100th anniversary), the Toronto Centre (the oldest centre), and the Mississauga Centre (the newest Centre). It will take place over the Canada Day weekend.

There is interest in establishing a national award for astro-imaging. A committee will be looking at what might be involved.

The executive will be looking at how the RASC can best participate in the International Year of Astronomy, which has been declared for 2009 to mark the 400th anniversary of Galileo being the first person to look at the night sky with a telescope. You can find more information at; <http://astronomy2009.org>.

National Astronomy Week: April 15—21, 2007

The Halifax Centre will celebrate International Astronomy Week by presenting talks at the Halifax Public Library as follows:

- * Wednesday, April 18th 7 p.m. - 9 p.m. - Cole Harbour Branch,
- * Thursday, April 19th 7 p.m. - 9 p.m. - Keshen-Goodman Branch

Pat Kelley will present, "Comets, Meteors and Impacts", and, "Black Holes, Structure and Theory", will be presented by Blair MacDonald.

Astronomy Week ends on April 21, and will be marked by, "Sidewalk Astronomy at the Library", at both the Cole Harbour and Keshen-Goodman branches.

Nova East 2007: August 17 - 19, 2007

Check out the details at <http://halifax.rasc.ca/ne/home.html>

HALIFAX CENTRE

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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 May 28th 2007.

If you are a member who downloads the latest issue of Nova Notes from our website, then 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

February 16th 2007
Gilles Arsenault

Editor's note: Due to poor weather for the February meeting and the cancellation of the March meeting (again due to weather), we have included an extended version of the February meeting report. Thanks to Gilles for his excellent report.

The Halifax Center convened its monthly meeting on the 16th of February 2007. There were about 25 people present including 2-5 non-members. This meeting was one of our member's nights where instead of one main quest speaker we get a chance to enjoy some short but excellent speeches from our membership. The meeting was kicked off with the President, Paul Evans welcoming everyone and giving a quick talk about the benefits of membership. Quinn Smith, our new Nova Notes editor was recognized for the new format and look of "his" first edition of our monthly newsletter.

The first presentation of the night was by Dr. Roy Bishop. His talk was titled Guided Astrophotography on a 0.3 kg Equatorial Mount. Roy showed us the lightweight set up that he has used for taking timed photographs. His equipment consists of 2 small camera bags and a heavy-duty camera tripod. His one camera bag is for his camera and the other small bag of tools contained a very small equatorial mount.

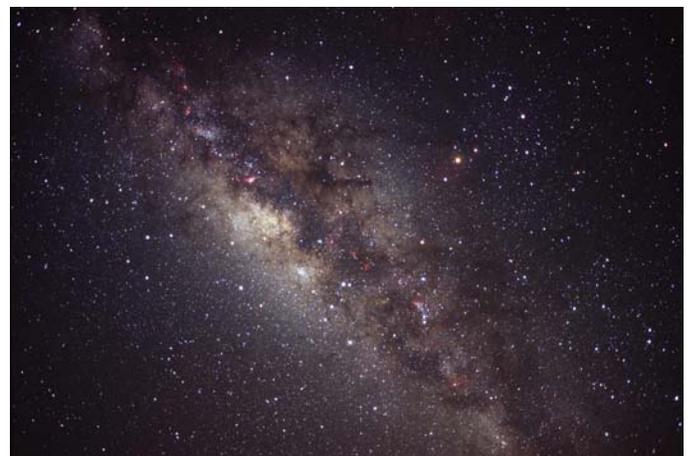


The mount is actually a small piggyback mount that has dual axis motion and has slow motion controls. This mounts on the camera tripod. Using a small wooden triangular jig, Roy adjusts the angle of the mount for the latitude he is observing at. Once the correct latitude was set Roy showed how he would sight along the side of the mount to line everything up with Polaris. With the mount all lined up his camera is attached to a ball mount, which allows the camera to move in all directions.

A small polar alignment scope with an illuminated reticule is then secured to the front of the camera body with a rubber band. A small binocular prism is held in place by a brass fitting to the bottom of this small scope. Roy demonstrated how he moves this prism by hand to find a guide star, which he centers in the small scope. He can then make fine adjustments to the mount while guiding his photos. The longest guided photo he has taken with this setup is 20 minutes. The whole set up is very lightweight with the heaviest part being the camera tripod. Roy concluded his talk by showing us several great photos of the heavens taken from different parts of the world. These photos included the Eta Carina nebula, Comet Hyutake and Hale Bopp as well as a beautiful Milky Way picture.



From Roy's setup: Hyutake (above) Milky Way (below)



The second presentation was by our former Nova Notes editor Mike Gatto. It was his first ever presentation to the Center and was great. Mike recounted how he got started in astronomy after seeing comet Hale-Bopp in 1997. After observing with binoculars for a while, he got his first scope with was a 6-inch f/8 Newtonian with good optics. Aperture fever eventually hit and he wanted more. He purchased a Zambuto mirror set from another member and went about building his own scope. His hand-illustrated slide show described all the steps he took in making his second scope.



This scope was made of 2 Sonotubes placed one inside the other. The inside was flocked and the outside was covered with a plastic coating. A hinged plywood box held the scope and the altitude bearings. The scope worked well for Mike but was heavy and after years of faithful duty began to show the effects of much use.

Mike detailed how he replaced the two Sonotubes with a Prostar Blacklite Tube. This a lightweight cardboard tube that is made with the flocking material build right in.



The hinged plywood box was replaced with a much lighter design with cut back the amount of wood that was used. Mike was very pleased with the results. The original scope was 31 lbs and the rebuilt one was only 23 lbs, a saving of 8 lbs. Mike utilizes this excellent handmade scope to produce really great sketches of the planets, that and can be seen on the Halifax center website.

Our third presentation was from Blair MacDonald. Blair is a regular contributor to our meetings and his recent presentations have dealt with the technical aspects of image processing. This time Blair showed us some of the astrophotography he has been working on. His first project was an image of G1, a small globular cluster located in M31. Blair's photo of this globular was compared to that taken by the Palomar sky survey and the two were very similar. Blair also showed us a picture of this same globular take by The Hubble Space Telescope. Blair went on the show us some of the photos he has been taking with his new Canon DSLR camera. The results are very impressive. We were treated to a really nice photo of M27 taken from his backyard as well as photos of M42 The Orion Nebula, M8 the Lagoon Nebula, and many other great photos. This presentation got Paul Evans to thinking that a talk about digital SLR cameras would be a great topic for a future meeting.

Gary Weber concluded the night's presentations with his talk on fan configurations and how to install a fan on a Newtonian reflector. He discussed how small fans are be used to control the temperature of the air inside the tube of a Newtonian reflector. His first design was built from the backing of a cheap clipboard onto which 3 small computer fans where mounted. The fans plugged into a control box that allows the speed of the fans to be regulated. His second design was a larger computer fan, which was more efficient at moving air, mounted on a piece of floor tile. This whole assembly was then mounted with Velcro to the bottom of his scope. This second design was also plugged into the adjustable controller and has proved to be a better design. Gary swears by the use of a fan to regulate the temperature of the air in his scopes. In several tests he has conducted the image in his scope is noticeably improved by using a fan, especially when doing high-powered planetary observing.

Gary also gave the "What's up talk" for the upcoming month. Highlights include the Moon near the Pleiades on the 23rd of March and a Lunar eclipse on the 3rd. Zodiacal light is also going to be visible in the west from the 6th to the 10th of March. Michael Boschat had also posted a notice to keep our eyes open for Nova Scorpii 2007, which was just recently discovered and was up to magnitude 3.4. It is located a few degrees below Antares in the constellation of Scorpius.

Although we didn't have a large crowd we had a great and informative night of talks. After the presentations we had our normal snacks and enjoyed everyone's company.

Astro Photo Processing 101.3

Blair MacDonald

Last time we looked at image noise and how it can be reduced by adding images or taking longer exposures. In preparation for looking at methods of reducing the effects of noise (and other problems) on your images, this time we will look at the idea of an image spectrum. Now this is not the normal spectrum produced by sticking a prism in the optical path of your scope, no my friends this time we dive into the realm of spatial image frequencies.

In the first installment, we looked at how an image is represented on a computer. Normally an image is thought of as a rectangular array of brightness values called pixels as shown in the diagram below.

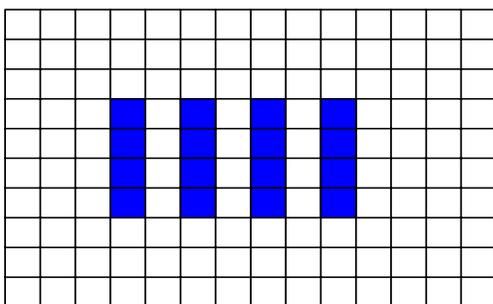


Figure 1 - Typical image representation

In this representation, there are four vertical lines spaced two pixel apart. Now we can have the same image with the lines spaced further apart as shown in the next diagram.

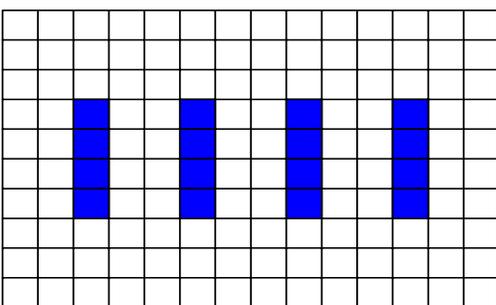


Figure 2 - Lower frequency image

Now in this image we still have the same four vertical lines, but they are now separated by three pixels each. Now, my

complete lack of artistic talent aside, these two figures show the basic idea of spatial frequency. In Figure 1 the pixels, at least in the horizontal direction, change at a faster rate than the pixels in Figure 2. That is the basic definition of spatial frequency, it is a measurement of how fast the value of the pixels of an image change.

Now comes the hard part, there are two completely valid ways of looking at an image. The first one is the usual *spatial* method and the second one is the *image spectrum*. Not only are both ways valid, but with a little math one can be transformed into the other. The typical representation of an image spectrum is a two dimensional plot with zero (no changing pixels) at the center and the spatial frequencies increase as you move away from that point.

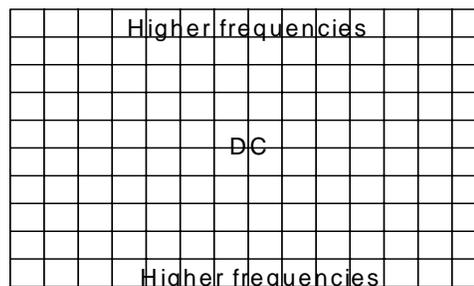


Figure 3 - Image spectrum

It is often easier to think of a one dimensional spectrum where the far left is zero and as you move to the right you are actually moving away from the center of the grid shown in Figure 3. The part of the information lost in this description is the direction away from the center, it could be left, right, up or down. We'll get back to the importance of this in future articles, for now just keep in mind that zero is in the center and as frequencies increase, you move away from the center of the plot.

Some interesting things can be discovered by looking at an image spectrum. For example, suppose there is a lot of noise in the image and further more suppose that it has a flat frequency response. This means that the noise has the same value at all spatial frequencies. The actual image cannot have a flat curve or the resultant image would look like a TV tuned to an empty channel so at some frequencies (usually the lower ones) the image frequencies must be of larger amplitude than the noise. If we knew at which frequencies the noise was lower than the image data, then we could make a filter to reduce the effect of the noise. This is why a low pass filter is used to improve the overall signal to noise ratio (SNR) of an image.

To see what an image spectrum looks like we will use the example of the M42 image shown below.

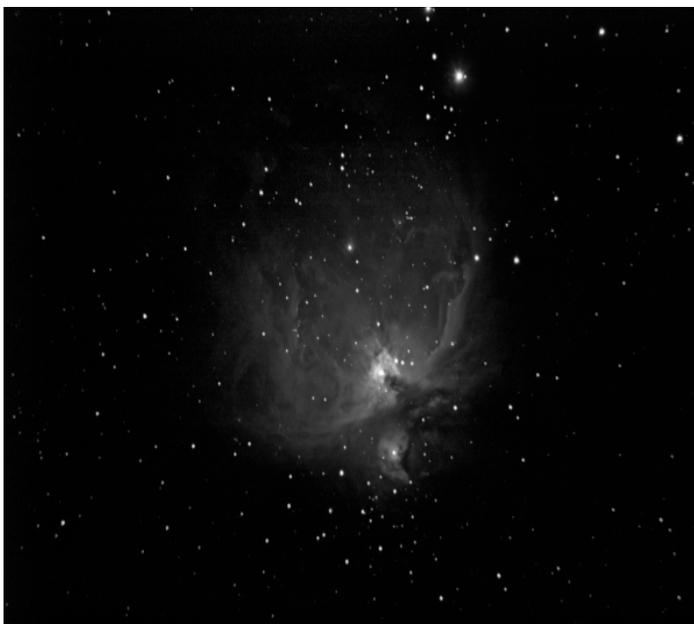


Figure 4 - Spatial representation of M42

The Fourier transform is used to convert this spatial image into its two-dimensional spectrum. This produces the image spectrum for the M42 image below.

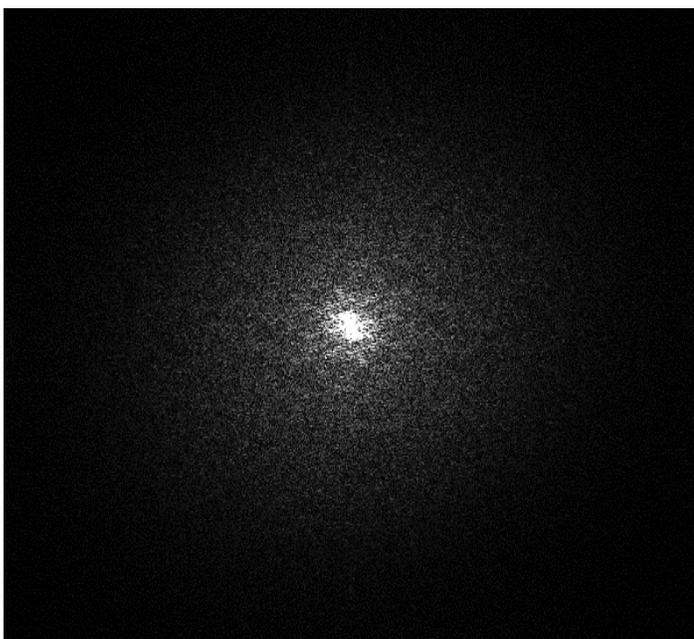


Figure 5 - M42 spectrum

Looks like the same image, doesn't it? Believe it or not, these are two completely valid ways of looking at the same image. Let's convert the spectrum to the normal one-dimensional type by recording only the maximum value at a fixed distance away from the center and see what it tells us.

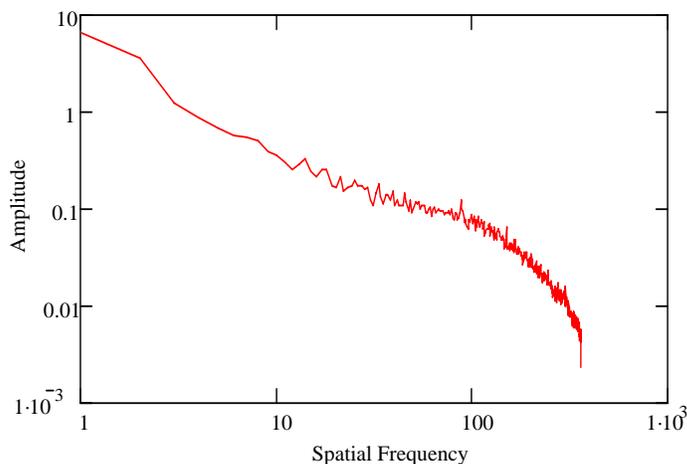


Figure 6 - One-dimensional spectrum of M42

If you look at the plot, you can see that it drops off rapidly and becomes very noisy just before a spatial frequency of 100. This means that you could reduce the noise in the image and not affect the image quality much by applying a low-pass filter placed at 100 in the spatial frequency spectrum (but that's the topic of the next article).

Another application of the image spectrum is in image compression. Formats such as JPEG convert an image to its spectrum, examine the values and set any that fall below a threshold to zero. Then only the image size and its non-zero spectral values are stored. This greatly reduces the size of the image on disk at the expense of a little processing to convert the stored spectrum back to an image when the file is opened.

The concept of spatial frequencies is important for many processing techniques. Things like image filtering and deconvolution make use of the idea, as does image compression. For now, the important points to take away from this discussion are that spatial frequencies are just a way of describing how fast pixel values in an image change and that an image can be converted to its spectrum and back using a little math.

Book Review: Practical Sky-watching

Pat d'Entremont

Editors note: A tremendous thanks to Pat for this book review. I hope that the newsletter receives many more. I might even throw one in myself.

The Nature Companions: Practical Sky-watching

From Fog City Press, first published 2002, this edition 2006.

By Robert Burnham, Alan Dyer, Robert A Garfinkle, Martin George, Jeff Kanipe, and David H. Levy. Consultant Editor: Dr. John O'Byrne.

The plane from Phoenix to Toronto was delayed five hours, and we only discovered this *after* we had checked out of our hotel with the five pools and the "Lazy River Ranch". What to do, what to do? Well, I was with my wife and my daughter, so if there are any women in the room you can probably figure out what we ended up doing.

You guessed it! We scooted toward the nearest shopping centre so fast we were red-shifted.

But I couldn't complain. Over the previous few days, I had been indulged with many things astronomical, including Meteor Crater and not one but two nights at Lowell Observatory in Flagstaff. I had observed the Wild Duck Cluster through the famous Clark Refractor, looked at gorgeous views of Jupiter through a 16" SCT, and had seen the very photographic plates that had allowed Clyde Tombaugh to positively identify Pluto, whatever it is.

Arizona Mills Mall is HUGE. If it were placed in Cygnus it would take up two degrees of sky. As I sat there, I was reminiscent of those cosmological lectures, where we learn about time going faster for some people than others. For Cindy and Andrea, five hours flew by; for me, it was like the poor soul who ventured too close to a black hole and everything started slowing down.

So I strolled down to the largest bookstore, hoping to find something useful to occupy my

space-time. And that's where I found the 480-page *Practical Skywatching*, from *The Nature Companions* series (US\$9.99). I must say, I've enjoyed it thoroughly. It appears to me like a great book for beginner or veteran alike. It starts off with the extremely easy-to-read history of astronomy, how to select equipment, things to see in the night sky, reading star charts, space travel, astrophotography, etc. Even if you know most of this stuff, it's still interesting to read, and you're bound to find something you either never knew, or else forgot.

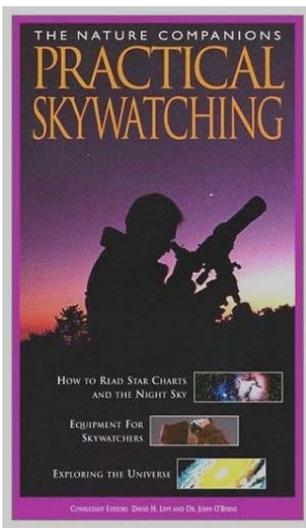
After the introductory chapters, it goes into the solar system, with detailed maps of the moon, and interesting facts on every planet. There's a section on asteroids, one on comets, the sun, meteors, eclipses... it's all there. It then goes into types of stars, nebulae, galaxies, novae, supernovae, and what it calls "other lights".

A large part of the book is devoted to star-charts, and it goes through all 88 constellations, pointing out areas of interests. For each constellation, it points out multiple-star systems, Messier objects, NGC objects, variable stars, and many other objects, often with beautiful accompanying images and always with a detailed chart.

Finally there is a "star-hoppers guide", where they take interesting areas of sky and point out objects to observe, and tell you how to hop from object to object. This is like some articles you'll find in popular astronomy magazines, only the sections here are typically longer than the magazine articles. I have yet to bring this book to a dark-sky site, but I am looking forward to doing so. I can imagine that a single tour could easily take up a whole evening, and there are 20 such "starhops". (Three of these are only available to southern observers.)

The only thing I found missing is that this book didn't cater to the pampered GOTO observers, like me. No RA/declination charts in this book for you to just punch in your computerized scope; it assumes you're going to do the work yourself, and actually hop to where you want to go. But having said that, the descriptive tours seem so interesting I'm actually looking forward to doing them. It might even force me to line my finder scope up with my main scope!

Practical Skywatching is an easy and extremely interesting read, one that neither talks down nor confuses. It is chock-full of beautiful pictures, very detailed sky charts, and many graphs and tables. It also has frequent sidebar "Skywatching Tips". Plus it has a comprehensive index to help you find things fast. This is one book that will be kept with my equipment, right next to the *Observer's Handbook*. My understanding is that there is a copy becoming available to the Halifax RASC's library, so I encourage you to check it out, and maybe literally check it out. Cloudy or clear out, you're bound to enjoy it.



The Lunar Eclipse (part 1): A Family affair

Mike Digdon

I haven't done any observing for many months, for a whole variety of reasons (some good, some not so good), so I was particularly excited about the lunar eclipse tonight. I watched the Moon rise over the past few days and it turns out that when it was to hit totality, it would be just above the trees right off my front porch.

My daughter, who is only 22 months old, is completely fascinated by the moon. For several months now, whenever she sees the Moon, she goes completely bananas. "Moon, daddy, moon! Oooooooo!" She stares up and points at it and oohs and ahhs. A budding astronomer, to be sure.

My plan is executing perfectly !!!!!

I really wanted her to see the eclipse, so I hoped and hoped for the past couple of days that the weather would hold out, and I believe that we were suitably rewarded.

As soon as it got dark, I grabbed my binoculars, camera, and tripod and got set up because I wanted to try to get some umbral pictures. Overall, the views were magnificent and I got a couple of really nice pictures of totality (unfortunately, I had the multi-focus setting wrong, so my umbral pictures are pretty fuzzy). But that certainly was NOT the highlight of the evening for me.

While I was waiting for totality, my wife came out, with my daughter all bundled up, and we watched the eclipse together. My daughter was absolutely amazed at the Moon. She definitely

noticed that something was different about it, although we really couldn't explain it all that well. We watched and watched and I took zillions of pictures. It was wonderful.

Eventually I packed things up and we headed back home. We were facing west, so she immediately saw the big, bright "sparkly" shining over our house. "Daddy, spark-y!"

"That's right, hon. That's VENUS. Can you say Venus?"

"Nee-us"

"That's right, sweetie!" She giggled.

All in all, an incredible evening and an amazing event. Oh yeah, the eclipse was pretty neat, too.

The Lunar Eclipse (part 2): The Time Line

Paul Heath

Due to work I missed the chatter on eclipse viewing. I also did not have any equipment with me. , however I saw the moon rise above Citadel hill at 18:35 almost 4/5 covered, with the covered side too dark to see detail. Heading home I swung into the Garrison Grounds and started to record observations by eye (old fashioned I know).

18:45 Full sphere began to appear – still slight sunlight NW edge

18:48 First tinge of orange begins on E side of moon – Mare features begin to be discernable

18:50 Moon pale ball in sky – east side orange more defined – thin ghost crescent on west side

18:54 Mare well defined

19:00 Pale ring surrounds moon

19:07 Moon has pale brown tinge

19:15 Face stares faintly from shadowed moon – slight wavering due to fog from harbour

19:17 Couple shows up with 6" dob – had been over on The Commons

19:20 Moon looks gray through scope but visually still brown tinge

19:23 Slight brightening on lower W edge – bright ray feature visible above Grimaldi (charts say Aristarchus)

19:31 Brightening to east side of moon

19:34 Visually orange tinge returns to face of moon – brighter reddish tinge through scope

19:42 First bright edge – lower west

19:47 Losing definition on Mare

19:58 end totality (couple packed up scope due to cold)

20:12 Curve of earths shadow moving off to NE – crescent moon lopsided

20:48 bright horns on edge of shadow – 7/8 moon uncovered – headed home missed end of eclipse

I estimated the eclipse to be slightly brighter than L-2, but I was looking through the slight fog off of the harbour. Those on the Hill were probably above this. Over all it was an awesome eclipse. Also got to take a peak at Saturn. The Cassini division was just discernable on the top arc of the rings.

The Lunar Eclipse (part 3) "High Moon"

An extract of an E mail thread between David Turner and Dave Chapman

David Turner wrote:

The highest point along the ecliptic for us Northern Hemisphere folks is the summer solstice point, at RA 6h, Dec. +23.5. Thus, a few years back when we had a Full Moon in late December when the Sun was near the Winter Solstice point, naturally the Full Moon, being 180 degrees away along the ecliptic, was at the Summer Solstice point, i.e. at its highest point in the sky. The Full Moon that night was also near perigee, so we had a spectacularly bright Full Moon almost overhead.

Tonight we have a First Quarter Moon, with the Sun near the Vernal Equinox. So the Moon is 90 degrees away along the ecliptic, i.e. once again near the Summer Solstice point, it highest point in our sky almost overhead.

Look for the same phenomenon for the Last Quarter Moon when the Sun is

near the Autumnal Equinox, oops, I suppose most of us will be asleep or just getting up when the Moon is overhead that night.

In similar fashion the Harvest Moon phenomenon in the eastern sky is related to the angle of the ecliptic relative to the celestial equator. The same phenomenon occurs as a mirror image in the western sky at times near the Vernal Equinox, i.e. now. So this is the best time of the year to look for the Zodiacal Light just after sunset as well as to see the thin crescent of New Moon with the crescent almost parallel to the horizon.

Dave Chapman wrote:

Yesterday, I mentioned that the First Quarter Moon seemed extremely high at dusk. Dave Turner explained that this is elementary astronomy, as at the Vernal Equinox the Ecliptic is steeply inclined at the western horizon, and therefore the FQ Moon roughly occupies the same position that the Sun would at the Summer Solstice. Hence, any FQ Moon near VE appears very high in the sky.

But there is more...

The Moon's orbit is inclined a little more than 5 degrees to the Ecliptic plane, so the Moon does not exactly follow the Ecliptic. Sometimes it is higher, sometimes lower, as much as 5 degrees, depending on the orientation of the Moon's orbit and the age of the Moon. On March 19, there was a partial solar eclipse, with the Moon's ascending node in Pisces very near the Vernal Equinox. So the Celestial Equator, the Ecliptic, and the projection of the Moon's orbit all nearly cross at the same point. Moreover, the "Equinox First Quarter" effect described above is enhanced, leading to a FQ Moon elevation of 73 degrees at transit yesterday in Halifax!

I did a little checking with the Voyager III software, and it seems that the Moon of March 25, 2007 had an extreme FQ declination. In the years 1950-2050, there was no ascending node solar eclipse closer to the VE than that in 2007, so I am hazarding a guess that yesterday's Moon had the highest FQ declination in that interval of time.

No wonder I have a crick in my neck!

Scope Transporter David Harris

Some might be interested in this scope transporter I had made up recently for my C9.25 + CG-5 mount. <http://www.deviantart.com/deviation/49872478/>

This set up I found is a tad to heavy to be lugging around by itself. I took a few ideas from some transporters I saw off the web. Cost me about \$150.00 but if I was doing it again I could build it for much less.

It comes apart in three sections including the handle, of which easily separates by pulling a snap link then a pin, this is handy to avoid running into in the dark. I choose pneumatic tires of nine inch diameter instead of the usual five inch hard wheel to better smooth out the ride.

If any one is interested in the construction details and some close up pics they can e-mail me at cdharris@eastlink.ca



Cosmic Debris

Odds & sods from the world of Astronomy, Cosmology (and for this week - Quantum Mechanics)

Now that's a relief!

BattleStar Galactica is one of my favorite TV shows. A few weeks ago two characters were "blown" into space and into a waiting rescue craft (remember Dave in "2001: A Space Odyssey". Could this really happen? Well now I know, thanks to Michael Boschat supplying this link: http://imagine.gsfc.nasa.gov/docs/ask_astro/answers/970603.html.

"How would the unprotected human body react to the vacuum of outer space?"

If you don't try to hold your breath, exposure to space for half a minute or so is unlikely to produce permanent injury. Holding your breath is likely to damage your lungs, something scuba divers have to watch out for when ascending, and you'll have eardrum trouble if your Eustachian tubes are badly plugged up, but theory predicts -- and animal experiments confirm -- that otherwise, exposure to vacuum causes no immediate injury. You do not explode. Your blood does not boil. You do not freeze. You do not instantly lose consciousness.

Various minor problems (sunburn, possibly "the bends", certainly some [mild, reversible, painless] swelling of skin and underlying tissue) start after ten seconds or so. At some point you lose consciousness from lack of oxygen. Injuries accumulate. After perhaps one or two minutes, you're dying. The limits are not really known.

You do not explode and your blood does not boil because of the containing effect of your skin and circulatory system. You do not instantly freeze because, although the space environment is typically very cold, heat does not transfer away from a body quickly. Loss of consciousness occurs only after the body has depleted the supply of oxygen in the blood. If your skin is exposed to direct sunlight without any protection from its intense ultraviolet radiation, you can get a very bad sunburn.

From the editor:

Short articles for "Cosmic Debris" are welcome (encouraged I should say).

They can be book reviews, items of interest, equipment reviews, web sites, or just general rambling related to Astronomy / Cosmology.

If articles are taken from an existing publication, please give a reference to such.

Cold viewing.

(from New Scientist)

We think it's cold here!

On 16th February 2007 the 25 metre tall, 280 tonne, South Pole Telescope made its first observations. The clear, cold, dry, atmosphere at the pole will allow the telescope to probe the cosmic background radiation, the afterglow of the "big bang".

Spacecraft glitches.

(from New Scientist)

Just as the Mars Reconnaissance Orbiter is about to break the record for data collection from Mars, NASA reports glitches with two of the spacecraft's instruments. The High Resolution Imaging Science Experiment camera has shown a significant jump in image noise. Also the instrument used to scan the planet's atmosphere is having intermittent positioning problems.

Just when you thought it was safe to go out.....

The quantum world is pretty strange. Particles can be in two places at once. Entanglement seems to allow particles to communicate instantaneously, and the "state" of an object can remain in flux till we look at it. Fortunately for us, we do not experience this quantum weirdness in our large, everyday "classical" world. Or do we?

What follows is an extract from March 17-23 New Scientist.

Schrödinger cats - macroscopic objects in "superpositions" of different quantum states - are hard to make. If they weren't, chairs and tables and you and I could be in multiple places at once. Now David Hallwood and Keith Burnett of the University of Oxford and Jacob Dunningham of the University of Leeds, UK, have come up with a recipe for researchers.

They imagine a bucket filled with a bunch of supercooled atoms all in the same quantum state, known as a Bose-Einstein condensate. One of the strange properties of this state of matter is that all the atoms remain stationary when you rotate the bucket, rather than move with it. From the bucket's point of view, however, the atoms revolve in the opposite direction. Similarly, if the atoms are in an excited state where they all revolve at the same speed, you can rotate the bucket so that from its view the atoms are not moving. Finally, imagine rotating the bucket at some intermediate speed so that the stationary atoms and the excited atoms have the same speed but are revolving in opposite directions from the bucket's point of view. Those are your states of superposition. "The system doesn't know what state to pick," says Hallwood.

In order to make a fat cat, the energies of the two states need to be similar, and there cannot be others close by in energy. The states must also have a high probability of making the transition from one to the other, but a low probability of going to any other states.

Oh dear—my brain really hurts now! Quinn



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:

- 13 April 2007
- 18 May 2007
- 8 June 2007
- 13 July 2007

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 can 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 that are 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 knowledgeable 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