

Nova Notes

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



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In this issue:

Meeting Announcements	2
Nova East 2013	3
A Spring Comet	4
April Meeting Report	6
May Meeting Report	7
Keji DSP—An update	8
GA 2015—Update	8
Featured Photo of the Month	9
St. Croix Observatory	10
Cosmic Debris	12

Front Page Photo: M51 Chris Turner

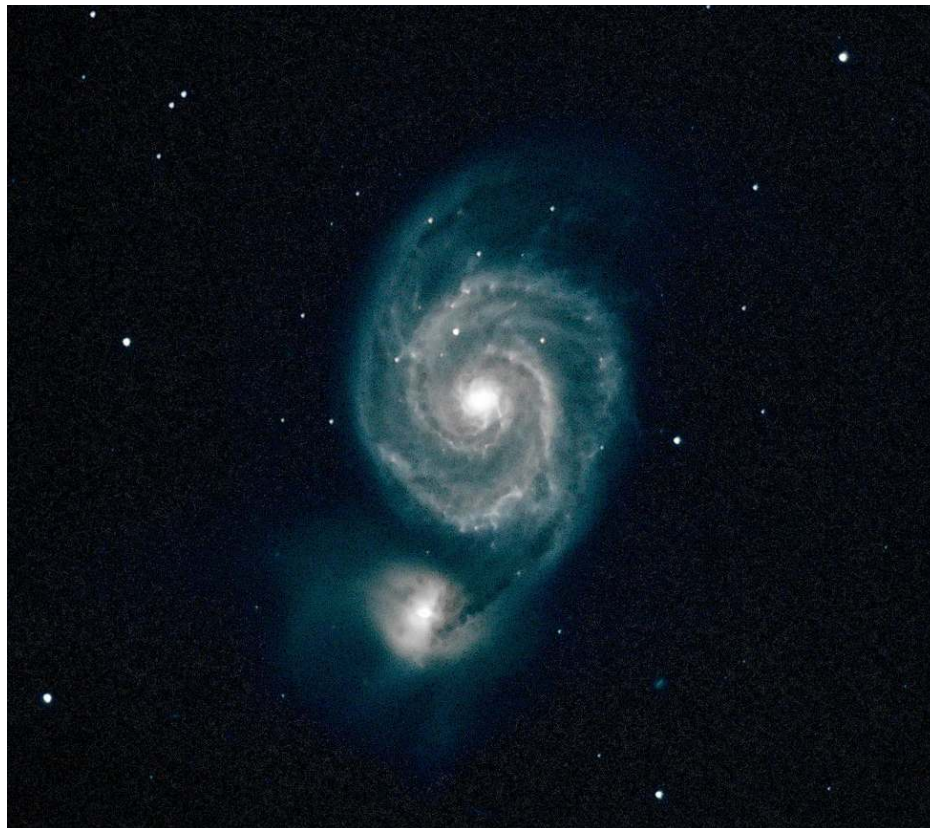
Imaged: April 17 2013,

Camera: Canon T1i

OTA: Mak Newt 190mm Guided: PHD

FWHM 3.5. Nebulosity (36 X 300s, 12 Dark, 51 Flat, 51 Bias, ISO 3200),

Workflow: align_recon_norm_pproc / digital development/curves/tighten star edges



From the editor

Quinn Smith

As the June approaches, our last meeting for the summer will be held at the Centre's observatory at St Croix, on the summer solstice (June 21st). For those of you who had not had an opportunity to visit the St Croix Observatory (SCO), this would be a great opportunity to see what you've been missing. Details will be posted on the "chat list", and a final decision (based on weather) will be made on Thursday June 20th. If the weather is bad, we will meet in our usual room at St Mary's University.

In July the RASC will be meeting for the annual General Assembly. This year it is being hosted by the Thunder Bay Centre. In 2015 it will be hosted by the Halifax Centre (see page 8). Due to changes in Federal laws, the governing structure of the RASC is being changed and there are several key motions that need to be voted on. If you would like to participate and have your vote counted you may do so by proxy, and your vote will be submitted by your National Representative (Pat Kelly) at the GA. Details can be found on the National Web site or by contacting Paul Heath. Proxy forms will also be available at the June meeting.

Finally let me remind you of our very own Nova East Star Party, being held on the weekend of September 6-8th at Smiley's Provincial Park (see page 3). It's a great time, a chance to meet friends, enjoy the talks, and drool over the equipment.

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, use of the Centre's 437mm-dobsonian telescope and 100mm-binoculars, 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. Observing nights (Fridays close to the New Moon) are open to both members and their guests. If you are not a key holder and would like to become one, or need more information, please contact the Observing Chairman, John Liddard (for contact info, see below).

Upcoming Observing Nights:

June	7th	2013	September	Nova East	
July	5th	2013	October	4th	2013
August	2nd	2013	November	1st	2013

Meetings begin at 7:30 p.m. at Saint Mary's University in room AT 101 Note new meeting time.

June 21st 2013

The meeting will be held at St. Croix Observatory starting at 7:30 p.m. Please bring a chair (and bug spray!)

July / August 2013—no meetings

September 20th 2013

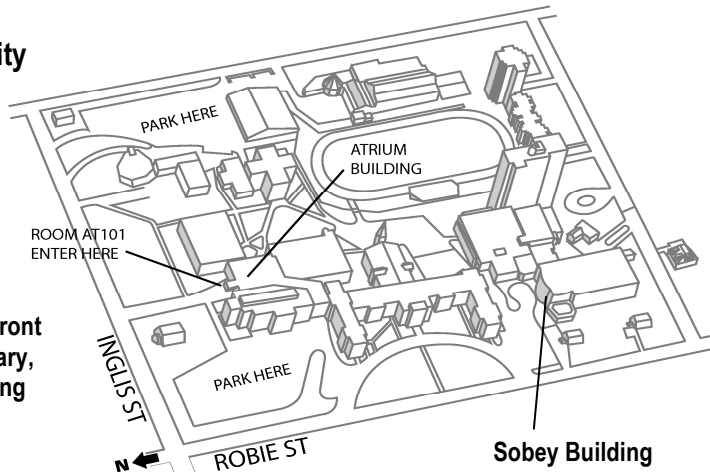
The first meeting of the Fall season. Details will be posted on line in September

All meeting location and contents subject to change

Meeting Location: Saint Mary's University

Atrium Building Room AT 101

The Atrium is located in front of the Patrick Power Library, between the Burke Building and Science Building.



Meetings are usually held on the third Friday of the month, except for the months of July and August, when there are no meetings.

The NOVA program (an introductory course in astronomy) will not be held this year.

Executive meetings begin at 6:30 p.m., usually in room AT 306, and all members are welcome. In April we will meet in SB 153

Halifax RASC Executive, 2013:

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Nova East

Our annual Star Party

Every year the Halifax Centre of the RASC and the Minas Astronomy Group, host an annual Star Party held at Smiley's Provincial Park. This year is no exception, and the event will be held on September 6th-8th (the weekend after Labour Day).

The events this year will follow our traditional format, where registration will occur on Friday afternoon, and our main guest speaker will present on Friday evening. This year our keynote speaker will be Dr. Luigi Gallo who will be talking about seeing the Universe in X-rays.

Saturday will be full of talks, events and workshops and both Friday and Saturday nights will be dedicated to observing and socialising. The Saturday evening speaker will be Blair MacDonald who will discuss "An Astrophotographer's Skies". The Star Party will wind up on Sunday, which will give us all a chance to get some sleep before returning to work!

More information, including the registration forms, agenda, and other information can be found on the Nova East web site at:

<http://halifax.rasc.ca/ne/home.html>

We always hope for good weather, but the event will take place rain or shine—subject as always to the vagaries of a passing hurricane (or two!).

So register early (especially if you want one of the best camp sites up on the hill), and look forward to a great weekend of astronomy and discovery, with friends and guests, of the Halifax RASC and the Minas Astronomy Group.

Clear Skies!

Quinn Smith (Nova East Registrar)

(Pictures of the 2012 Nova East by Blair MacDonald)



A Spring Comet Panstarrs C/2011 L4

Roy Bishop

Many thanks to Michael Gatto for such a fine job in merging my seven photos of Panstarrs into one!

What follows is rather long, and for that I apologize, but it may be of interest. You don't have to read further. :-)

A remarkable aspect of Panstarrs' path in our sky is that the two-week span of comet images (March 29 through April 12, near 0h UTC) lie along an almost perfectly straight line (see the composite photo). My first thought was that Earth must have been located in the plane of the comet's hyperbolic orbit. Only from that perspective would the comet's curved path be seen as straight.

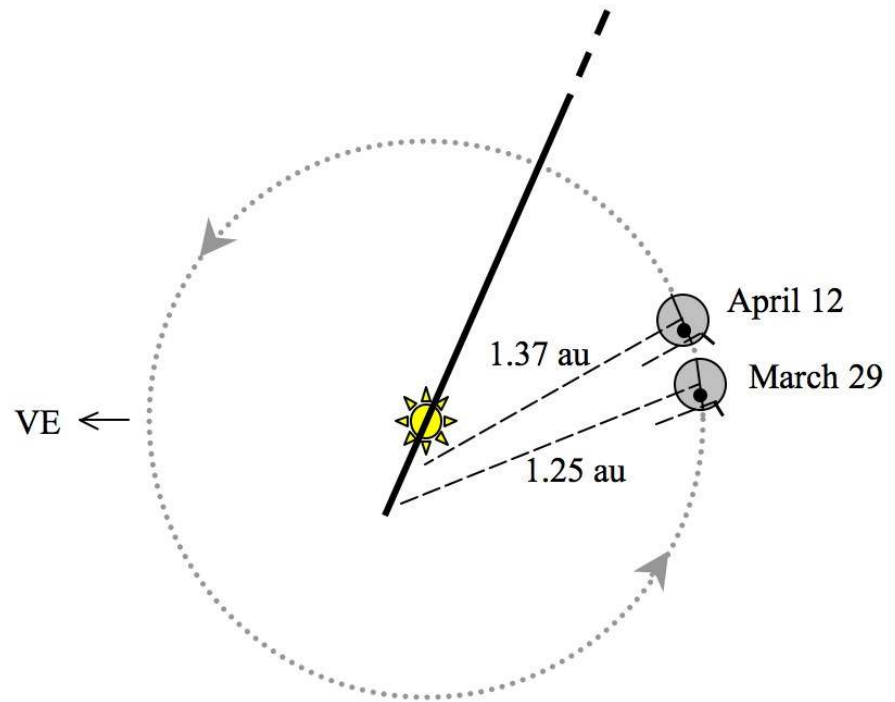
However, Earth moves, so my "first thought" was pre-Copernican and therefore wrong! The comet's recorded track against the stars involves three things:

- Its curved track in the plane of its open orbit.
- Earth's position relative to the plane of the comet's orbit.
- A parallax drift due to Earth's orbital motion.

Perihelion was on March 10. The seven photos show the comet a few weeks later as it soared away from the Sun, up and out of the north side of the Solar System.

To see where Earth was relative to the plane of the comet's orbit, three things are needed:

- The heliocentric longitude of the ascending node of the comet's orbit (66 degrees),
- The inclination of the orbit (84 degrees),
- Earth's heliocentric longitude during the two weeks of photos (it increased from 188 to 202 degrees).



The photos (and their coordinates on StarryNight) give the comet's geocentric longitude on March 29 and April 12 as 22 and 30 degrees, respectively. The diagram is a view of that geometry looking directly down from the north side of the Solar System. "VE" is the direction of the vernal equinox (0 degrees heliocentric longitude).

The dotted circle represents Earth's orbit. The straight, heavy, black line with the dashed end is where the plane of the comet's orbit intersects the plane of the ecliptic (Earth's orbital plane), and approximates an edge-on view of the comet's orbit, its 84-degree inclination being near 90 degrees. 84 is less than 90 which means that Panstarrs' motion is prograde (in the same counterclockwise sense as Earth's orbit).

Thus during the photo sequence when the comet was north of the ecliptic and coming up out of the diagram (toward you the viewer), it was veering slightly to the right of the heavy, black line. The position of Earth (the gray disks) is shown at the beginning and at the end of the photo sequence. The black dot indicates the north geographic pole, displaced downward in the dia-

gram by Earth's axial tilt. The straight, thin, dashed lines indicate the direction of the comet as seen from Earth, and the numbers beside the lines are Earth-comet distances.

During the photo sequence the comet increased its distance from the Sun from 0.62 to 0.92 au, placing it well above the ecliptic plane, coming up out of the diagram. A wonderful three-dimensional view (with zoom, tilt, rotate, and animate controls) is available at:

<http://ssd.jpl.nasa.gov/sbdb.cgi?ID=dK11L040;orb=1;cov=0;log=0;cad=0#orb>

If Earth had remained stationary at its March 29 position, the two-week photo sequence would have shown an oblique view of the comet's curved path, curving to the right against the stars. But Earth moved, and it is apparent from the diagram that the resulting parallax displaces the comet's apparent position to the left.

Remarkably, the comet's actual curved path, our oblique view of that path, and the parallax resulting from Earth's orbital motion, combined to produce

an essentially straight path in the composite photo!

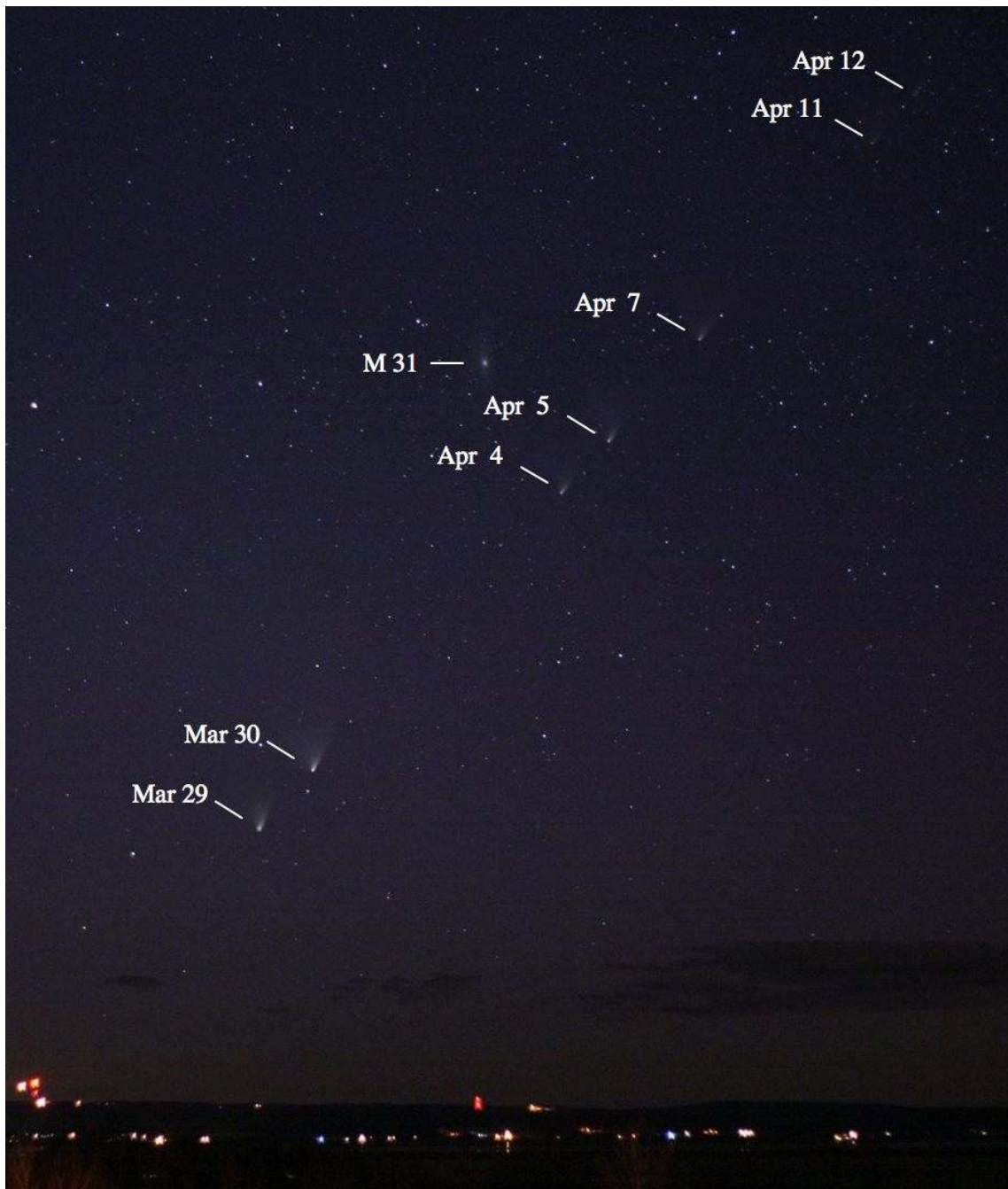
The diagram also shows why Panstarrs has been called the "Horizon Hugger", and also why, from night-to-night, it has been shifting further northward in the northwestern sky. In the diagram, the short line standing vertically on Earth represents an observer in a mid-northern latitude at the end of evening twilight, and the short dashed line his line of sight toward the comet.

As is evident in the diagram, the horizon west of the observer rises northward tending to hide the comet, and the line of sight on April 12 passed closer to the geographic pole than it did on March 29.

Regarding the tail of the comet, that material lies in the plane of the comet's orbit (almost edge-on in the diagram). Thus the diagram shows that in the photos (especially the first two photos), we are seeing a flat sheet of dust

angled steeply away from us toward the left. Also, by April 12 that angle was even steeper, although less apparent because the comet had become dimmer as it receded from the Sun.

If a tail is still detectable when Earth passes through the plane of the comet's orbit on May 27, the tail will appear as a needle-like ray of light, possibly extending both away from the Sun and toward the Sun, from our perspective on Earth!



A word of caution regarding the composite photo: it gives the impression that Panstarrs was NOT a "Horizon Hugger". The horizon shown in that photo was the horizon at the end of twilight on one evening, March 29

(corresponding to the second comet image, that of March 30, 0h UTC). On subsequent evenings the horizon was successively higher relative to the stars, keeping the comet low in the sky.

Having put this article together, I now understand the geometry of what I have been seeing and photographing over the past many nights.

As the science writer Chet Raymo put it:

"Two things are required to truly see: love and knowledge. Without love, we don't look. Without knowledge, we don't know what it is we are seeing."

April Meeting Report

Chris Young (Secretary)

The Centre President, Paul Heath, opened the meeting with a poem of his own composition—"Candle Light". Paul begins each meeting with a poem to open both our hearts and minds for the meeting.

Paul introduced the 28 members and guests to the Centre's executive, and explained the benefits of membership to the RASC and the Halifax Centre. This includes the upcoming Nova East Star Party on the weekend of September 6th—8th (the weekend after Labour Day)

Graham Rose requested members to join in a committee to discuss ideas on how to attract younger members, and five people agreed to assist. Graham has set up a Facebook Page, and a Facebook Group will open shortly for those interested.

Upcoming events were briefly mentioned.

- The Astrophoto Seminar at Atlantic Photo Supply on April 20th presented by our very own Blair MacDonald
- The St. Croix Observatory orientation on April 26th

Paul then introduced the speaker of the evening, Professor Robert Deupree, the director of Computational Astrophysics of Saint Mary's University. He spoke on RR Lyrae Variable Stars

RR Lyrae are stars of variable brightness which have a consistent and reliable pattern of brightening to a known magnitude. Their behaviour is different from other variable stars. This particular stellar behaviour allows astronomers to use these stars for determining stellar distances, as a known brightness from a star of known size permits calculation of the distance due to the drop in brightness over distance.

Prof. Deupree explained that these are old stars, in a size of 0.6 to 0.7 solar masses, metal-poor (composed only of hydrogen and helium), and are usually found in globular clusters.

He described our current understanding of how these stars flare up to a maximum brightness and then subsided back to their minimum on a regular schedule, usually in less than 24 hours.

He explained how stars, different in size and composition, could not behave in this way, and therefore the RR Lyrae stars were a specific limited group.

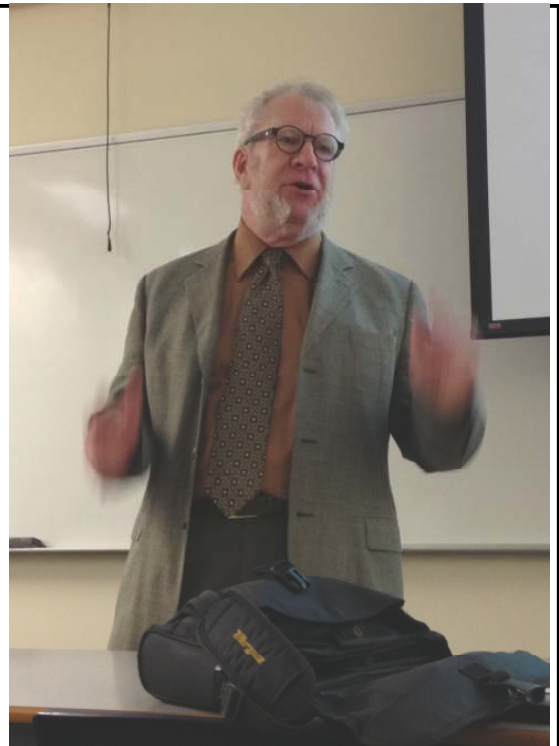
Prof. Deupree demonstrated how computer simulations provided a reasonable fit of predicted behaviour to the actual measured behaviour. Amateur astronomers have contributed to the observed data on these variable stars.

Computer calculations have been two dimensional simulations, taking days to weeks of high speed computer time. One of Prof. Deupree's doctoral students, Chris Geroux, did three dimensional modelling, taking months of computer time. This provided a closer fit of predicted behaviour to that observed.

This further increases confidence in our accepted understanding of these variable stars. These stars will eventually become red giants which will later likely blow off their outer shell and become white dwarfs.

While the talk, at times, asked for a greater understanding of astrophysics than many of us possess, I found the basic ideas well explained, and am convinced that the observations, theory and modelling strongly support that RR Lyrae stars' behaviour are well understood.

After many questions, the meeting ended with discussions over our usual snacks and beverages.



Guest speaker , Dr Robert Deupree

CANDLE LIGHT (Paul Heath)

*A Candle lit and set upon the table
bare,
I sit quiet, with focused stare
To take the measure of this Twinkling
Light.*

*And when my eye holds fast that sight,
With measured pace, I step into the
Night.*

*Turning, a Second Candle, I set upon
the Lintel bare,
And standing quiet with focused stare,
I take the measure, of this Twinkling
pair.*

*And when my eyes hold fast the sight,
And I am sure my Measures right,*

*I reach my Vision up . . . up into the
Night.
And standing quiet, eyes held fast
I take the measure of this Vast display,
and compare
To my one Candle and its Twinkling
Light.*

May Meeting Report

Quinn Smith

The May meeting was opened by our President, Paul Heath, at the new time of 7:30 p.m. As has become a tradition with Paul, he started the meeting by reciting a poem he had written for the event—“*Gather In*”.

Paul welcomed the 32 members and guests, and introduced the Executive. Our guest speaker for the evening was not able to attend and so Paul explained that this meeting would be a more casual affair, with several short items, presented by various members.

Paul first mentioned the changes that are taking place at the National level. These changes are to bring the RASC in line with the new Federal Charities Act, and require changes to the organisation of the Society. Proxy voting sheets were handed out at the meeting, so that members could vote on two important issues. Please log onto the members area of the National site and click on Governance, for more info.

There were two members who had received awards or certificates. Michael Gatto was presented with his “Finest NGC” certificate, having not only observed all 110 objects but having sketched them all! Michael Boschat (who was not present) was also mentioned, having been recognised by the NCL CAN AM, for 25 years of noctilucent cloud observing. Congratulations Michael!

Paul then played the “Space Oddity” video recorded by Chris Hadfield on the ISS. For those of us who remember the David Bowie original—it was a very moving experience! (<http://www.youtube.com/watch?v=KaOC9danxNo>)

Blair MacDonald then gave a Nova East update (see page 3) and Quinn Smith gave a brief GA2015 update (see page 8).

Roy then gave a wonderful comet Panstarrs presentation, based on his article on pages 4 and 5 in this edition. Roy went into detail of how and why the tail of the comet was changing, and how although not all that bright, Panstarrs was, (and is), a very interesting comet. Roy finished his talk by pointing out that the current location of Panstarrs is in the Little Dipper.

We broke for munchies and discussion at this point (we normally do this at the end of the meeting).

It was then Dave Chapman’s turn to discuss the pros and cons of upgrading or replacing the 437mm (17.5”) Dob in the observatory. Due to problems associated with using the “big scope” at SCO it was suggested that it be replaced with either a 355mm (14”) or 406mm (16”) Go-To SkyWatcher Dob. Atlantic Photo Supply has offered us a fantastic price on either of these scopes (\$2,400 or \$2,700—inc. taxes).

Ian Anderson (our treasurer) has indicated that, as a Centre, we can afford to purchase a large ‘scope, and an interesting and lively discussion ensued. Although no decision was made at the meeting, it was decided to continue the discussion on the “chat list” on-line. It was decided to compare the performance, and ease of use, between a 16” SkyWatcher and the current 17.5” Dob, side by side, at SCO in the near future.

We finished the meeting with short presentations and photos from Blair MacDonald, Art Cole and Chris Turner. The meeting ended with Graham Rose briefly showing us the new Halifax Centre Face Book page.

It was very pleasant to have a more informal meeting and I think everyone enjoyed themselves.



Paul Heath presents Michael Gatto with his “Finest NGC” Certificate Photo—Blair MacDonald

GATHER IN (Paul Heath)

*Come Gather to the Fireside, as dusk settles nigh.
Come sit upon logs, still warmed from oh so many suns
Come sing the Songs and roast the dogs,
While flames, flare up against the twilight coming.*

*Come Gather at the Fireside, as the last log tumbles in
Sending notes of glowing starlight, rushing skyward in the night
And Elders start their stories old, beside a fires dying light.*

*Come Gather at the Fireside, were stories weave and flow
To tie the Diamonds of the sky . . . to forests filled with quiet sounds,
And mix them deep, within the embers pulsing glow.*

*Come Gather at the Fireside, and learn what tales are told,
So in our young hearts and minds, a quiet Wisdom grows
As Elders pass their stories on, the tale instilled, will carry on.*

*Come Gather at the Fireside, for soon your time will be,
To lite the logs and sing the songs, to open younger eyes
And Tell the Tales, that you . . . an Elder knows,
Of rustling sounds by Firesides and Diamonds tossed across the Skies.*

Keji DSP - An Update

Quinn Smith

For those of you that may be wondering how Nova Scotia's first Dark Sky Preserve is doing—let me tell you that it's doing just fine!

Kejimikujik National Park and National Historic Site was declared a DSP in the summer of 2010 and since that time, the Park has introduced continuous improvements to the DSP.

Dave Chapman and myself conducted a two year DSP audit of the Park in the fall of 2012 and, despite extensive Federal cut-backs, the Park has done a great job of reducing light pollution, and improving observing amenities. It was unfortunate that the cut-backs necessitated the Park closing over the winter, but the astronomy related outreach programs planned for this summer are excellent.

In particular I would like to remind you of the annual Dark Sky Weekend planned for August 9–11th. There will be talks and outreach events, as well as public telescope viewing at the Sky Circle. The Halifax Centre members will be participating in many of the weekend events, and if previous years are any indication, it should be a great time.

Go to <http://www.pc.gc.ca/pn-np/ns/kejimikujik/activ.aspx> for information about the Park and its activities.



The "Sky Circle" at Keji. Photo: John McPhee

GA 2015—Update

Quinn Smith

I'm sure you all know that we (the Halifax Centre) will be hosting the 2015 General Assembly. This was approved by the RASC National Council in March.

The GA is the annual meeting of the RASC Nation Council and is hosted by a different Centre each year. Due to the changes in the structure of the RASC, 2015 will be our first opportunity to organise a GA under the new system.

The date has been set at July 1st - 5th 2015 with Thursday (2nd) a tour day, and Friday, Saturday and Sunday as GA meeting and event days. As of now we have secured accommodation and meeting rooms at Saint Mary's University.

The event is being organised by the GA Committee and, over the summer, we will be working on the budget, the GA "theme", and looking at main speakers.

We are on track - with 25 months to go. I will keep membership regularly updated as to our progress in the pages of Nova Notes. I will be also reaching out for volunteer support as July 2015 approaches. Hosting the 2015 GA will be a major undertaking but will be a lot of fun. Volunteering is a way to be involved with your Centre, have a lot of fun in the process, and be part of a very special team of members.

If you would like to get involved in the early planning stages, please contact me at quinnjem@yahoo.com

Your GA 2015 organising committee:

Quinn Smith,	Pat Kelly (Co-Chairs)
Mary Lou Whitehorne,	Paul Gray
Paul Heath,	Graham Rose
Chris Young,	Wes Howie
Dave Lane,	Michael Gatto
Ian Anderson,	Paul Evens

Consultants:

Roy Bishop
Dave Chapman

HALIFAX
CENTRE

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Nova Notes is published 5 times a year, in February, April, June/July, September/October, and December.

The deadline for the next edition is September 15th 2013

The opinions expressed herein are not necessarily those of the Halifax Centre.

Articles on any aspect of Astronomy and Allied Sciences will be considered for publication.

Jeff Donaldson



Object: M13 Keystone Cluster

Location: Enfield, NS., Canada.

Camera: Canon XSi / 450D (Gary Honis full spectrum modified)

Telescope: Orion 8" f/4 Astrograph

Mount: Celestron CGEM

Guiding: Celestron 80mm guide-scope with a Celestron Nexguider.

Subs: 120s x 58 Integration time of 1h 52m (darks/bias/flats added)

Acquisition: Backyard EOS

Processing: Pixinsight 1.8 RC5

Post-Processing: Pixinsight 1.8 RC5

Hanging out in space at a distance of 25,100 light years, this 24 million year old beauty is one of the most impressive globular clusters for the northern hemisphere. Containing over a million stars packed into a 145 light year sphere, the center of this glorious object is 500x more concentrated than its outer perimeters. And out of all of those stars there stands one stranger... Barnard Number 29. What is it? In a world where all the stars should be the same age, there is a spectral type B2 – a young, blue star. Where did it come from? Apparently on one of M13's journeys around our galaxy, it collected a field star, for radial velocity measurements have proved that it does belong to the globular cluster!

My main object was the needle galaxy (NGC 4565) but it rose higher than my scope could slew because when it reached 60 deg I was starting to see the top of the dome in my images. I knew M13 was low but I wanted to go for it and what a beauty this cluster is, was even very bright in my guide-scope! I was tired of playing with Deep Sky Stacker and its failure to properly work with modified cameras. I decided to give Pixinsight 1.8 a go and it didn't disappoint, I just need to learn the settings. I used a lightness mask to tone down the core, using a simple histogram de-stretch. The stars are all there! I also added an HDR multi scale transform to bring out more stars in the core. I think this is my best M13 yet!

St. Croix Observatory

Editor

The St. Croix Observatory is one of the great resources to that can be enjoyed by members (and their guests) of the Halifax Centre. It is located outside the village of St. Croix. Between Sackville and Windsor.

The Observatory features pristine dark skies, car access, a roll off roof observatory, a warm room, and a washroom. Observing equipment consists of a 437mm Dob, 100mm Thurlow Binoculars, and plenty of room to set up personal equipment both inside and outside the observatory building.

If you haven't yet visited the observatory now is your chance! The June meeting (June 21st) will be held at the observatory at the new meeting time of 7:30p.m. For directions contact our Observing Chairman at: jliddard@gmail.com

To whet your appetite I have included a recent observing report and sketch from member Michael Gatto,

Just a little observing report...
Michael Gatto

Conditions were great, in my opinion. I set up my scope (8" f/7.5 reflector) and panned around a bit. Then I settled in and did three 'proper' sketches;

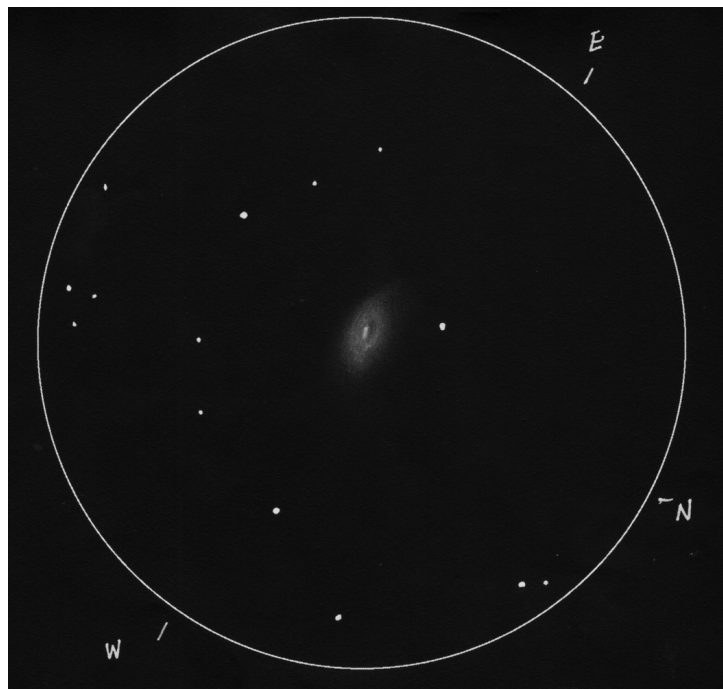
- M64 - The Black Eye galaxy (the dark area was never obvious in my scope but I sketched my best averted-vision-guess of its position and I was right)
- M98 (an edge-on spiral with a subtle, non-stellar core)
- M99 (a face-on spiral galaxy that you could tell in a big scope would give up some spiral structure)

I also took a swing down and looked at the Antennae galaxy west of Corvus (they appeared as a single noticeable smudge)

I also looked up at M81/82 again, and went after the Owl nebula (M97). It looked really nice, much larger than I remember. I didn't observe it long enough to see if the 'eyes' appeared, but there were light and dark areas, and it was not uniformly bright across the surface.

I looked at M51 and it looked as good as it ever does. The transparency must have been good because the contrast on everything was quite high.

My surprise of the night was M101. It is usually a round area of low-surface brightness glow, with a slightly off-center subtle core. But last night it was evident that there was some



Details: M64 sketched at the eyepiece in pencil, scanned and reversed in photoshop, no digital processing.
Time and Place: SCO, May 6th, 10:05 p.m. ADT
Equipment: 8" f/7.5 Newtonian reflector on a dobsonian mount, hand-tracked with 13mm Hyperion Eyepiece (120X)
Notes: Easy to find, it is visible in the 50mm finder. At low power it is bright and large! Elongated E-W, football shaped. Noticeable condensed core at 45X. Looks great at all magnifications, viewed up to 200X. 120X hints at structure in the halo, best guess puts the "eye" at the North side of the core. Actually a very nice object, no stars associated with the halo at any magnification. Most field stars drawn.

structure showing. There really seemed to be a spiral arm appearing to the southwest of the core. There were several faint stars associated with the galaxy, and there was a small distinct bright patch SE of the core and outside of the glow of the halo, real structure!

That was a first for me with this object. I went back to the sketch I made on September 2011 and I did not record either of those elements. Photos online confirmed my suspicions, which is always nice! I did a really quick sketch to capture it. I also just panned the scope around that area and picked up 3 or 4 other faint fuzzes in the immediate area of M101. Starry night shows 5-6 galaxies in the 12-13 magnitude range nearby.

By this time it was WAY later than I wanted to be there, but I was caught up in the good conditions. I did an SQM reading (a few in different directions) and they were between 21.48 and 21.50.

A very fun night!



Kneeling, from left-to-right:

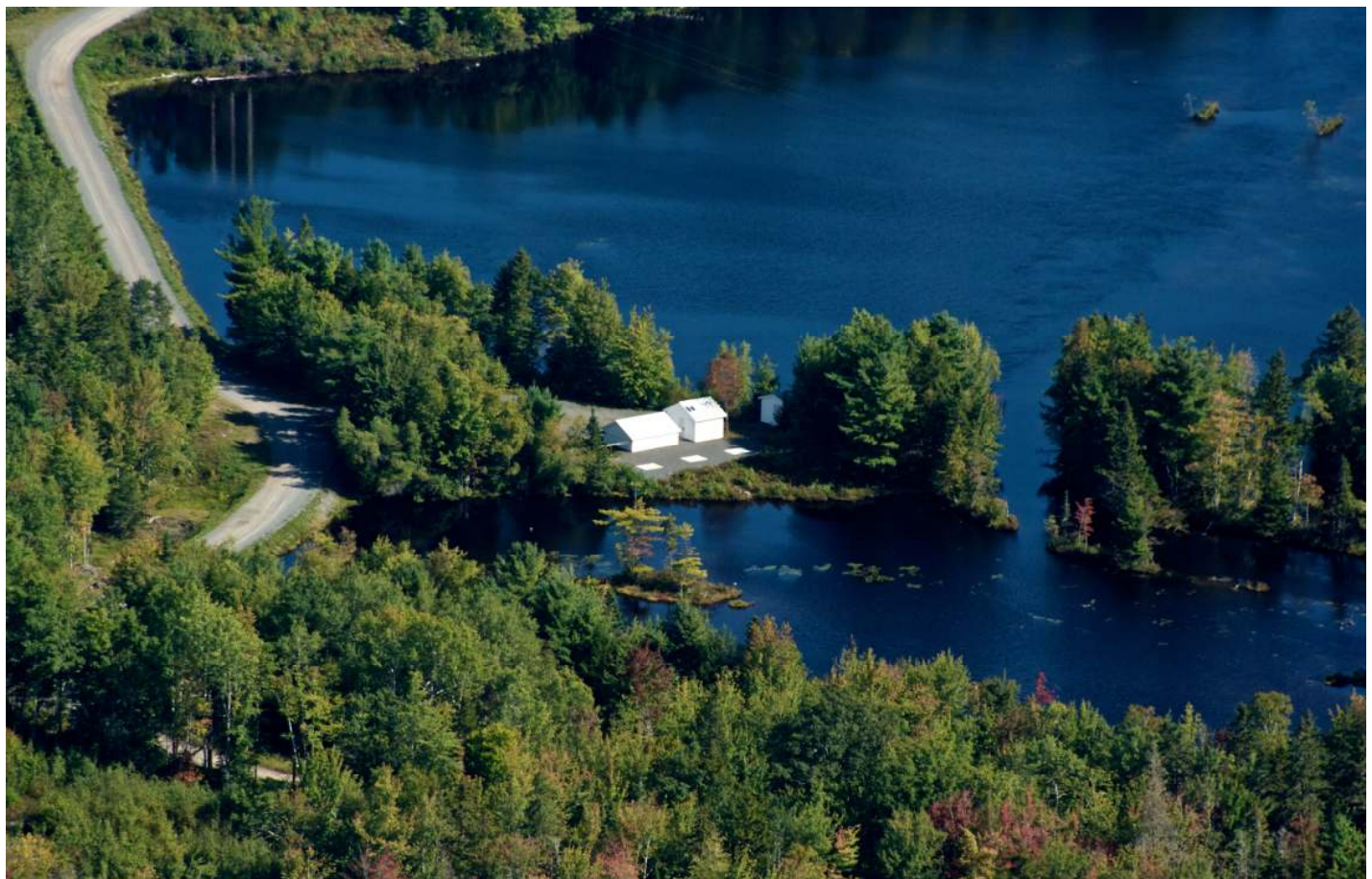
- K1 – Martin Hellmich
- K2 – Sylva Bradova
- K3 – Chris Young
- K4 – Paul Heath

Standing, from left-to-right:

- S1 – Tony McGrath
- S2 – Chris Turner
- S3 – Blair MacDonald
- S4 – Mat Nightingale ?
- S5 – Simon d’Entremont
- S6 – Carl ??
- S7 – John Liddard
- S8 – Ian Anderson
- S9 – Royce MacRae
- S10 – Robert Bussieres
- S11 – Mark Dryden

Participants of the SCO orientation tours in April 2013

Photo: Roy Bishop



Arial view of SCO

Photo by John Liddard

Cosmic Debris

Odds and Sods from the world of astronomy and astrophysics

May 30, 2013: NASA News

Here we go again! Another asteroid is paying a visit to the Earth-Moon system.

Asteroids have been a hot topic since February 15th, when one small asteroid exploded over Russia, and another larger one, 2012 DA14, made a record setting close approach to Earth on the same day. This time the interloper is 1998 QE2, a potentially hazardous asteroid 2.7 km in diameter. Astronomers are preparing to study the space rock as it harmlessly passes by on May 31st.

"This is a big asteroid that's going to be one of the best radar imaging targets of the year," says Lance Benner of NASA's Jet Propulsion Laboratory.

"As my old friend, radar astronomer Steve Ostro used to say, spaceship Earth is making a flyby of the asteroid,

so we're going to exploit the capabilities of the radars to understand as much as possible."

At closest approach on May 31st, the asteroid will be 5.8 million kilometers from Earth, about 15 times farther than the Moon.

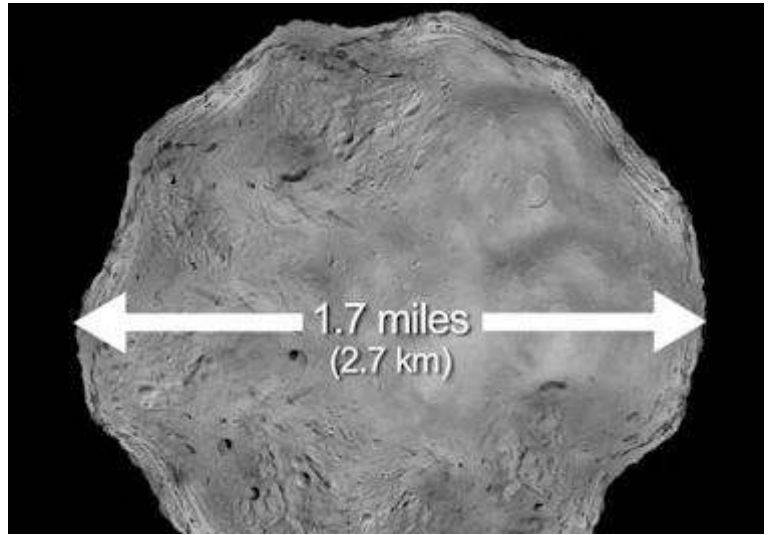
"At that range, both the Goldstone and Arecibo radars should be able to make detailed images of 1998 QE2," says Benner. "The radar maps should rival images of other asteroids obtained by spacecraft during flyby missions."

One thing that intrigues Benner is the asteroid's dark complexion. According to measurements by the Spitzer Space Telescope, 1998 QE2 reflects only 6% of the sunlight that falls on it, which

makes it blacker than coal. Consequently, it could have a composition similar to that of 101955 Benu, the target of NASA's OSIRIS-REx mission," he says.

Due to launch in 2016, the OSIRIS-REx spacecraft will travel to near-Earth asteroid Benu, study it from orbit, and ultimately bring back a sample for laboratory study on Earth.

Near-Earth asteroid Benu inter-



ests researchers for two reasons: First, it is a carbon-rich asteroid that could harbor amino acids and other organic molecules essential to primitive life. Second, it's the kind of asteroid that NASA ultimately might want to capture. Indeed, the OSIRIS-REx mission is considered to be a vital part of NASA's plans to find, study and relocate an asteroid for exploration by astronauts.

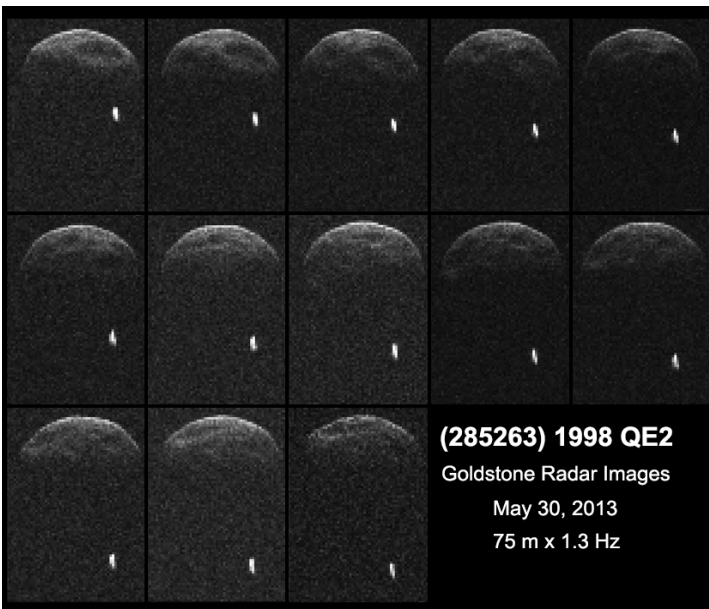
Perhaps 1998 QE2 will give researchers a sneak preview of this fascinating space rock.

Although the closest approach is on May 31st, the best time to observe 1998 QE2 will be during the first week of June when the asteroid enters northern skies. At that time, its sunlit side will face Earth, making it an easy target for large backyard telescopes. At maximum brightness on June 3rd and 4th it is expected to glow like an 11th magnitude star.

While amateur astronomers watch the space rock glide through the constellations Libra and Ophiuchus, NASA radars will be pinging the space rock with powerful bursts of radio energy, revealing an alien landscape that no one has ever seen before.

Credits:

Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA



First radar images of asteroid 1998 QE2 were obtained when the asteroid was about 3.75 million miles (6 million kilometers) from Earth. The radar collage covers a little bit more than two hours. Image credit: NASA/JPL-Caltech/GSSR