Nova Notes

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

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

Volume 44 Number 4 of 5 September / October 2013 E mail: novanoteseditor@rasc.ca

In this issue:

Front Page Photo: Jeff Donaldson
M13—the winning entry in the 2013 Nova East astro-photography contest.

Congratulations Jeff and all the other entrants in the competition and thanks to the judges Blair and Brian Giffin.

From the editor *Quinn Smith*

There is always a lot happening within the Halifax Centre over the summer months, despite not having monthly meetings in July and August. 2013 was no exception, and this summer was one of some observing gems.

The Executive is pleased to inform the members that the Centre has acquired a Sky-Watcher 16" SynScan (Go To) dob, which is now operational, and available for members to use at our observatory in St. Croix. We have to thank the profits from the 2012 Nova East for the funds to make this purchase, and to Brian at Atlantic Photo Supply for giving us a fantastic deal. (see page 2).

Both the Dark Sky Weekend at Keji and the recent Nova East Star Party were great opportunities to enjoy some great observing, socialize with fellow Centre members, and reach out to the public and share the joys of our passion (see pages 8 and 10).

Finally our Milky Way galaxy gave us a display in the form of a binocular nova in Delphinus. Not bad for one summer!

Meetings again are resuming, and as the end of the year draws nearer, I would ask members to consider running for positions on the Executive. It really is fun and very rewarding, and give you a chance to shape the direction of the Centre in future years.

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 new Go To 400mm-dobsonian telescope, 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 a member of the Executive (for contact info, see below).

Upcoming Observing Nights:

October 4th 2013
November 1st 2013
December 6th 2013

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

October 18th 2013

Jeff Donaldson will discuss the building of his observatory.

November 15th 2013

Member Chris Young will give a talk titled, "One Sky, Many Stories". All cultures have star patterns and sky stories. This presentation will survey cultures other than the Greek & Roman.

December 13th 2013

a week earlier than usual

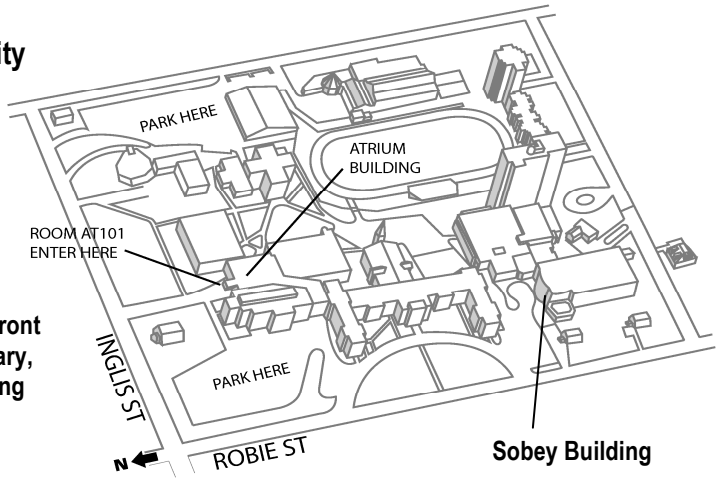
Our Annual General Meeting, followed by the quiz show "Who Wants to be a Gazer?". More fun than a barrel of monkeys!

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. Members and non-members are welcome to attend meetings. The December meeting will be held on the 2nd Friday of the month.

Executive meetings begin at 6:30 p.m., usually in room AT 306, and all members are welcome.

Halifax RASC Executive, 2013:

Honorary President	Dr. Roy Bishop	902 542 3992	RLB@eastlink.ca
President	Paul Heath	902 457 0610	pheath@eastlink.ca
1st Vice-President			
2nd Vice-President	Karl Penney	902 457 4046	karlpenney@eastlink.ca
Secretary	Chris Young	902 441 6861	cjy@eastlinkca
Treasurer	Ian Anderson	902 678 8009	taursagroup@yahoo.ca
Nova Notes Editor	Quinn Smith	902 852 3894	quinnjem@yahoo.com
Librarian	Graham Rose		gbrosegr@netscape.net
Observing Chair	John Liddard	Unfortunately John will be stepping down due to family matters	
Observing Chair assistant	Alex LeCreux	902 253 2173	alecreux@eastlink.ca
National Representative	Pat Kelly	902 472 2322	patrick.kelly@dal.ca
Councilor	Wesley Howie	902 448 3966	wes@lightimages.org
Councilor	Sean Dzafovic	902 430 9062	sdzafovic@gmail.com

St. Croix Observatory — A New 'Scope!

The editor

Our Observing Chair, John Liddard, and the entire Executive are pleased to announce the arrival of out new "baby" at the St Croix Observatory—namely a 400mm Sky-Watcher Syn-Scan (GoTo) dobsonian telescope.

The Centre Executive has been discussing this purchase for several months, and after consultation with the membership at the May meeting, it was decided go ahead with the acquisition over the summer. We would like in particular to thank Brian at Atlantic Photo Supply, who by offering us a fantastic deal, made the purchase feasible.

We would also like to thank the 2012 Nova East organizing committee, everyone who attended the 2012 Nova East, and especially all who donated items to the very successful auction. It was the profit from the 2012 Nova East (in particular from the auction) that gave the Centre the extra funds to purchase the new telescope.

The new telescope is installed and is fully operational. There are a few items that still need to be purchased but any member is welcome to use the new 'scope, once they are familiar with its set-up and operation. To this end we have included a short form operating manual on the Centre web site under "publications" (thank you Dave Chapman).
http://www.halifax.rasc.ca/documents/SkyWatcherSCOManual.pdf

That advantages of a Go-To telescope are obvious to all observers as a way to easily find and observe astronomical objects, especially to less experienced observers who have a more limited knowledge of the night sky. To this end (and because of the style of mount) the 'scope is primarily intended as a visual observing telescope - although I'm sure some of you astro-photographers will give it a try out. Even Blair has admitted to owning an eyepiece or two!

The original 17.5" dob has been removed from SCO and is currently being serviced by Tony McGrath and Chris Young. We haven't decided what to do with the 17.5" once it is again in full working order—and suggestions from the membership are welcome.

At this point we request that members bring their own 12v power supply to power the new 'scope, but eventually we will have a separate 12v, solar charged, power supply for the Sky-Watcher. I believe we are also planning to purchase a wi-fi unit that will allow the telescope to be controlled remotely by i-phone and computer software.

There are eye pieces available at SCO, but most observers bring their own. This is a wonderful telescope and a great addition to SCO. We hope that we will see more members using the facilities at SCO and enjoying the pristine dark skies that SCO affords.

Specifications:

Optical Design:	**Newtonian (Parabolic)**
Aperture:	**406 mm**
Focal Length:	**1800 mm**
F/Ratio:	**F/4.4**
Finder Scope:	**8x50mm**
Focuser:	**2" dual speed, crayford**
Mount:	**Dobsonian Go-To**
Tube:	**Collapsible - 3 rod design**
Tube weight :	**30 kg**
Total weight:	**70 kg**
Go-To:	**SynScan AZ**
Modes:	**Auto Tracking / Alt /Az Go-To**

A Journey to the Centre of the Galaxy

Tony Schellinck

On August 1st, I gave my first presentation in the planetarium. It was entitled "Journey to the Centre of the Galaxy".

In preparation for the "show" I spent a week this June in the Nevada desert near Beatty, taking photos of the Milky Way (it was just me, the wild burros, sidewinders and a very cranky rattle snake that made me pack up early one night).

I took wide angle shots of the Milky Way to identify the key constellations and stars found there, followed by shots using my Canon 100-mm lens to capture groupings of the Deep Sky Objects (DSOs) I intended to talk about, such as M8, M20 and M23.

I had the pleasure of trying out my new modified Cannon T3i camera while I was in Nevada, and it worked perfectly. I followed up with more photos taken late July from my Port Mouton observatory, using my Sky-Watcher 80ED, zeroing in on each of the twelve objects I would introduce to the audience during the presentation. I also had a few close-up photos of galaxies and DSOs that I had taken previously though my 8 inch SCT.

To use the photographs during the show, Stephen Payne from Dalhousie University, invested quite a bit of time to set up a data projector in the Planetarium. We did some rehearsals and Stephen made some improvements to the system, such as drilling large holes in the base of the projection box and installing a fan to help keep the data projector cool after it failed during the second rehearsal. I had dimmed the PowerPoint slides by drawing a black box over the slides and then adjusting the transparency to between 20% and 50% depending on the brightness of the underlying slide. However, in some cases the slides were still too bright to allow the stars projected on the dome to be seen sufficiently to allow me to illustrate the location of the DSOs. The temporary solution was to put a piece of cardboard over the projector box hole when we wanted to look at the stars and Milky Way projected on the dome. This necessitated my wife, Heather, to assist me during the presentation by putting the cardboard over the hole when I wanted the audience to see the stars! Stephen says he has a solution that in the future will allow the presenter to block or dim the image from the console.

The projected Milky Way was only visible to the audience after they had become dark-adapted, so I spent the first fifteen minutes using the star projector to introduce them to the sky, with a focus on the August night sky and the Milky Way. I then showed them three slides of the Milky Way followed by six photos of other galaxies to illustrate what a galaxy was and the existence of dust lanes. Having set the context, we came back to the Milky Way projection on the dome when I reminded them where the Cygnus, Lyra, Aquila, and Sagittarius constellations were located.

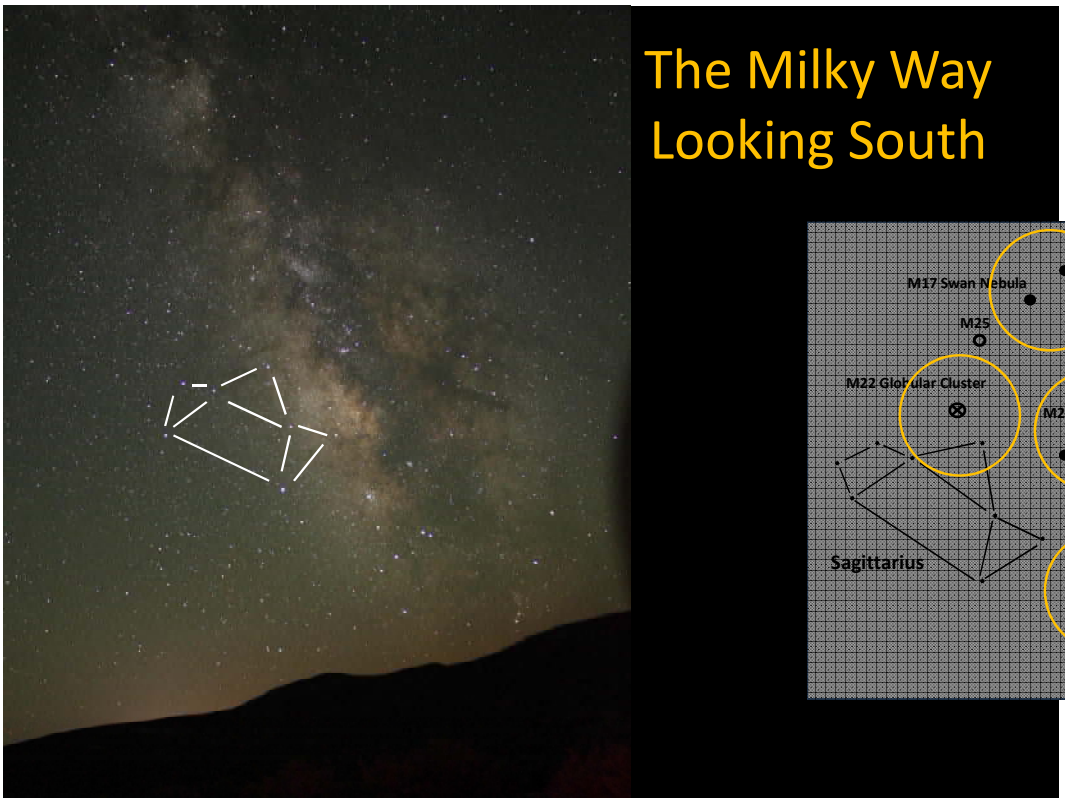
We then started our journey to the centre of the Galaxy by looking at NGC 7000, the North American Nebula, as this illustrated the role of the dust lanes in forming many of the shapes we see in the Milky Way. We then examined double stars in Lyra and of course Albireo in Cygnus. I introduced them to planetary nebula and showed them M27, the Dumbbell Nebula. We then moved south to the DSOs around the "tea pot" in Sagittarius. They were told about open clusters and shown where M6, M7, M21, M23 and M25 were in relation to the tea pot and the other nearby nebula using the pictures taken with the Canon 100-mm lens.

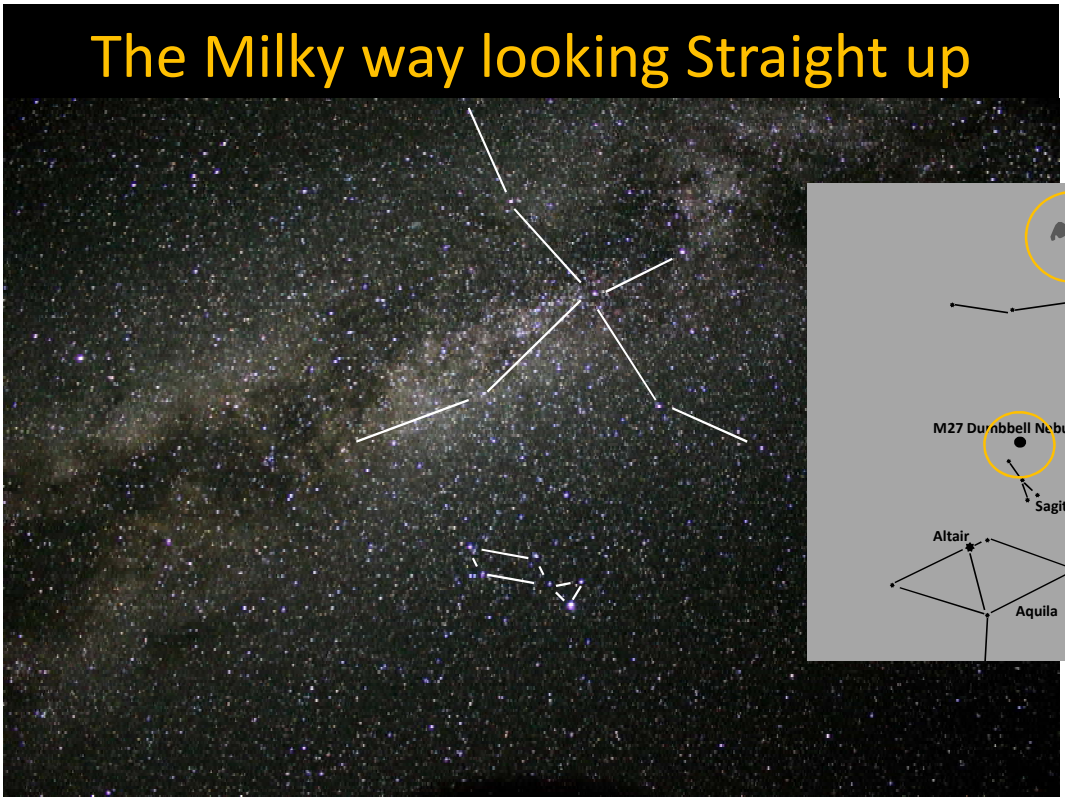
Using merged 100-mm photos, I showed them the location of the nebula close to the “teapot”; M8 (Lagoon), M20 (Trifid), M17 (Omega or Swan), and M16 (Eagle). We finished with a discussion about globular clusters and I showed them a photo of M22. After the lights came up I showed them sets of 10 x 50 and 15 x 70 binoculars, and we discussed how they could use these (emphasizing the need of a tripod for the 15 x 70s), where they could be purchased, and what they could expect to see with them.

All the way through the presentation I presented this as a travelogue, with them having travelled the 180 km to the sky circle Keji and now they and their family were comfortably seated at 10 p.m. on an August evening, binoculars in hand, prepared to travel another 500 to 9600 light years to visit these faraway places on their way to the centre of the Galaxy. I finished the show by using the planetarium projections to review the path their trip would take and the sights they could see on the way.

I would like to thank Stephen Payne for the considerable amount of work he put into setting up, testing and modifying the projection set up so that I could use my own photographs and PowerPoint slides during the show. Using PowerPoint slides allowed me to start with wide-angle photos to show the Milky Way, then focus on areas around the constellations to help people find and recognize the DSOs through a set of binoculars, and then to show detailed photos of the DSOs as I described them to the audience.

The audience seemed to be very appreciative and enthusiastic at the end of the show (only one child and my wife fell asleep) and I know that I certainly enjoyed the experience and look forward to doing more planetarium shows in the future.





A couple of examples of the photos and slides that Tony used during the presentation.
The Planetarium is not yet ready for presentations using a digital projector as there are still several issues to be resolved (as described in Tony's article), however progress is being made and we hope that in the foreseeable future, computer-driven presentations will complement the existing star projector. *Editor*

June Meeting Report

Chris Young

The June Halifax Centre Meeting was held at the St. Croix Observatory (SCO) location. Approximately 30 members and their guests attended, making the short trip from HRM. Parking was at the site for some, with a shuttle running back and forth to the Park-n-Ride lot in St. Croix.

The main purpose of the meeting was to have a social meeting and to familiarize and promote the Centre's Dark Sky Site and facilities. There was a BBQ and the meeting was a great success.

Paul Heath, the Centre President, opened the meeting with his poetry reading "Food for the Soul". Tours of the facility and its equipment were provided. There was discussion of equipment and Tony Schellinck demonstrated his 16" Go-To Dobsonian 'scope, the same model which the Centre was considering purchasing (and are now proud owners of!).

Paul Heath presented a Lunar Observing recognition to Melody Hamilton for having completed (with enthusiasm!) the Beginner's Lunar Observing Guide (BLOG) Program. Dave Chapman has created this program as an introduction to observing the Mooon. Dave has provided straightforward guidance on relating the position of the terminator with the moon features to be explored. A great program, soon to go national!

A wonderful evening, great company, and an excellent introduction for the newcomers to SCO!

Melody Hamilton receiving her Beginner's Lunar Observing Guide recognition from President Paul Heath.
Photo: Blair McDonald

June meeting at SCO ***Photo: Blair MacDonald***

FOOD FOR THE SOUL — SCO
By Paul Heath

Do you say 'SELDOM COME OUT'?
Perchance instead, you'll stray with us
Along a wooded lane, to pass astride a channeled stream.
Come pace the twisting turns of forest thickening
Until with rise and fall, the forest opens on a wall held pool.

It's here our Sentinels, heads held high, stand to watch
Assessing travelers that drift on by.

Upon a turn our search fulfilled,
Enfolded close by often mirrored pools, our Fortress stands
Within a quiet glade, like solitary
Clouds upon a sky of green.
We step from woods, into mystery.

As roof unfurls, we reach into the night, with mind and sight
Yet in the quiet, mystery dwells, for stars appear on mirrored pools,
And in the sky bright curtains sway, as Sun and Earth begin to play,
And from the dark the forest calls, to let us know that solitude
Holds friends and wonder, for all to find.

So now, perchance to SCO you'll go
For now the meaning, S - C - O, you know, it's Wonder, Mystery, and Friends.

September Meeting Report

Quinn Smith

To start the Fall season, our President Paul Heath had arranged an informal meeting with several short talks by members and invited guests.

Paul welcomed the 34 people at the meeting and extended a special welcome to new members, guests, and astronomy students from SMU.

As usual Paul opened the meeting with a poem from his "Food for the Soul series titled "Young Eyes, Old Eyes"

Paul opened the meeting business by announcing that John Liddard was stepping down as Observing Chair due to family matters. Paul thanked John for his service and dedication and hoped that John would be able to rejoin the Executive at a later date.

Several short reports were then given. Pat Kelly gave a brief report on the 2013 General Assembly in Thunder Bay, and Quinn Smith gave a Nova East summary, and an update on the planning of our own hosting of the 2015 General Assembly in Halifax.

Pat Kelly then presented the President's award to our own Dave Lane, for his continued outstanding contribution to the RASC. This award was announced at the Thunder Bay GA but Dave was not present to receive it.

Pat Kelly presents Dave Lane with the President's award.
Photo: James Edgar

Dave Chapman then introduced James Edgar, the National RASC Secretary, who was visiting Halifax. James explained the workings of the new RASC Board of Directors and National Advisory Committee, and explained that the members of the BOD were hoping to visit all Centres throughout the year.

Dave Chapman gave a short introductory talk about the new telescope at SCO and reminded us that operating instructions are posted on the Centre web site (see page 3). He also requested that only assigned members collimate the 'scope, noting that it should rarely need collimation as it will not be moved. Dave also thanked Brian Giffin at Atlantic Photo Supply for the fantastic deal he gave us when purchasing the 'scope.

Sean Dzafovic then gave us a "What's Up?" for the coming month, taking the objects that were well positioned for observing, from the Explore the Universe Certificate.

It was then Prof. Dave Turner's turn to talk about variable stars, their observation and his involvement with the AAVSO (American Association for Variable Star Observers). Go to: ***http://www.aavso.org*** for more info. Dr Turner explained his own method of variable star observation, in particular reference to Nova Delphini (see page 9). He explained that the human eye was a very accurate estimator of star's magnitude, but only if it was approaching the lower limit of visibility. As he pointed out, when it comes to visual magnitude estimates, less is better!.

The last talk of the evening was an introduction to the Beginners' Lunar Observing Guide by Dave Chapman. Dave explained the reason for a beginners' guide, and why the objects in the guide were chosen. The BLOG is still being tested, and if you would like to be involved please contact Dave at: ***dave.chapman@ns.sympatico.ca***

Dave explained a unique feature of the BLOG, namely "Q-days" The "Q-day" is a timing convention from the first quarter Moon (Q = 0). Days before the first quarter (Q = –1,–2, –3 etc) and days after the first quarter (Q = 1, 2, 3 etc). The objects in the BLOG are arranged by Q-day, making observations easy and systematic.

The meeting concluded at 9:30 p.m. after socializing and conversation.

Young Eyes, Old Eyes—Paul Heath

Young Eyes seek Old Eyes for wonders long found
With searches, meticulous and sound.
Yet Old Eyes seek only now, a favored few.

Young Ears hear Old Ears tell tales upon the Sky
Of searches, in whispers on nights long gone by.
Yet Old Ears hear only now, a favored few.

Young hands reach to hold wonders
Old hands held when new
While searching, through shiny glass tubes.
Yet Old hands hold only now, a favored few.

Yet here, find Young Eyes searching
And Young Ears listening too.
For Young hands outreached, are seeking anew.

So come now, Old Eyes to Young Eyes
For it is always true
That the Searching brings the Wonder
And not only, for the Favored few.

Keji Dark Sky Weekend

Dave Chapman

The 4th Dark Sky Weekend at Kejimkujik National Park and National Historic Site may have been the best yet, based on sky conditions, public attendance, and RASC member participation. Friday was pretty wet, and there was no observing, but we greeted campers at the Visitor Centre (Karl, Andrea & Julius, myself, and Cathy*). Paul L's night hike went ahead in the rain.

Conditions cleared for "Pacing the Solar System" program on Saturday morning, but the public turnout was low (Paul H, Andrea & Julius, Cathy). Karl set up solar observing at the Visitor Centre for most of the day, assisted by Wayne and Martin. The afternoon workshop on Star Finders had about 15 persons, and was followed by solar observing (Andrea & Julius, Paul H, Karl, Jill).

Chris Young presented the evening amphitheatre talk "One Sky–Many Stories" on global cultural astronomy (this should be a Centre meeting talk!) to about 60 people (Chris Y, Paul L, Ashley). This was followed by the Green Laser Tour of the Sky (Dave C, Paul L) at the Sky Circle, followed by meteor observing and public telescope viewing (myself, Tony, Wayne, Paul H, Jim M, Martin, Karl, John M, Andrea & Julius, Paul L, and Ashley). There were 150–200 people (hard to tell), and apologies to any members I missed—it was dark!

The Sky Circle at night ***Photo: Chris Green***

Sky conditions were near-perfect and many stayed late. Local photographer Chris Green arrived to take photos. There were several non-members there with telescopes privately observing. Last to leave were Martin, Chris Y, and myself, at 0400!

There were no activities scheduled for Sunday except the rain date for observing, and some of us stayed for that, while the others went home. Public observing that night was equally successful, starting and ending earlier (myself, Tony, Jim M, Jen, and Lesley). We observed the Moon and Saturn in the twilight, and the meteors were more numerous. Chris Green arrived later to take photos, and brought wine! That was a great way to end the weekend! He and I were the last to leave, at 0230.

I have provided lots of names, events, and numbers here. It is hard to convey in words the majesty of the clear, dark Keji skies, with the constant Milky Way slowly turning overhead, and brief interruptions of bright Perseid meteors, many with trails. We were indeed fortunate this year, and thanks to all who contributed and participated to make this event so successful.

* Cathy, Paul L, Jill, Ashley (Supervisor), Jen, and Lesley are members of the Keji interpreter team who lead or assist in programs.

Andrea and Julius presenting the StarFinder workshop. Photo: Dave Chapman

Nova Delphini

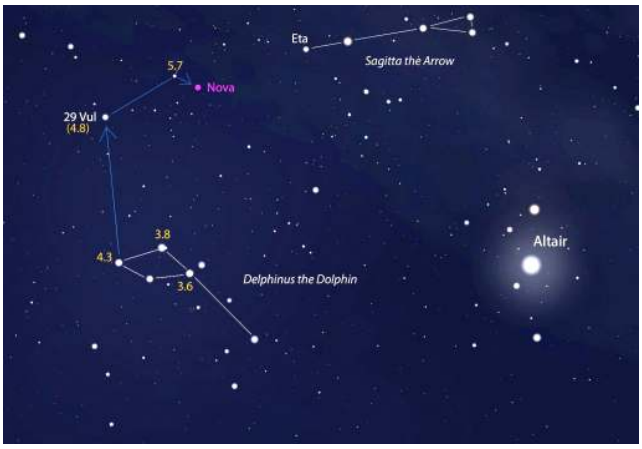
Editor

PNV J20233073+2046041 (or Nova Delphini 2013) was a bright nova star in the constellation Delphinus. It was discovered on August 14th 2013 by amateur astronomer Koichi Itagaki in Japan. The nova appeared with a magnitude 6.8 when it was discovered and peaked at magnitude 4.3 on August 16th 2013.

One of the questions that came up on the Halifax "list" was what was the difference between a nova and super nova? From Wikipedia:

A nova is a cataclysmic nuclear explosion in a white dwarf star. It is caused by the accretion of hydrogen on to the surface of the star, which ignites and starts nuclear fusion in a runaway manner. Novae are not to be confused with supernovae or luminous red novae. A nova is a sudden brightening of a star. Novae are thought to occur on the surface of a white dwarf star in a binary system. If these two stars are close enough, material from one star can be pulled off the companion star's surface and onto the white dwarf.

A supernova is a stellar explosion that is more energetic than a nova. Supernovae are extremely luminous and cause a burst of radiation that often briefly outshines an entire galaxy, before fading from view over several weeks or months. The explosion expels much or all of a star's material, driving a shock wave into the surrounding interstellar medium. This shock wave sweeps up an expanding shell of gas and dust called a supernova remnant. Supernovae can be triggered in one of two ways: by the sudden reignition of nuclear fusion in a degenerate star; or by the collapse of the core of a massive star.



Here is a posting of some of the comments from the "list"

Michael Boschat: Aug 14th
Bright New Nova In Delphinus — You can See it Tonight With Binoculars.

Dave Chapman: Aug 14th
With the help of the S&T finder chart and SkySafari, I believe I located the nova in 7x50 binos from Dartmouth. A nearby star is mag. 5.7, and to me the nova seems a little brighter, in which case, it is still brightening.

Paul Gray: Aug 15th
Well tonight I went out and observed this nova for myself. At 00:45 UT I have it at mag 5.0!

Kathryn and my oldest boy Nathan were both able to see it with unaided eyes as well. Both excited to see a Nova with there own eyes after searching for really faint supernova in fuzzy images! :)

Ian Anderson: Aug 15th
I also observed Nova Delph tonight at 22:20ADT on North Mountain above Centreville and think it to be as bright as 29 Vulpeculae which is about a 4.8 mag, about a full mag by my estimation brighter than last night under similar conditions. Definitely brighter than the close 5.7 comparable last night.

Bruce & Melody Hamilton: Aug 15th
Melody and I could see it unaided eye this evening, we placed it 4.9 or 5 not quite as bright as 29 Vulpecula.

Dave Chapman: Aug 16th
Wow, I observed it at 0245 UT this morning, and it is significantly brighter. I would agree with mag. 5.0 or 4.9. How bright might it get? I observed Nova Delphini 1967 in my teens, and it became brighter than the principal stars of that constellation!

Michael Boschat: Aug 17th
Nova Delphini last night. I used my 7x50's and gave an estimate of 4.8,using the stars numbered in the photo from the AAVSO star map. I could just see it with adverted vision .

Photo: Art Cole August 16th 2013

Nova East 2013

Quinn Smith

Happy campers as night falls on Friday

Who would have thought? Great weather for Nova East three years in a row! Despite rain almost every day leading up to Nova East, the Friday of the event was sunny and warm.

Blair and I (as registrar) were somewhat concerned about the low pre registration for the star party, but our concerns were swept away by the number of people registering on site. It seems many people were concerned about the weather and wanted to see the forecast for the weekend before registering.

In the end, we had 53 registrations with over 65 people attending (there were several family registrations) and this attendance compared very well with the last few NEs. For those of you who like to keep track of these things registrations for the last few years were: 2011 (47), 2012 (59), 2013 (53).

Friday evening events were started by Blair, who welcomed everyone to the event and introduced our guest speaker for the evening: Dr. Luigi Gallo from Saint Mary's University. Dr Gallo's topic was "Seeing the Universe in X-Rays".

The theme for this Nova East was "What you see depends on how you look" and that was the idea behind this year's tee-shirt design. We look at the universe in many different frequencies of electro-magnetic radiation, from radio waves, through visible light, to X-rays and beyond. At each of these frequencies the universe looks very different, and Dr Gallo described not only how the universe looks at X-ray frequencies, but also how we go about building a telescope that can "see" at these frequencies. It was a great talk and when he was finished we all had the chance to see some of this universe in visible light through a pristine clear Smiley's Park dark sky.

Saturday was a beautiful (hot) day with many talks, activities, and workshops. In the evening Brian Giffin spoke about the capabilities of his store, Atlantic Photo Supply, before the judging of the Astrophoto Contest and door prizes. Congratulations to Jeff Donaldson for winning the astrophoto contest (front page photo).

Mark's "big dob" beside Dave's 3" reflector

After the door prizes were given out (main prize won by Dave Parsons) Blair MacDonald gave the closing talk "An Astrophotographer's Skies". Blair outlined his start in astronomy and astrophotography, his equipment, and the trials and tribulations involved in learning his skill. A very insightful talk.

The skies Saturday evening were softer than those of Friday, with high clouds drifting in and out. Despite this, many 'scopes were active well into the morning and the general public were treated (on both nights) to some spectacular views. For many of us, Saturday night provided an opportunity to socialize and a very pleasant evening it was.

Group photo—note the colour of the sky!

True to form, we had a little rain overnight (just enough to keep the dust down) and most people managed to pack up in the damp (but rain-free) morning before another band of rain arrived mid morning on Sunday.

Panning for "gold"

Another great Nova East and a big thank you to all the organizers, speakers, helpers and participants. I look forward to seeing all of you again on the weekend of August 22-24th 2014 at our next Nova East Star Party.

Special thanks to the NE committee: Blair MacDonald (Chair), Irene More Pat d'Entremont, Ron Mills, Ian Anderson, Tony Schellinck, and Quinn Smith.

Thanks to speakers and presenters: Dr Luigi Gallo, Tony Schellinck, Paul Heath, Mark Dryden, Dave Chapman, Sherman Williams, Ron Mills, Brian Giffin, Blair MacDonald, Roy Bishop, and Quinn Smith

Thanks also to Roy Bishop and Dave Lane for lending equipment.

All photos: Blair MacDonald

HALIFAX CENTRE

Nova Notes: The Newsletter of the Halifax Centre of the RASC

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

E-mail: novanoteseditor@rasc.ca Newsletter editor: Quinn Smith

Nova Notes is published 5 times a year, in February, April, June/July, September/October, and December.
The deadline for the next edition is November 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.

Cosmic Debris

Odds and Sods from the world of astronomy and astrophysics

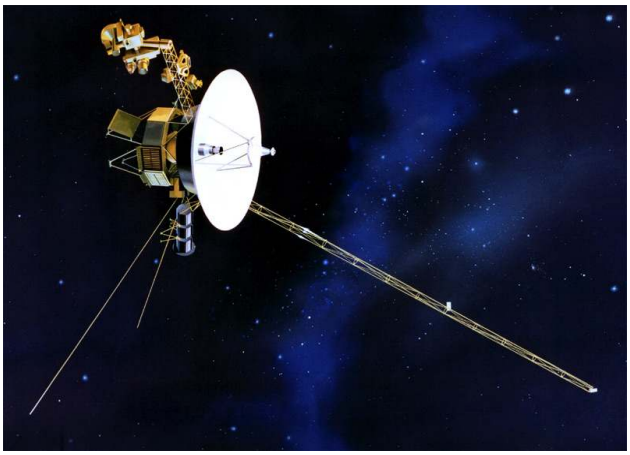
Sept. 12, 2013: NASA's Voyager 1 spacecraft officially is the first human-made object to venture into interstellar space. The 36-year-old probe is about 12 billion miles (19 billion km) from the Sun.

New and unexpected data indicate Voyager 1 has been traveling for about one year through plasma, or ionized gas, present in the space between stars. Voyager is in a transitional region immediately outside the solar bubble, where some effects from our sun are still evident. A report on the analysis of this new data, an effort led by Don Gurnett and the plasma wave science team at the University of Iowa, Iowa City, is published in Thursday's edition of the journal Science.

"Now that we have new, key data, we believe this is mankind's historic leap into interstellar space," said Ed Stone, Voyager project scientist based at the California Institute of Technology, Pasadena. "The Voyager team needed time to analyze those observations and make sense of them. But we can now answer the question we've all been asking "Are we there yet?" Yes, we are."

Voyager 1 first detected the increased pressure of interstellar space on the heliosphere, the bubble of charged particles surrounding the sun that reaches far beyond the outer planets, in 2004. Scientists then ramped up their search for evidence of the spacecraft's interstellar arrival, knowing the data analysis and interpretation could take months or years.

Voyager 1 does not have a working plasma sensor, so scientists needed a different way to measure the spacecraft's plasma environment to make a definitive determination of its location. A coronal mass ejection, or a massive burst of solar wind and magnetic fields, that erupted from the sun in March 2012 provided scientists the data they needed. When this unexpected gift from the sun eventually arrived at Voyager 1's location 13 months later, in April 2013, the plasma around the spacecraft began to vibrate like a violin string. On April 9, Voyager 1's plasma wave instrument detected the movement. The pitch of the oscillations helped scientists determine the density of the plasma. The particular oscillations meant the spacecraft was bathed in plasma more than 40 times denser than what they had encountered in the outer layer of the heliosphere. Density of this sort is to be expected in interstellar space.



The plasma wave science team reviewed its data and found an earlier, fainter set of oscillations in October and November 2012. Through extrapolation of measured plasma densities from both events, the team determined Voyager 1 first entered interstellar space in August 2012.

"We literally jumped out of our seats when we saw these oscillations in our data—they showed us the spacecraft was in an entirely new region, comparable to what was expected in interstellar space, and totally different than in the solar bubble," Gurnett said. "Clearly we had passed through the heliopause, which is the long-hypothesized boundary between the solar plasma and the interstellar plasma."

The new plasma data suggested a timeframe consistent with abrupt, durable changes in the density of energetic particles that were first detected on Aug. 25, 2012. The Voyager team generally accepts this date as the date of interstellar arrival. The charged particle and plasma changes were what would have been expected during a crossing of the heliopause.

Voyager 1 and its twin, Voyager 2, were launched 16 days apart in 1977. Both spacecraft flew by Jupiter and Saturn. Voyager 2 also flew by Uranus and Neptune. Voyager 2, launched before Voyager 1, is the longest continuously operated spacecraft. It is about 9.5 billion miles (15 billion km) away from the Sun.

Voyager mission controllers still talk to or receive data from Voyager 1 and Voyager 2 every day, though the emitted signals are currently very dim, at about 23 watts—the power of a refrigerator light bulb. By the time the signals get to Earth, they are a fraction of a billion-billionth of a watt. Data from Voyager 1's instruments are transmitted to Earth typically at 160 bits per second, and captured by 34- and 70-meter NASA Deep Space Network stations. Traveling at the speed of light, a signal from Voyager 1 takes about 17 hours to travel to Earth. After the data are transmitted to JPL and processed by the science teams, Voyager data are made publicly available.

Scientists do not know when Voyager 1 will reach the undisturbed part of interstellar space where there is no influence from our sun. They also are not certain when Voyager 2 is expected to cross into interstellar space, but they believe it is not very far behind.

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