

# Orbit

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Royal Astronomical Society of Canada

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# Issue Number 3, January, 2013

## Roger Hill, Editor

I had a feeling that the response to the NOVA program would be good, but I must admit to being a tad overwhelmed!

I'd put a lot of work into that first night, printing out some good name tags, emptying two Staples stores out of binders, getting the tables from the Butler building, and trying them in several different configurations, running the cable to connect my laptop to the projector through the ceiling, and getting the heaters turned on, as so on.

Finally, about an hour before the start of Session 1, I was ready...the result is on the front cover of this month's Orbit.

The room was filled to capacity (and perhaps a bit beyond), but the atmosphere was convivial, and even more so when people had introduced themselves.

I'll give a more thorough report on the first night (and possibly the second) later in these pages, so there's some good reading coming up!

All this talk about NOVA has triggered a fair bit of discussion between the Board members. Andy, for instance, is going to prepare, and deliver, a course on basic astrophotography (see his report, page 3).

There are a number of people who'd like to take a course like this, so hopefully it will be offered to current members.

What will be done for an encore? Some ideas are being tossed around like putting a bit more structure into the astrophotography nights by publishing a topic ahead of time (tripod based, piggy-back, lunar, planetary, solar, aurora, comets, etc.), which would have the advantage of offering the (potentially) large number of new members something to try after becoming a member.

Another idea that came up was to make the astrophotography nights more of series of workshops, with topics like making a barn-door tracker, modifying and using a webcam for lunar and planetary work, making a solar filter, constructing a light-box, and so forth.

Anyway, all of this gives you an idea of why we have been desperately wanting to have more Board members, because once we have enough to look after all the club business (seems to be about 6 people), any extra people allow the Centre to start offering other programs, improving the facilities, and the entire process starts to snowball.

With two potentially great comets coming up, an influx of new members, and AstroCATS, it looks like there are some very interesting times coming up for the Hamilton Centre. Will we need to increase the size of the parking lot? Should we be looking at adding a school portable at the site? A portable planetarium? How about some new folding chairs with the enlarged armrest that allows writing?

Regardless, change is in the air at the Hamilton Centre, and while "change" and "progress" are not synonyms, there is no doubt that progress requires change.

There are some great opportunities coming up!

Roger Hill

# Presidents Report—Andy Blanchard

Well it's been a few months since I wrote my Presidents report. Membership in the club is steadily increasing, largely due to our new Nova Program.

Even though I have traveled a bit this month, we have completed our negotiations with Henry's and I am pleased to report we have a great agreement. Over the next year we have promised to provide basic 101 Astrophotography lessons, in exchange for paid memberships. Henry's have scheduled ten sessions over the next several months with a minimum of ten new students at each event. Yes we will have a hundred new members by the end of the year. That's enough to pay for our entire yearly operating costs.

AstroCATS is progressing very well with confirmation from Celestron, KW Telescopes, Khan and many others stepping up to book booths. We are very early in this project, but it looks like this event will be not only a success but our major fund raiser.

Now is the time to step forward and get involved, there are lots of interesting places to apply your time and skills. We are growing and extra hands will very much be appreciated.

The banquet tickets will be available soon, we have a great speaker David Levy, the great comet discover and of course year end awards and don't forget camaraderie and a great meal. Be sure to get your tickets early as they will go very fast with a speak as interesting as David Levy.

I look forward to seeing you all this Thursday the 7th at our next meeting. We have an excellent speaker and as always a fun night

Have a great day  
Andy Blanchard

## Quotes:

### **Carl Sagan:**

“At the very moment that humans discovered the scale of the universe and found that their most unconstrained fancies were in fact dwarfed by the true dimensions of even the Milky Way Galaxy, they took steps that ensured that their descendants would be unable to see the stars at all. For a million years humans had grown up with a personal daily knowledge of the vault of heaven. In the last few thousand years they began building and emigrating to the cities. In the last few decades, a major fraction of the human population has abandoned a rustic way of life. As technology developed and the cities were polluted, the nights became starless. New generations grew to maturity wholly ignorant of the sky that had transfixed their ancestors and that had stimulated the modern age of science and technology. Without even noticing, just as astronomy entered a golden age most people cut themselves off from the sky, a cosmic isolationism that ended only with the dawn of space exploration.”

### **Neil deGrasse Tyson:**

“The atoms of our bodies are traceable to stars that manufactured them in their cores and exploded these enriched ingredients across our galaxy, billions of years ago. For this reason, we are biologically connected to every other living thing in the world. We are chemically connected to all molecules on Earth. And we are atomically connected to all atoms in the universe. We are not figuratively, but literally stardust.”



# The Super Huge Interferometric Telescope

## A New Paradigm in Optical Interferometry

J.J. Charfman, G. Rudnick, J. Bailin, C. Drouet D'Aubigny, C. Gottbrath, C. Groppi, M. Kenworthy, C. Kulesa, A. Leistra, E. Mamajek, C. Meakin, J. Monkiewicz, B. Oppenheimer, P. Young, K. Knierman



Sponsored by Absolut Magnitude

### Introduction

Inspired by the GI2T telescope (see Figure 1), we came up with the idea of an interferometer of silly looking telescopes.



Figure 1: ~~GI2T~~ GI2T Telescope, France

With 5800 Edmund Astroscan telescopes (see Figure 2), we can reach the equivalent collecting area of the 8.4-m Large Binocular Telescope with a synthetic aperture of >100m and the equivalent silliness of 2 John Cleese skits.



Figure 2: Edmund Astroscan telescope

### Cost

5800 x \$200 = \$1.16 million for Astroscans  
\$0.34 million for infrastructure  
 = \$1.5 million

Compare this with \$80 million for the LBT or \$100 million for Keck! [Figure 3]

Infrastructure costs are kept low using cheap off-the-shelf components and readily available low-cost turnkey adaptive optics using laser pointer guide stars (Figure 4).

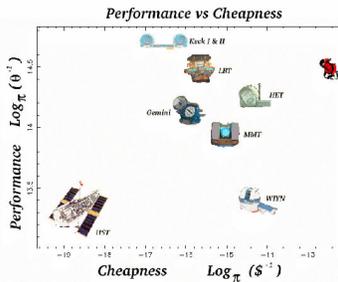


Figure 3: This simple plot shows how the Super Huge Interferometric Telescope occupies a unique area in cost-performance parameter space

### Instrumentation

The portability of the array elements leads to flexible array configurations (see Figures 5-7) including the possibility of corporate tie-ins for outside funding (see Figure 8).



Figure 5: prototype array



Figure 6



Figure 7



Figure 8

The Super Huge Interferometric Telescope is also the ideal platform for the SUB-arcsecond Camera for the Ks-BAnD (see Figure 9). The color of the Astroscan makes it ideal for infrared observations.

### SUB-arcsecond Camera for the Ks-BAnD



Figure 9: The SUB-arcsecond Camera for the Ks BAnD

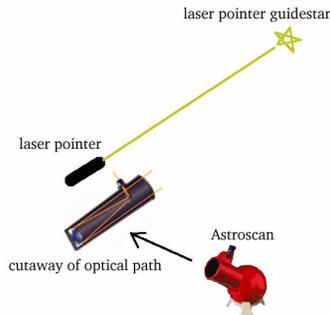
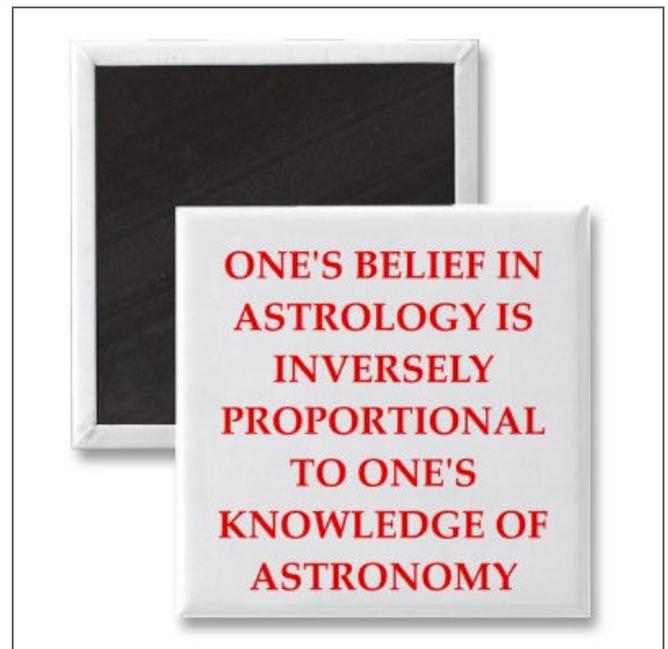
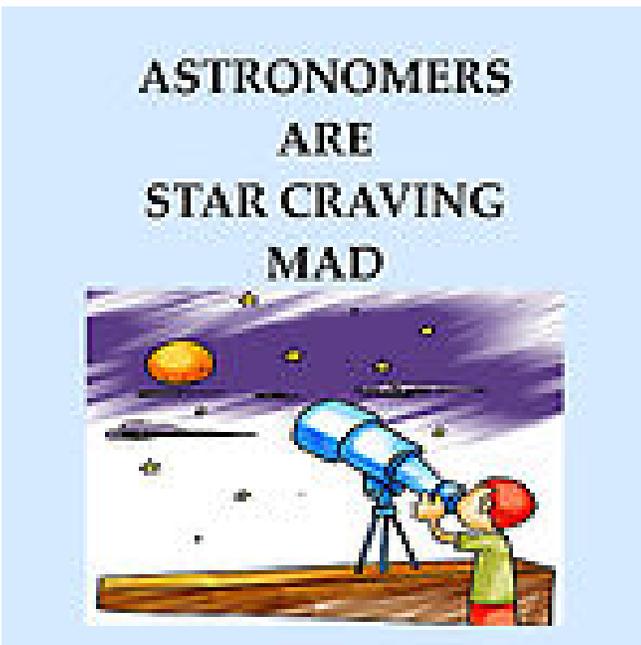


Figure 4: A schematic diagram of the Super Huge Interferometric Telescope System



## The Art of Space Imagery By Diane K. Fisher

When you see spectacular space images taken in infrared light by the Spitzer Space Telescope and other non-visible-light telescopes, you may wonder where those beautiful colors came from? After all, if the telescopes were recording infrared or ultraviolet light, we wouldn't see anything at all. So are the images "colorized" or "false colored"?

No, not really. The colors are translated. Just as a foreign language can be translated into our native language, an image made with light that falls outside the range of our seeing can be "translated" into colors we can see. Scientists process these images so they can not only see them, but they can also tease out all sorts of information the light can reveal. For example, wisely done color translation can reveal relative temperatures of stars, dust, and gas in the images, and show fine structural details of galaxies and nebulae.

Spitzer's Infrared Array Camera (IRAC), for example, is a four-channel camera, meaning that it has four different detector arrays, each measuring light at one particular wavelength. Each image from each detector array resembles a gray-scale image, because the entire detector array is responding to only one wavelength of light. However, the relative brightness will vary across the array.

So, starting with one detector array, the first step is to determine what is the brightest thing and the darkest thing in the image. Software is used to pick out this dynamic range and to re-compute the value of each pixel. This process produces a grey-scale image. At the end of this process, for Spitzer, we will have four grayscale images, one for each of the four IRAC detectors.

Matter of different temperatures emit different wavelengths of light. A cool object emits longer wavelengths (lower energies) of light than a warmer object. So, for each scene, we will see four grayscale images, each of them different.

Normally, the three primary colors are assigned to these gray-scale images based on the order they appear in the spectrum, with blue assigned to the shortest wavelength, and red to the longest. In the case of Spitzer, with four wavelengths to represent, a secondary color is chosen, such as yellow. So images that combine all four of the IRAC's infrared detectors are remapped into red, yellow, green, and blue wavelengths in the visible part of the spectrum.

Download a new Spitzer poster of the center of the Milky Way. On the back is a more complete and colorfully-illustrated explanation of the "art of space imagery." Go to [spaceplace.nasa.gov/posters/#milky-way](http://spaceplace.nasa.gov/posters/#milky-way).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



## Messier Certificate

### About the Catalogue

The Messier Catalogue was developed in the 1700's by Charles Messier (1730-1817). Messier was a comet hunter working with speculum metal reflectors and small refractors that were the equivalent of a modern 80 - 100 mm reflector. As a result of the limited tools that he had to work with, he could not see the true nature of many of his "faint fuzzies" that are revealed in today's modern instruments. The certificate has been awarded since 1981. Handy recording and application forms can be found from a link at the bottom of this page.



Here is an overview of the Messier Catalogue:

Open Clusters	28	Includes many beautiful open clusters like M6, M7, The Beehive, The Pleiades and The Wild Duck.
Globular Clusters	29	Includes the showpieces M13, M22, M5 and M3.
Bright Nebulae	8	Includes the great Orion Nebula as well as the Lagoon, Swan, Eagle and Trifid Nebulae.
Planetary Nebulae	3	Includes the impressive Ring Nebula as well as the Dumbbell and Owl planetary nebulae.
Galaxies	40	Includes the amazing Andromeda Galaxy as well as M51, M33, M81/M82 and many others.
Double Stars	1	This is M40, an unusual Messier object

For a total of 110 objects.

If Messier were alive today he would no doubt be astonished at the size, distance and complexity of the various objects that he catalogued. As a comet hunter, they were often nuisances since they "got in the way" of his search for new comets.

### The RASC's Messier Certificate

A Messier Certificate is awarded to RASC members who visually observe all 110 objects on the Messier list as published annually in the Observer's Handbook. Note that there are several published versions of the Messier list so it is important to follow this official reference. The Messier list can be started during any season. You must be a member in good standing of the RASC to be awarded this certificate.

Exploring the Messier Catalogue is an excellent observing project as it contains many showpiece objects. Moreover it allows you to see the universe from an 18th century perspective and to learn more about the night sky.

### Observing Forms

The RASC Observing Committee has created special observing forms to help you complete the Messier certificate program. These observing forms (653 KB, 110 pg) will help to keep your observations in one organized file. They feature all of the important data about each Messier object and a generous area for making notes and drawings.

The RASC Messier 110 observing forms can be found at: <http://www.rasc.ca/sites/default/files/rascmessierforms.pdf>

# Imagers Corner, by Blair MacDonald—Halifax Centre



This edition continues a group of Imager's Corner articles that will focus on a few techniques that are useful in processing astrophotos. Over the next several editions I'll attempt to give a guide to image stretching, background correction, SIM processing and any other technique that I happen to find useful. All the techniques discussed will be useable with nothing more than a standard image processor that supports layers and masks. No special astro-image processor is required.

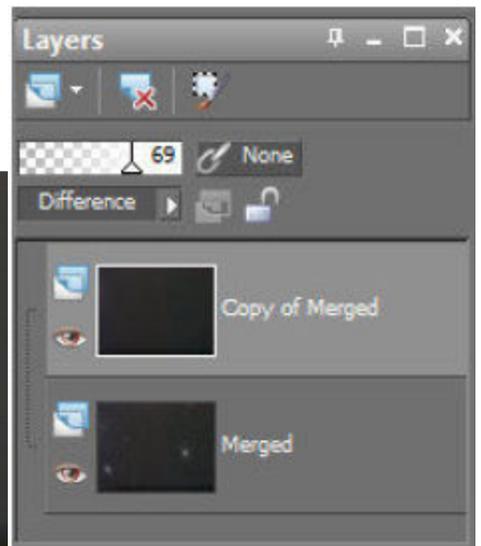
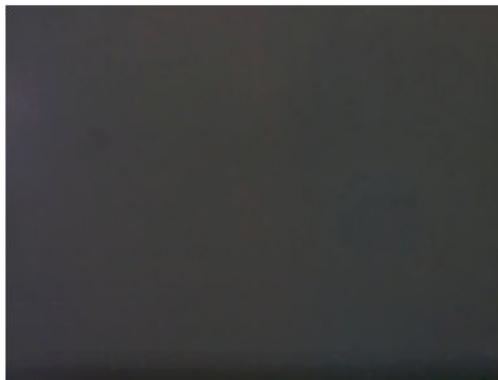
This edition will deal with background correction using processing to get that smooth dark sky look, even from the city.

There are several common background problems that we can correct in processing, here we are correcting colour splotches and gradients.

Let's start with the M97 image (bottom left). There is a slight under correction from the flat field, a darker strip along the bottom and a purple blotch in the upper right edge.

The first thing to do is to remove the gradient and colour blotches. The first step is to duplicate the layer and clone out the galaxies and any bright stars. This will take a while so have some patience as getting this step right has a big impact on the final result. Next use a median filter with a radius much larger than the remaining stars (10 to 30) to remove the remaining stars in the image. Optionally if you don't get a smooth result apply a Gaussian blur, but if you've done a good job cloning out the bright stars and DSO's you should not have to use further blurring. This gives a layer that has no image detail, but contains the colour spots and gradient as shown middle left.

Now set the combine mode of this layer to difference and adjust the opacity to get the result you want. If you leave the opacity at 100% the background will be zero and you will clip some faint data. If you make the layer too transparent then the resultant image will be under corrected. The layer stack is shown bottom right.



## RASC Book Review by Joseph Pipitone

### **WALK THROUGH THE SOUTHERN SKY: A Guide To Stars and Constellations and Their Legends M. Heifetz and W. Tirion., Cambridge University Press (2012)**

This is the 3rd edition of this popular book by these authors who also wrote a similar book about visible stars in the northern hemisphere in 2004 called a Walk Through Heavens (3rd edition). Dr. Heifetz is an amateur astronomer and a neurosurgeon and the inventor of the "Precession of the Equinoxes" planisphere. Mr. Tirion is a uranographer and graphic designer and the author of the Monthly Sky Guide as well as several Sky Atlases.

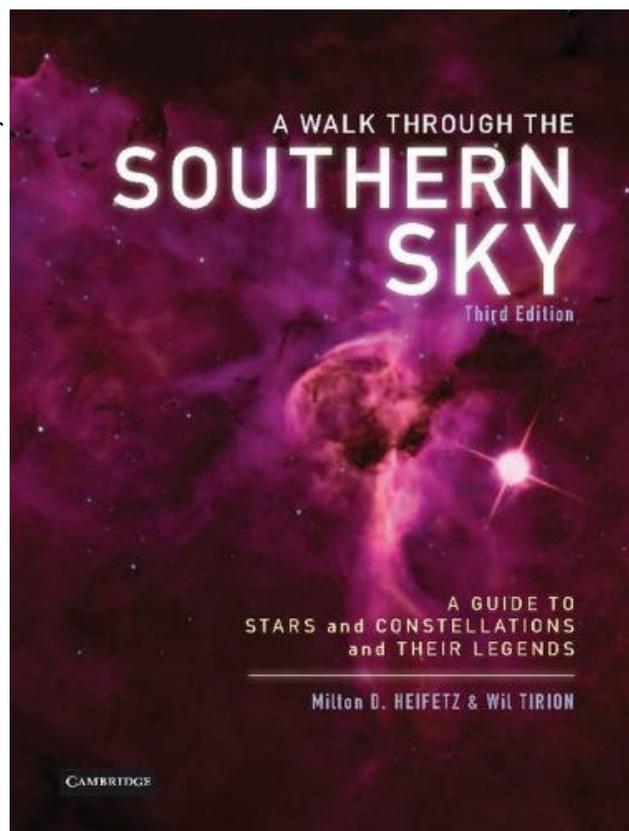
This book is meant for southern sky visual observing but also for some visible northern sky stars. The guide is intended to provide a simple and easy way to orient oneself to the night sky and the constellations. It does this by large and simple graphic images of numbered stars in a constellation and then providing a few directions leading to stars in constellations. Along with these easy to follow instructions for each area to hop to, the authors teach the familiar method of using one's hand to gauge distance by degrees. This method of orientation is also reinforced by a brief outline of the mythology of each constellation so that it becomes easier to remember what one is observing and how to put it into context to the surrounding sky.

Having recently been to the southern hemisphere I wish I had read this book before I went. It is really simple to use and does what the authors meant it to be for. The diagrams are excellent and use only what is necessary to provide a visual picture of the constellations for each of the seasons. The use of numbered stars really make the path to other constellations easy to follow. I particularly liked the mythology section as it really burned the stories in my head. I enjoyed reading a bit on how other cultures interpret the same constellations with their own unique stories. I even tried to make up my own stories of some of the constellations using pop culture and the "good fellows" ghetto talk to describe constellations. So, anyone can make up their own stories to describe a constellation in order to remember it better. Besides visual observing this book can be useful in planning astrophotography sites to shoot at night.

I recommend this book for anyone planning a trip to the southern hemisphere or for those who have the curiosity to explore a part of the sky that is not visible to us in Ontario. I would suggest that anyone interested in this part of the sky to borrow it from our library before buying it. In my opinion this book is excellent but overpriced for just over one hundred pages of information.

This book is now in our library.

List Price: **CDN\$ 35.95**  
Price: **CDN\$ 25.19** & this item ships for FREE with Super Saver Shipping from Amazon.ca



# Pocket Sky Atlas Challenges for January—John Kulczycki

## February Sky

It is the riot of stars that draws February's astronomer away from the warm hearth into bluster and cold nights. Gemini and Orion are full of pleasures and there are dogs and dog stars to look for as well. Somehow, the clear night don't seem so cold with these old friends around.

This month we start the march of the "M's". These Messier Objects creep up slowly from the eastern horizon and soon they will be calling to astronomers, night after night, with their delights. As enticing as those Messier objects may be, try to spend some time on the other weird and wonderful stars and objects that hint at warmer days of spring. Even a quick venture with binoculars can soon turn into a full viewing session with just a little more planning. Get comfortable with them now so you can get the most out of your observing sessions when the weather warms up.

Happy Hunting!

The challenge objects are indexed to the object on its star chart page.

### Naked Eye:

- Wasat and Mebsuta, Page 23.
  - RA 07h 20m, Dec +21° 59'
  - RA 06h 43m, Dec +25° 08'
- 68, 74, 81 and, 85 Geminorum, Pages 24, 25.
  - RA 07h 34m, Dec +15° 50'
- Adhara, Page 27.
  - RA 06h 59m, Dec -28° 58'

### Small Scopes and binoculars:

- M44 (Open Cluster), page 24
  - RA 08h 40m Dec +19° 41'
- M 67 (Open Cluster), page 24.
  - RA 08h 51m Dec +11° 49'
- M41 (Open Cluster), page 27.
  - RA 06h 46m, Dec -20° 46'
- 30, 31, Xi and 32 Geminorum, Page 25

### Larger Scopes:

- NGC 2149 (Nebula) page 23
  - Ra 06h 04m, Dec -09° 44'
- NGC 2266 (Nebula), Page 23
  - RA 06h 34m, Dec +05° 00'
- NGC 2359 (Nebula), page 27.
  - RA 07h 18m, Dec -13° 13'
- NGC 3640 (Galaxy), page 25.
  - Ra 11h 21m, Dec +03° 14'
- NGC 2683 (Galaxy), page 35.
  - RA 08h 52m, Dec +33° 25'

### Bonus objects:

- Cr 121 (Open cluster), Page 27
  - RA 06h:54m, Dec -24° 25'
- Cr 132(Open cluster)), Page 27
  - RA 07h 14m, Dec -31°: 10'
- CR 140 (Open cluster) Page 27
  - RA 07h 24m, Dec -32°12'
- Tau Leonis (Double Star), Page 34
  - RA 01h 27m Dec +02° 51'
- Groombridge 1830 (Halo star), Page 32
  - RA 01h 52m Dec +37° 43'

## Waiting For ISON by Stuart Atkinson

There you are - a faint, fuzzy star  
Camouflaged by the crushed diamond dust  
Sprinkled between Castor and Pollux.  
Not much to look at now, it's true,  
But before year's end, you promise us,  
You will blossom and bloom, unfurling  
Your Camelot banner tail across our frosty  
Northern skies as you whip around the Sun...

Please don't let us down.  
We've waited for you for so long;  
Dreamed so many dreams of you;  
Wished on so many shooting stars for you;  
Imagined you lighting up our sky since childhood;  
Sighed for oh so many years at the sight  
Of paintings showing those that came before you  
Burning bright on nineteenth century nights,  
Their searchlight tails sprayed across the heavens,  
Princes and peasants alike staring up at you  
With wide-with-wonder eyes,  
Unable to believe what they were seeing,  
Some no doubt screaming "Begone! Flee!  
Leave us be!"

Others like you have promised us the world,  
Reached out from across the Great Black  
To fill our hungry hearts with hope,  
Only to leave us standing in the dark alone,  
Glaring at another empty sky,  
Shaking our fists at the universe for lying  
To us again, playing us for fools again,  
Shattering our dreams and making us feel  
Stupid again...

Oh please, don't be lying to us,  
Don't leave us standing at astronomy's altar in tears.  
We want to gather on our school playing fields,  
Hilltops and harbour-sides, watching you rise  
In glory from behind bare-limbed trees.  
We want to park our cars in crowded lay-bys and stand  
With strangers, marvelling at the sight of you  
Stretched across the purple-hued twilight  
Like God's own Maglite beam.  
We want to hear people standing in line  
At bus-stops and post offices describing  
How they saw it walking home, or walking the dog,  
Or weaving their way back from the pub,  
"And it was beautiful..."  
We want to walk along the shore, hand in hand,  
To stand at the waves' foaming edge and whisper  
"Look at that...!" as your tail paints  
A mother of pearl rainbow across the sky.  
We want to walk out into our gardens at dawn,  
In our Christmas slippers and cat hair matted dressing gowns  
And see you shining above our sheds,  
Long tail stretched above our heads, feeling small,  
Banishing The Ghost of Kohoutek Past  
Once and for all...

So please, don't let us down, oh please  
Don't let us down. Not again.  
Don't make future generations snarl  
As they say your name; don't make us hate you  
When you've gone, cursing bitter memories of you.  
Put on a celestial circus show for us!  
Thrill us as you fly around our star,  
Make us want to weep at your beauty as you leap  
Over Sol's flickering flames to hang above  
Our cities and towns, briefly looking down  
On our warring, weary world like an angel  
Before flying away again, leaving us behind,  
Leaving us with a thousand Facebook photographs  
And a trillion breathless Tweets to remember you by...



# What you missed in January...!

The first Thursday in January saw the Hamilton Centre gathered in Waterdown once more. There were a few presentations that were well worth the price of admission!

Gary Bennett, subbing for the vacationing Andy Blanchard, talked about a number of developments coming up for the Hamilton Centre. Our membership continues to rise, and the centre has entered into a partnership with Henry's Camera to deliver a course on Astrophotography.

Next up was Gary Colwell, who gave his usual excellently illustrated talk on "What's Up" in the sky for the coming month.

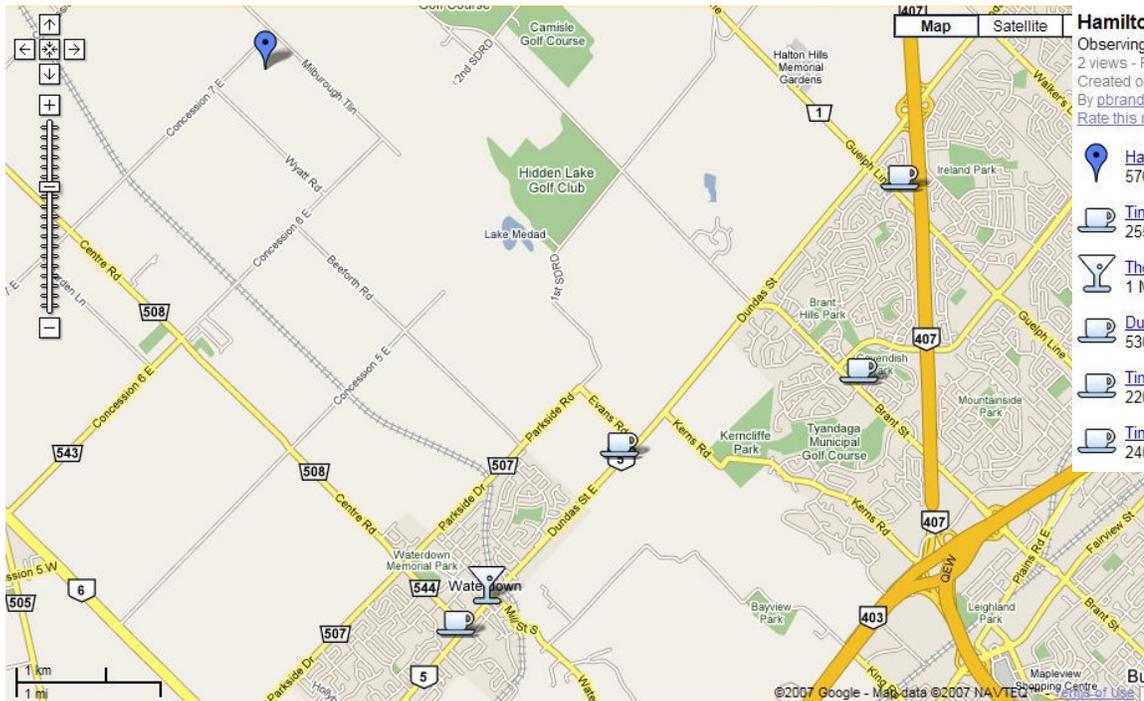
Alison Hill gave an illustrated talk about several astronomical events that she had been involved in while living in Australia from February to November, 2012. She observed a partial eclipse of the Moon, the Transit of Venus and was in the path of totality for the November total eclipse of the Sun. She had taken video using her Canon T1i as totality approached. Most astonishing was the rapid drop in the light level. Despite being clouded out, she still thought it was an incredible event.

Roger Hill talked about the upcoming NOVA course, with a number of people signing up on the spot.

Our Guest Speaker was Eric Briggs. Eric presented several topics suitable for citizen science, but as a co-discoverer of a Super Nova via the Puckett Supernova search, he focussed strongly on this. He talked about supernovae in general and about supernova searches, with the emphasis on the Puckett groups efforts.

If you weren't there, you missed a good evening...try not to do it in February, OK?





- Hamilton Observing Sites**  
 Observing site in Hamilton and area.  
 2 views - Public  
 Created on Oct 18 - Updated Oct 20  
 By pbrandon  
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- [Hamilton Centre Observatory](#)  
576 Concession 7E, Flamborough, ON
  - [Tim Hortons, Waterdown](#)  
255 Dundas St E Waterdown, ON L0R, Ca
  - [The Royal Coachman](#)  
1 Main St N Waterdown, ON L0R, Canada
  - [Dundas Street, Tim Hortons](#)  
530 Dundas St E Waterdown, ON L0R, Ca
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2201 Brant St Burlington, ON L7P, Canada
  - [Tim Hortons, Guelph Line](#)  
2400 Guelph Line Burlington, ON L7P, Car

**Website:** <http://hamiltonrasc.ca/>

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 N43° 23' 27" W79° 55' 20"

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### Calendar for February, 2013

Mon	Tue	Wed	Thu	Fri	Sat	Sun
				01	02	03 ☾
04 • 8pm» NOVA Program - Lesson 2	05	06	07 • 8pm» Public Monthly Meeting - Guest Speaker Ted Rudyk - Kuiper Belt Objects	08	09	10 ☉
11	12	13	14 • 7:30pm» RASC Board Meeting	15	16	17 ☽
18 • 8pm» NOVA Program - Lesson 3	19	20	21	22	23	24
25 ☉	26	27	28 • 7:30pm» Free Public Astrophotography Lessons			