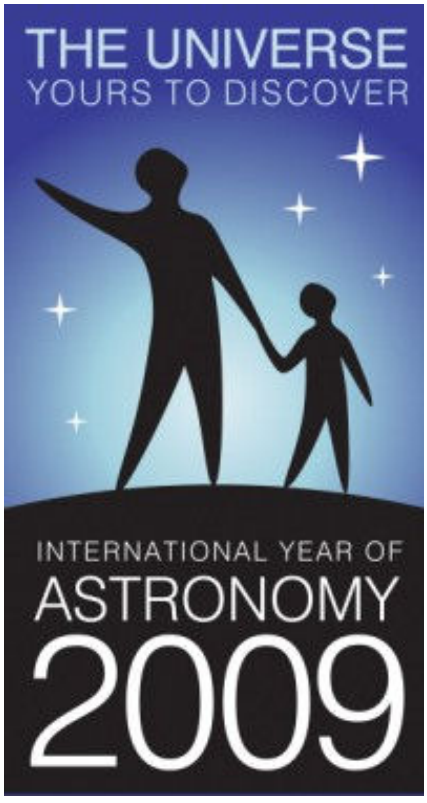

Orbit

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Welcome to February, the month that separates the dedicated observers from the merely casual, the heat from the sensor, and the skin from your nose using just an eyepiece!

The International Year of Astronomy has started off quite nicely, and the Hamilton Centre has been involved in one event at the Observatory, and another at the newly refurbished William J. McCallion Planetarium at McMaster University. We'll be helping out a number of cubs at a winter camp this coming Saturday night, and we've got lots of plans to do more public events than the Centre has done since the heyday of Grant Dixon 20 years ago. We'll be trying to keep you apprised of these events, but the best thing would be for you to come on out to one of these events and see how much fun they can be.

We held an event called a "New and View" on Friday, the 16th of August. The turnout was not what we could have hoped for, but we'll try again in March. The people who did show up had a great time, though.

We ran into difficulties right off the bat, because we couldn't get the roll-off to roll off! Actually, our troubles started earlier than that when we initially couldn't get the lock open on the "gate". Liberal dashes of lock de-icer eventually solved that problem, and we took the lock with us into the main building to put on a heater to melt any trace of ice (and hopefully evaporate any water) inside the lock. We managed to get the roof open about 8 feet or so, when the cable came loose from the hook that pulls the roof open. New member Ed Mizzi, of Waterdown, went running home, and came back with some tools, including a hammer, which we used to try to get rid of the ice on the rails while the cable was repaired. Eventually, with a lot of pushing, pulling, tugging and banging, we got the roof to open all the way barring about 3 foot...enough to see Orion from the 16". Mark Pickett was big help with this, because, being tall, he was able to get a bit more strength into pushing the roof off.

The scope was turned on, and despite the occasional bit of noise from it as metal squeaked, it performed perfectly...again!

Ed had brought his Canon XT DSLR with him, and since I had my XSi with me (along with the crucial 2" adapter), we decided that Ed should take his first astrophoto. We used Live View on my camera to focus the scope, and then removed my camera, but left the adapter in place. We then put Eds camera on to my adapter, and took a 30 second exposure. Ed was thrilled. His first astrophoto can be found elsewhere in Orbit. Also to be found is mine, and the difference between the XT and the XSi is remarkable. When processed, the difference is more marked, not all of it attributable to different processing. The extra 2 bits (14 bit colour, vs. 12 bit for the XT) accounts for some of it, but I think that the biggest factor was that I used automatic dark frame subtraction, whereas Ed did not. Fortunately, this feature is available on the XT, and he'll be using it from here on it.

While I took some images of M45 with a new (well, new to me, anyway) 300mm Pentax thread SMC Takumar lens, that aren't worth including here, Gary gave Ed a good tour of the wonders of Images Plus (which he turned into the Astrophotography 101 article further in). Mark Pickett and Ev Rilett were busy, too, and the 16" was in use most of the night. However, it was COLD, and after almost four hours, we'd had enough, closed up shop, turned off the heaters and headed for Tims in Waterdown.

Anyway, in this issue you'll find the usual humour, images from members, and other things, besides.

Oh, and this months front cover image comes from Gary Colwell.

I hope you enjoy it.

Roger Hill
Editor

From the Keyboard of the President

Well, I didn't get a mass rebellion, but the date of the Board meeting was changed from Tuesday the 20th to Monday the 19th, due to some scheduling conflicts. We had the entire Board out, plus our National Rep, Steve Barnes.

What was discussed? Actually, quite a lot. We're looking at a number of options to make the Observatory more useful to the membership. Needless to say, we don't like working in the dark (well, maybe we do!), and we'd like your input on one possibility in particular. You see, there is a possibility of putting something like a school portable at the site to use as a meeting room. It'll take a year, or more, to do this, but is it worth while doing? The consensus on the Board is that this is something that needs to be seriously looked at.

We're looking at a couple of other things, too. One is in the area of fundraising, and the other is a change to the roof of the Powis building. All these and others too, will be discussed at the next Board meeting , currently scheduled for February 12th at Andy Blanchard's office in Bronte (it's nice, and warm, there!). If you want to attend, and if you're interested in the future of the Centre, then I'd urge you to, then let me know. Actually, if you're really interested, we could still use some help on the Board...particularly for all the public nights and sidewalk astronomy we want to do!

Last month, I mentioned that there was a call for participation in the IYA Sky Quality Meter Program by Dan Taylor. He wants as many Centres as possible to measure the skies and help understand how light pollution is affecting areas across Canada. Is anyone interested in taking this on? It seems very worthwhile to me, but I've got my hands full doing other things. Enrolled Centres across the RASC can borrow an SQM unit for a period of time, and will be asked to do public outreach and take a multitude of measurements throughout their region. Please come and see me and we'll do what we can to get you set up.

There was a major event in Hamilton on March 15th, when the refurbished William J. McCallion Planetarium was shown off. It took two shows to get everyone in, there was that much interest. The press was there, the public was there, various dignitaries from McMaster, and a number of people from the Department of Physics and Astronomy. There were a number of old friends there too, Doug Welch, for instance, and our speaker for February, Mike Reid. The Hamilton Centre was well represented by me, Steve Barnes, Les Nagy, Colin Haig and Ev Rilett.

So what is the new planetarium like? Well, they've done a marvelous job of making it more comfortable. It use to hold 50 people, but that was with everyone packed in like sardines. It now holds 2/3rds that, about 34 people, and very comfortably, too. The projector is digital, and is basically a fast Linux machine running Stellarium (freeware, you can get it for Windows, too). It's hooked up to a 1024x768 pixel DLP (Digital Light Processing) chip, using only a circle measuring 768 pixels to cover a hemisphere, a bright light source, and a fish eye lens to project it. This means that each pixel is just under 1/2 degree, or about the size of the full moon. So, it's not the sharpest possible view of the sky, but it is enormously capable, putting, as it does, the entire dome at your disposal to display what you want.

Mike Reid put the new projector to good use, showing off the sorts of images and events that would have been impossible with the old system.

All in all, it was a marvelous evening, and I think we'll have to look in to what it would cost to have a meeting in there, it could be really cool!

One last item before I let you go to explore what else is between these pages…we're looking at disposing of some old equipment, including the 14" Schmidt camera that used to belong to Hans Vehrenberg. It was acquired for a project that will now never see fruition, and so is surplus. Let me know if you have any strong feelings about keeping this instrument, otherwise, we'll sell it for as much as we can!

That's all for now. Roger Hill

DSLR Deep Sky Astrophotography
For the Novice (or Novice at Heart!)
By Gary Colwell

Ok, you want to get started in the wonderful world of astrophotography, but you have more questions than answers…What do I need?, what do I do?...how do I do it?....
These are all questions I have asked myself…there are soooo many ways you can attack this hobby….and you can literally spend thousands…or a few hundred bucks…depending on what you want out of it…
I have been at this hobby for nearly 45 years now (ok…I am an old geek!)…and have just taken up astrophotography seriously for just over a year now….and I am amazed at just how daunting I thought it was at the beginning…only to find out that once you have a "plan of attack"…it is really quite simple and a whole lot of fun….nothing feels better (ok… maybe a week in the tropics might...lol.) than to gaze on your very first picture of some object in the heavens! It may not be of the Steve Barnes or Jack Newton type quality….but it is YOURS!

Alright…where do we start?…I will try to simplify things as much as I can without blasting you away with "Astro-jargon"….sometimes just some of the words are enough to scare anybody off!

<u>Need #1 – DSLR Camera</u>

You can have one of the fanciest telescope setups on earth, but if you don't have a camera…well, astrophotography is not an option. Like the sands of the sea there are sooo many options here, but since we are getting started, lets talk basics.
There are two types that work great for the beginner…the Digital camera and the small astrophotography cameras you can buy like the Meade DSI, the Orion Starshoot etc.
If you have a digital SLR camera or DSLR as it is also known, this is the one we are going to use for the purposes of this exercise. You will need what is called a "T-ring" that allows you to further attach either a 1 ¼" or 2" photographic adapter sleeve that fits into the eyepiece holder of your telescope. Your telescope now becomes a super telephoto lens!

+


+


= go!

Make sure that the camera you are using has the ability to take time exposures (of at least 1 minute) or a bulb setting (the best option) which allows you to take longer exposures.

NOTE:
You can also use dedicated astrocameras, which involve more work (and a computer to run) but the results are pretty good too. They either come in B&W (the cheapest price) and colour (considerably more.) You can pick up used cameras on sites like Canada Wide Astronomy Buy and Sell for between $150.00 and $250.00.

Need #2 – Telescope

Wow…here is the toughie!...what to use….but strangely enough almost any scope will do…
I have taken pics with Schmidt Cassegrains, Newtonians and refractors.... but the ones I like the most are refractors… the choice is up to you….but let me first dispel a common misconception…for the beginner…..Size DOESN'T Matter!....
What I mean by this is you can get just as good a picture with an 80mm aperture scope as you can with a behemoth 150mm. (albeit the 80mm image will be smaller in comparison). As a newcomer to astrophotography , use what you have.
Here are pics I have taken with an 80mm Skywatcher vs. my 110mm William Optics FLT Apo chromatic (a difference of about $2500.00 in price)

M81&82 80mm.

M81&82 110mm.

So you see, you can get good results no matter what you use.

Need # 3 - Equatorial Mount

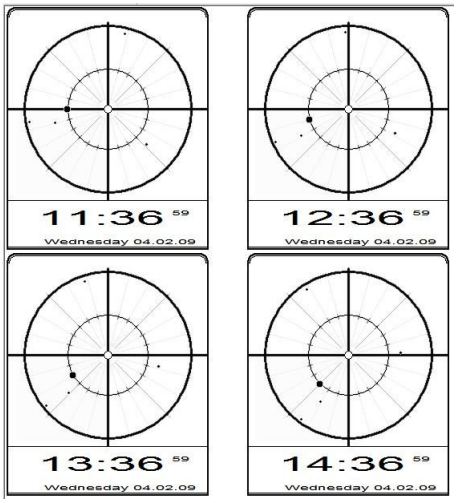
Another essential for deep sky astrophotography is that you have a mount that can guide the stars, otherwise you are severally limited in the exposure time you can achieve.
If you want to take respectable deep sky astrophotos, you will need a mount that can track equatorially, either using motors or hand controls. (Note: some scopes that come with motorized alt-azimuth mounts can be used for astrophotography but are limited to 1-2 minutes of tracking before the field begins to "rotate"….but more of that in a later article).

If you have an equatorial mount that is not motor driven, you can hand guide the mount, but your exposure time will be limited to the time you can accurately guide your mount before the lactic acid kicks in, and your hands and arms all cramp up!...lol.. Usually you can guide up to a 3 minute exposure once you get good at it…but not much more….

The three "P"'s with these hand guided methods and astrophotography .

1. **polar alignment. – good polar alignment is particularly important if you do not have an "auto guider" guiding the scope (more about these later).**
2. **patience – be patient, it takes time to learn how to use this method…many a jiggled image will be before you learn how to smoothly track…**
3. **perseverance – keep trying it!...**

For those who have equatorial mounts, the key is polar alignment. A very useful and FREE tool is a computer program called Polar finder. It can be found at: http://www.onealwebsite.com/AstroPage/software.htm



This program gives you a simple way to align your mount that is surprisingly accurate and easy! Just line up Polaris in your finder as pictured above for your time and latitude…and that's it!
If you polar align your scope well, you can get up to 2-4 minutes tracking with good results. It ALSO depends on the "magnification" you are getting with your scope…by that I mean the resulting image size. Without getting into the math of it all, generally as a rule..

1. **The greater the focal length, the greater the magnification. i.e. A 500mm focal length scope will yield a smaller image than a 700mm focal length scope. This is also dependant on the size of the objective, but suffice it to say that the lower the focal length, the smaller the relative image will be.**

As you can see from my pictures of M81 &82, the 110mm (770mm focal length) image yields a greater

"magnification" than did the 80mm…(495mm focal length). This means that any tracking errors will be magnified greater in the larger focal length scope than the smaller. This will mean less exposure time for the larger focal length than the smaller. This will have to be done by trial and error.
Other things that will affect the time you expose the image will be sky conditions….generally the darker the sky, the longer the exposure you can take. In Hamilton, anything longer than a few minutes will be washed out by background sky conditions…whereas, in Algonquin Park….well…the sky is the limit usually allowing 10 minute exposures or more….

Need#4 Processing Software?

Depending on how sophisticated you want to get with your processing (but as a beginner we will keep it simple ….KISS..) there are a number of freeware and commercial products available.
Since we are new to this type of astronomy, I am going to leave this to the end and discuss a few of the basics of taking a picture first.

In the digital age, unlike in the past when using film….exposure time is NOT as critical…i.e. longer isn't necessarily better. With a free program like REGISTAX, you can take a series of short exposure frames and "Stack" them on top of each other to create a more detailed image. More on this later…
Generally your exposure time will be dependant on the accuracy of your mounts tracking ability and sky conditions. For the purposes of a newcomer to astrophotography, I suggest you start with taking images of no longer than 2 to 3 minutes duration. This will allow you to get a decent picture that you will be happy with. Nothing is more frustrating than taking a bunch of 5 minute exposures only to have blurred results.

Ok, lets get into the nitty gritty and get taking some pictures!!!!! At this point I am assuming you have your scope and mount all polar aligned and ready to go!

Step 1. Set up your camera

a. **Set your ASA to the fastest available (this will be adjusted later)**
b. **Set your picture quality to its best setting (large/fine NOT RAW at this stage 1728 x 1150 is a good size. Also a good size for stacking in REGISTAX)**
c. **Turn on 'noise suppression' if you have it. (more about that later)**
d. **Set to "Bulb" or the longest exposure setting you have.**
e. **Clamp camera into the telescope.**
f. **Turn it on…! (most frustration comes from a camera that is not turned on…lol..)**

Step 2. Select a good imaging target!!

As a beginner, don't be trying to take pictures of some distant far away galaxy….start with something big and bright! This time of year, a few good objects are M42 the Great Nebula in Orion, M31 the Andromeda Galaxy, M44 the Beehive and the like…
For our purposes I would like to use M42…it always yields a 'gasp' the first time a new astrophotographer takes its picture!

Step 3 – Focus, Focus, FOCUS!
Assuming you have already set up your mount accurately and all is ready…it is time to focus…but NOT on M42….!! Focus your camera using a bright star or a few bright stars. This is going to be trial and error at first…but it is critical in obtaining a picture you are going to be happy with. The beauty of digital cameras is that you can take a whole bunch of pictures without wasting film…and that is what we are going to do…

a. **align a bright star in the camera….you may not be able to see it very well but if you have your finder scope and telescope aligned together, the star will be in your camera. Rough focus it as best you can in the camera.**
b. **since your exposure time is set to 'bulb' count off 5 seconds (this is so that you can get a picture to check on**

the focus)

c. **take the exposure and see what the image looks like. (Note: if you have a zoom feature for image viewing on your camera, use it to zoom in on the image to fine focus even further.**
d. **adjust the focus IN ONE DIRECTION and take another 5 second exposure to see if it improves**
e. **if it improves, focus it in the same direction a little bit more until best focus is achieved. If it does not improve, focus in the OPPOSITE direction**
f. **continue this process until the image is focused as best as possible.**
g. **Once focused, LEAVE ALONE! You shouldn't need to adjust again**

Step 4 – Move scope to align your target

Move the scope so that the object you want to take is centered (using the guide scope as it is easy to pick out M42 with a guide scope. Once this is done you are ready to start taking pictures. At this stage we are only going to take jpeg images so that you can get used to the process. Once you get this stage down, we can discuss other methods in a later article.

Step 5- Take sample images to determine best exposure time!

a. **Re-set your ASA. A good ASA for astrophotography is 800. This gives you a good speed without all the graininess you get at higher ASA settings. 1600 ASA yields a good but often grainy image.**
b. **Start by taking a 30 second, 60 second, 90second, 120 second and 180 second images, or longer depending on sky conditions and mount accuracy. This will give you a good idea of the maximum exposure time you will get for your configuration. (also, if you have the noise reduction activated on your camera, it will take exactly the exposure time you have taken to process the image I n addition, so be aware of this too.) Compare images to see when or if trailing occurs. Once this is determined, use the previous exposure length where no trailing occurs. See below for examples. Notice that the detail increases as the exposure increases.**


30 sec


60 sec


90 sec


120 sec.

c. **Once you take your first good picture you will be SOOOO excited!.... I remember my first good shot….there were a whole bunch of people around and I shouted out my glee…and gave 3 of those people near heart attacks!**
d. **Once your max exposure time is determined, take 5-10 more pics and save them in a folder for later use.**

Step 5 - Save or Process the images

If you are like me, your first clear jpeg image of the heavens will thrill you to no end…sometimes all you want to do is keep the picture and be proud of your accomplishment…here is my vey first image of M42! It was a one minute

exposure using a 300mm telephoto lens strapped to the back of my scope…..Not too shabby for a beginner!...

But if you are <u>really</u> like me you will want to push, process, highlight, stretch, adjust the death out of your picture….but remember the KISS process (Keep It Simple Silly)…. The first thing is to get to the point where you get comfortable with the procedure. Once this is accomplished you can get a bit more fancy.

If you are adventurous and want to "push the envelope" you can try stacking multiple images. Like previously mentioned REGISTAX is a good program. (this is why you have taken multiple pictures in step 4.) You can download this program at: http://www.astronomie.be/registax/ (But a bit of caution, take it slowly at the beginning…or else you run the risk of becoming frustrated. Try some other heavenly objects and get yourself accustomed to taking pictures first…)
Once you learn the basics of the program, you can stack your images to make them even more beautiful.

Well, that is about it for the "rudimentary" stuff….next month we will learn a bit more about how to take better and more detailed pictures….but in the meantime, practice these ideas and get familiar with the process…it is a huge learning curve as we go along, but like all things, get good at the basics and the rest will take care of itself!

Have fun with it…and DON'T EXPECT HUBBLE QUALITY IMAGES right away…that day will come. I am no expert in the field, just another fellow astronomer excited about the prospect of being able to enjoy pictures of the heavens that I took…and you will find out for yourself the same.
In less than a year…. I went from this….

To this

And finally, to this!

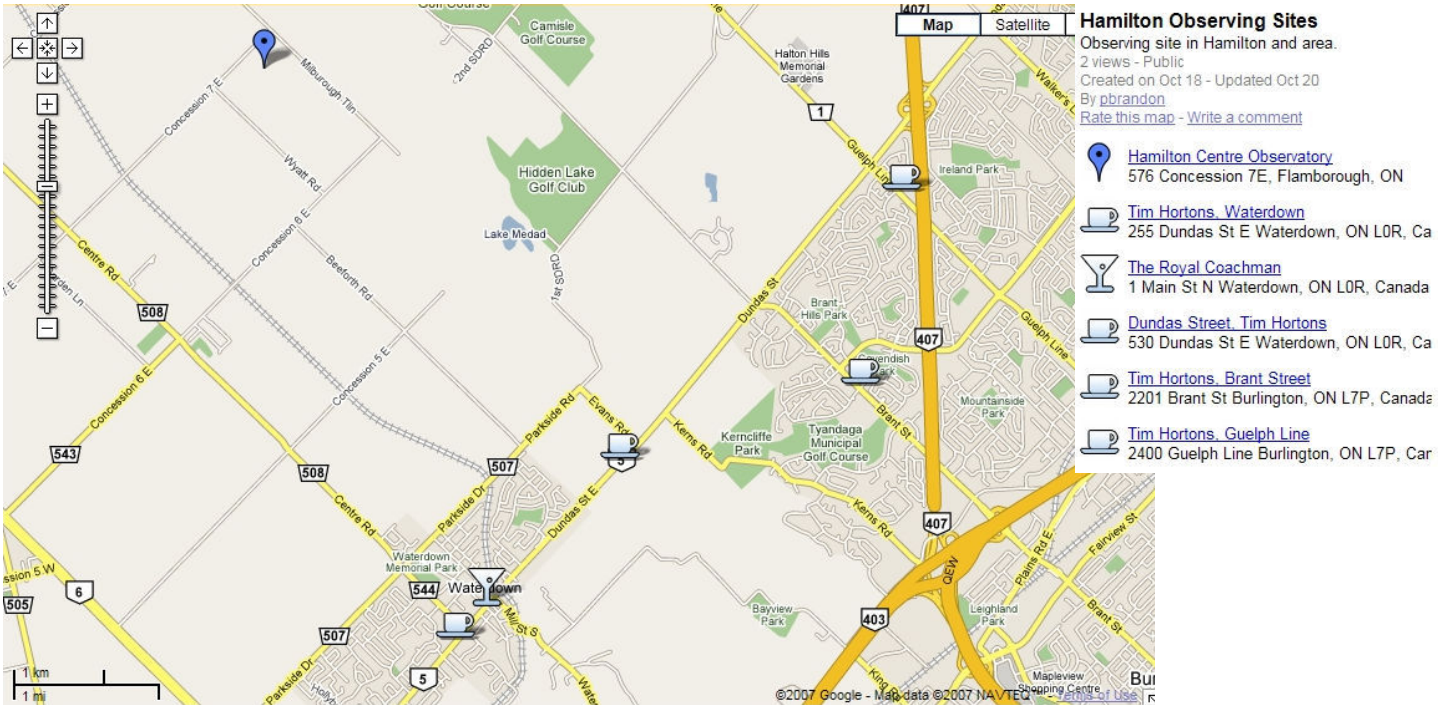
<u>Good Luck!</u>

What you missed last Month

Brady Johnson of KW Telescopes was our featured speaker in January. He showed us why his telescope store is a bit different that the other vendors in southern Ontario. One of the biggest was that Brady helps develop new products. There have been a couple of new items that have helped establish his store as one of the best places to go. One of the most popular now is the KWIQ Guider. The KWIQ Guider offers a 2 degree field of view. It's excellent sensitivity virtually ensures you will always find a guide star. It resolves centroid positions by means of software to approximately 0.06 arc seconds so you can guide virtually any imaging focal length with high precision. Capable of reaching 9th magnitude with a 1 second exposure, there are very few areas of the sky where there isn't at least one star that bright visible to this autoguider.

Gary Colwell also showed a number of pictures that he's taken over the last little while.

What are you going to miss in the coming months? Nothing, I hope. If everything works out, we've got some great speakers coming, and a diverse range of topics, too! The International Year of Astronomy is looking really good to be part of the Hamilton Centre.



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Normally, this is Steve Barnes spot, but he’s been really busy lately, and didn’t have any truly superb new images. Instead, here is Ed Mizzis first astrophoto, along one of mine. They are both 30 second exposures, single frames (no stacking), and are taken through the Centres 16” at prime focus. Ed’s is processed using a piece of Apple software called Aperture, and mine was done in Photoshop V6. The main difference is the two cameras. Ed has a Canon XT, 10 megapixels, 12 bit colour, no long exposure noise reduction, and no High ISO Noise reduction. Mine is a Canon XSi, 12 megapixels, 14 bit colour, and does have both noise reduction systems turned on.

What should also be noted is that Eds first effort is FAR superior to my first attempt at M42, with a poorly polar aligned C8, on a shaky tripod, badly focused, on slide film. It was two weeks before I realized how bad it was, because I had to finish off the roll of film and send it to Benjamin's in Toronto for processing.