Volume 15, Issue 5

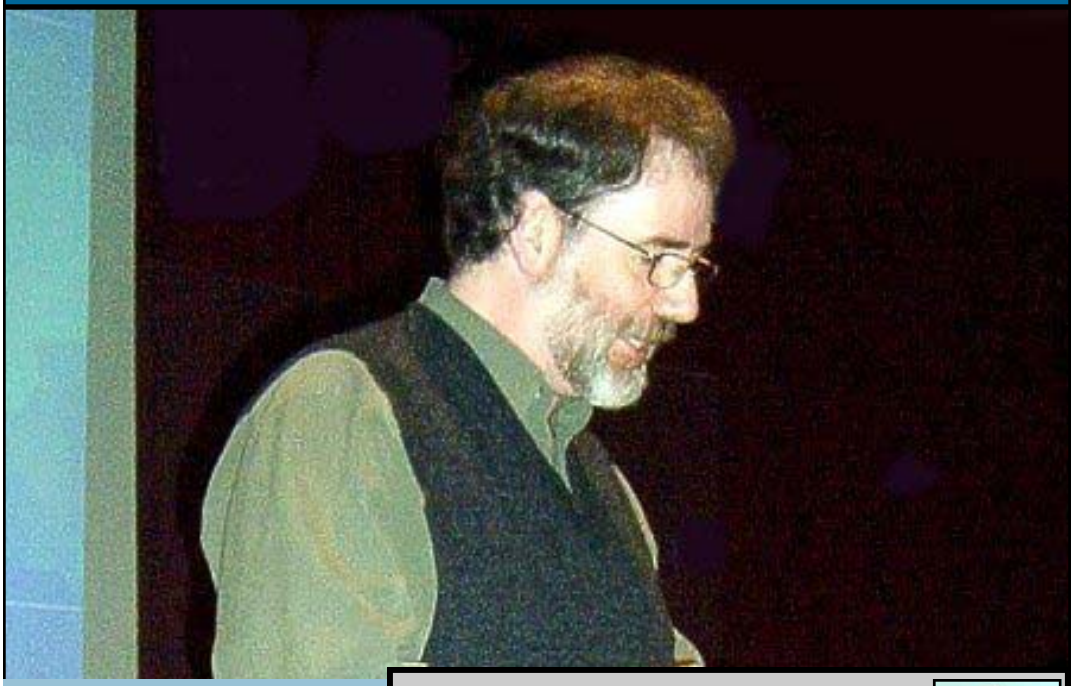
May 2008

HAMILTON AMATEUR ASTRONOMERS

Event Horizon

John Gauvreau on Things We Never Think About

Photo and Story by Mike Spicer



There were very few seats empty for the Hamilton Amateur Astronomers' April meeting at the Spectator Auditorium Friday evening, 11 April 2008. Fifty members and almost a dozen guests were in attendance for our line-up of excellent speakers!

Club Observing Director Prof. Greg Emery gave a very detailed run-down of the Sky for April to aug-

(Continued on page 2)

From The Editor's Desk

Every year in the spring we celebrate Astronomy Day as an opportunity to do outreach to the community. All we need do is look around the club and see all of the grey hairs to realize that we need to do a better job of getting young people interested in astronomy. Photographs of HAA meetings from many years ago show a lot of young people. How do we get them interested in our hobby? One thing is certain, if we don't get new people interested, there are going to be a lot of telescopes sitting idle when we are all too old to lift them anymore.

Tim Philp, Editor

Inside this issue:

NOTICE

Astronomy Day at Bayfront Park in Hamiltion. Saturday May 10th @ 20:00 hrs.

WEATHER AND CLOUDS PERMITTING!

Check the web site for directions.

April Meeting Roundup

By Mike Spicer **(Continued from Front Page)**

ment his very informative article in last month's newsletter, the Event Horizon.

Glenn Muller announced an HAA "road trip" to the Cherry Springs Star Party in Pennsylvania at the end of May, giving some impressive "dark sky site" information. Mike Jefferson presented on recent observations of our LOFAR radio telescope and answered some interesting questions, thanks guys.

Members and guests used the break to drink coffee (thanks, Jim), eat Timbits (thanks, Steve), watch AV presentations, pick up free magazines and copies of our club newsletter Event Horizon (thanks, Tim and Don), buy memberships or check out the new HAA caps and jackets (more on that from Jim at May's meeting).

After the break, Jacob drew the door prize winners and Gail Muller and Gary Krevenky were presented with their Sky & Telescope Aurora posters. Our 50/50 draw netted $43 for a grateful visitor - Dave ("and a membership is only $25"). Club members voted overwhelmingly for a buffet-style for about $25 at our 15th anniversary dinner venue this fall.

John Gauvreau was the night's main speaker, entertaining the whole group until 10 pm with his enthusiastic presentation on ten astronomical items we seldom think about, from Greek geometric calculation of the distance of the Sun, to the minimal separation of neighbour galaxies.

After the meeting, about two dozen members retired to Kelsey's on Main Street for dinner, discussion and to wish Ed a happy birthday.

Treasurer's Report— By Don Pullen

(Unaudited)

Cash opening Balance (1 Apr 2008)		**$ 3,026.26**
Expenses		**$ 88.23**
Revenue		**$ 160.00**
Closing Balance	**(30 Apr 2008)**	**$ 3098.03**

Notes:

Major expenses included: Newsletter printing (Apr) ($70.63), Speaker's Meal (Feb $17.60).

Major revenue sources included: Memberships ($55.00), 50/50 Draw (Apr $42.00), Donation ($43.00), Messier Marathon ($20.00).

From the Chair

by Mike Spicer

May brings warmer weather, boosting Hamilton Amateur Astronomer observing and public demonstration efforts. Posting of observing reports on the HAA blog is up and the number of people attending our sessions is increasing, too. Why wait for July to start observing?

Spring has some clear skies of wonderful transparency... use them because the heat of summer can bring smoggy evenings and night skies grey with light pollution.

Speaking of transparency, I have always felt that members of the club should know what their Council is doing. Members are of course welcome to attend Council meetings but most cannot attend for one reason or another. Would it be helpful if there was an article about Council's activities, available in the Event Horizon or on the web site? The official Minutes can't be published until approved at the subsequent Council meeting and that means a month's delay or more. But an unofficial report on Council meetings might keep everyone better informed as to what is being decided, and who on Council is doing what.

So here is what I recall of our last Council meeting:

Council met at Jim Wamsley's in Dundas on 16 April starting at 7:30 pm. There were 12 items on the agenda:

1. Council decided that Astronomy Day Saturday May 10th will feature a public viewing night from 8 to 11 pm in the parking lot of the Bayfront Park, as the Discovery Centre grounds are no longer available without paying a fee.

2. Tim Philp reported that the "Movie about HAA" he undertook to make will not be ready for Astronomy Day but he will bring a rough draft of it to view at our next Council meeting, May 14th.

3. Council set the dates and times for summertime public observing sessions and Steve Germann volunteered to drum up publicity for: May 24th at Murray Street Park in Grimsby from 8-11 pm; July 12th from 8-11 pm at a Burlington location Steve Germann will select; August 12th from 8 pm at Binbrook Conservation Area for Perseid meteors; September 6th from 7 pm at the Brantford Tourism Centre, Tim Philp to book the site. No public observing in July (too bright). An HAA excursion to Onondaga Farm Observatory was suggested; Tim Philp is meeting with the Program Director and will report at next Council meeting; Don Pullen is checking into the Saltfleet High School Observatory. Members voted overwhelmingly at the April meeting to hold our Club's 15th anniversary dinner at the Mandarin or a similar buffet-style restaurant. Council appointed Don Pullen and John Gauvreau to look for a speaker for the dinner.

4. Treasurer Don Pullen delivered a detailed report on our healthy financial situation which I suggested should be published in the Event Horizon as a mid-term report card;

5. Secretary Darrell Maude, busy recording the Minutes, advised there had been no club correspondence received in the past month save for new membership applications; Jim had mailed out Event Horizons to 6 non-computerized members;

6. Membership Director Jim Wamsley reported 2 new memberships in the previous month, plus the winner of the April 50/50 draw generously had returned his winnings and Council decided to give him a membership once we have his membership info; Jim demonstrated the proposed HAA jackets and baseball caps; Council voted to order 25 caps for sale at the May meeting @ $15 each.

7. The bylaw review committee hopes to meet in the next month;

8. Council heard that this year's BASEF judges, Don and Jim, had so much fun that they volunteered to serve next year; Jim presented the Winger Prize, an autographed copy of "Nightwatch" and a cheque for $50 to Stephen Hogg, our 2008 science fair winner;

9. Chairman Mike advised that the May meeting will feature a donated telescope as the door prize. Glenn Muller will talk in May on "Forces of Nature" and Mike Spicer has "the Sky this Month"; the June meeting will bring Eric Briggs and a talk on "Telescope Secrets" by Ray Khan from Toronto;

10. Tim Philp advised that a winner has been chosen for the 2007 Telescope Contest, more information to follow, leaving the way open for Don to approach local papers concerning the HAA 2008 Telescope Contest (the Chairman has donated telescopes for this cause);

11. All members of Council have received the HAA brochure in printable format and Don has begun updating the information; Mike Spicer has donated 500 sheets of thick paper and Council budgeted $25 to Steve Germann to print 500 copies of the brochure for use at public events;

12. Council voted to raise the Event Horizon budget by $75 to increase newsletter copies from 50 to 70 in each of May and June, plus to make 50 copies of a summer issue. Steve Germann is looking into lower pricing to copy the Event Horizon on 11 x 17" paper.

Hamilton Amateur Astronomers is not a club of armchair observers. It's active observers attending our meetings in great numbers. My thanks to those members who volunteer to help plan, organize and carry out its many wonderful activities.

Image Stacking One of the Keys to Success in Digital Astrophotography

By Kerry-Ann Lecky Hepburn

When I first started to take pictures of deep sky targets with my digital SLR and telescope I was thrilled to just see a hint of the object on the back of the camera LCD. There were often times when I would think the image looked great and that all it needed was just a little tweaking to be ready to show. Much to my surprise, once it was loaded and enlarged on the computer screen it was rather disappointing. When I tried to process it, there was not much detail nor colour and it was filled with lots of noise.

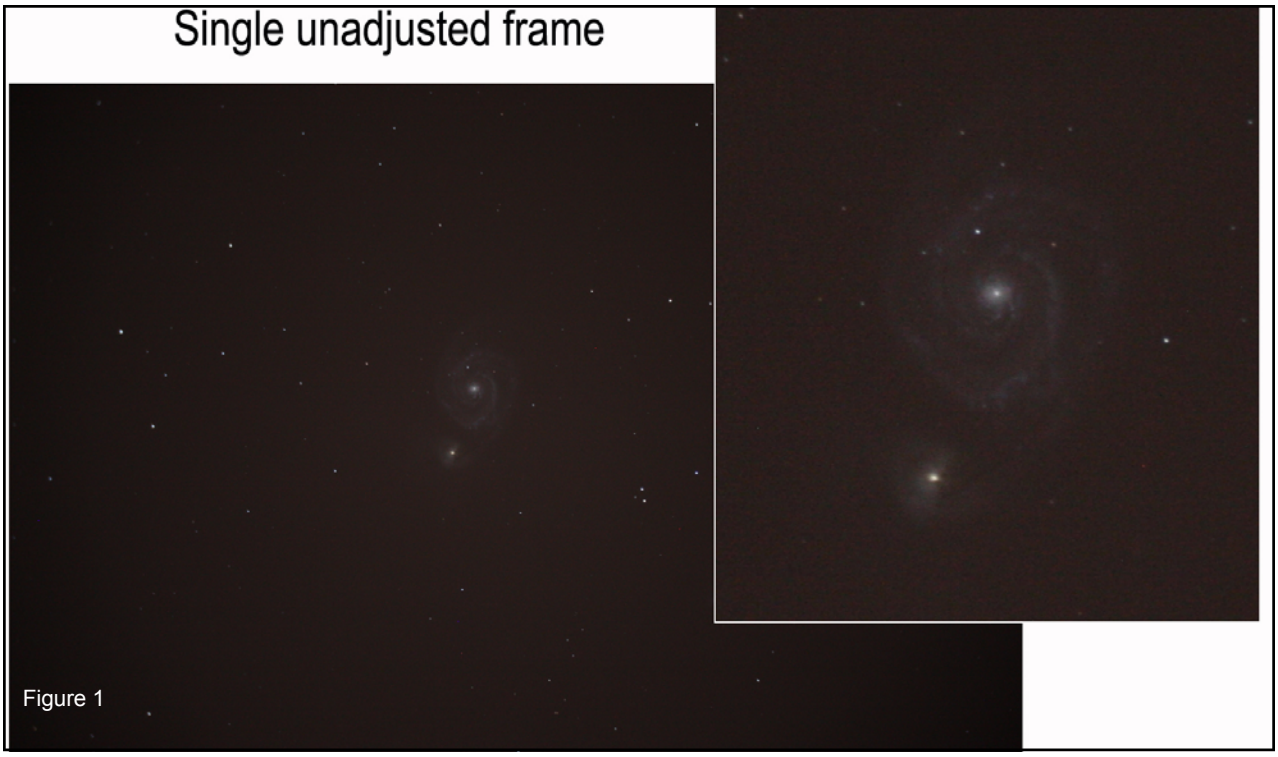


Figure 1

After showing my results to veterans in astrophotography, they would often tell me that I needed to take more frames and stack them together. It took me a long time to really understand the benefits. I started by stacking 2 or 3 frames of the target, then months later aimed for 10 to 15 and now 30 or more. It's hard to really understand the impact of stacking until you actually test it out and see it for yourself.

For example, **Figure 1** is a 3 minute exposure of M51 at ISO800 straight out of the camera with no adjustments other than converting to jpeg. It looks dim but has a smooth background with some colour noticeable in the galaxy. It is usually just after this point, when you decide to brighten it up with processing, and this is where you begin to realize the problem with noise.

Figure 2 is an example of M51 after basic processing with a various number of stacked 3 minute exposures at ISO800. The basic processing or stretching is needed just to bring it up to a reasonable brightness and contrast so that you can see the galaxy and its details. In these examples I stretched with the curves tool instead of levels so that I could have more control in preserving the dynamic range of the galaxy's bright cores and outer faint bands.

Number of Stacked Images	Amount of Noise Compared to the original
4	1/2
9	1/3
16	1/4
25	1/5
100	1/10

Figure 3 is a final stack of 38 frames with even further processing to bring out detail and colour..

As you can see the more images that are stacked the more you can increase the signal to noise ratio. This will allow you to stretch and process the target to bring out even fainter details. The relationship for reducing noise boils down to the inverse square law.

Free and simple to use software like 'Deep Sky Stacker' (DSS) makes this process

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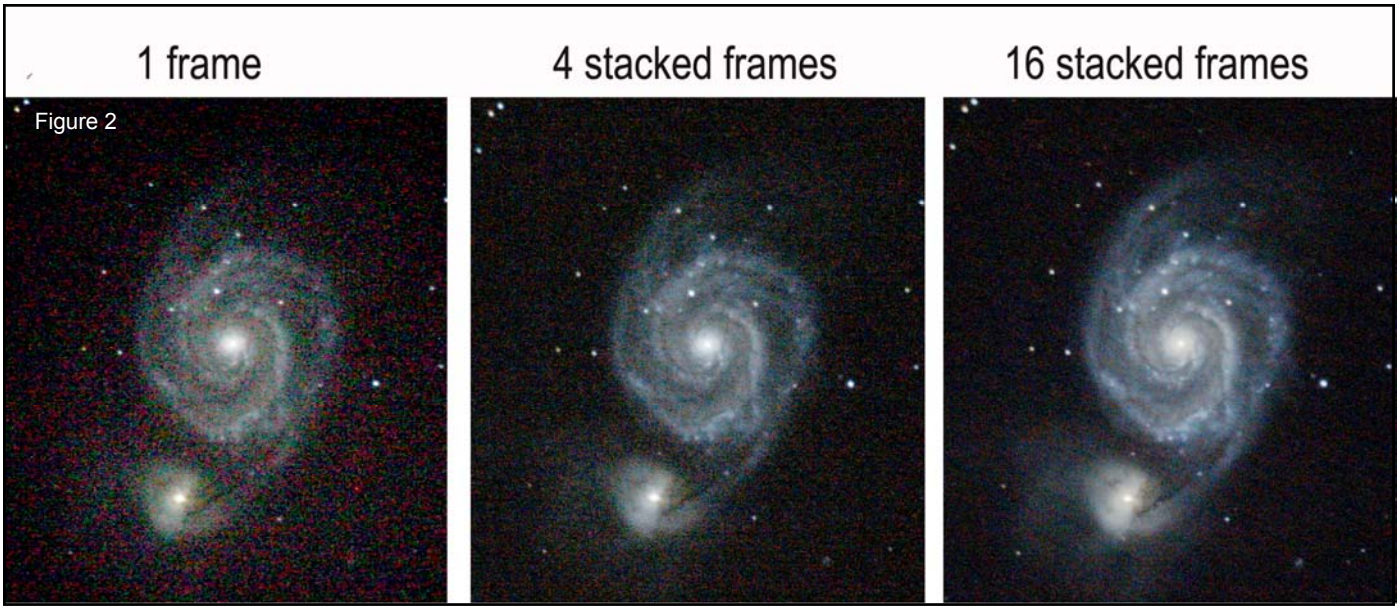


Figure 2

Figure 3

very doable and should be included as part of your basic pre-processing routine. With DSS, all you have to do is load your image frames (called 'lights'), check off the appropriate settings and away it goes. After the stacking is complete, save it as a 16-bit tif file and then open it up in a program for image processing. Of course for even more benefits from these kinds of programs, you should also stack your images with several dark frames to smooth out the background noise and get rid of those pesky dead pixels. Plus, take a series of flat frames to reduce the appearance of dust motes/dirt on your camera sensor and eliminate vignetting from your lens or telescope. As always don't forget to switch your camera into RAW mode before you shoot.

Stacking is a very easy process and the benefits can be seen above. Your final image will look cleaner and is much easier to process for colour and fine detail. So next time you are out taking astro-photos, snap as many frames as possible and start stacking!

Get Ready to (Star)Party!

By Steve Germann

Mark your calendar as this year promises to be the most active one yet for summer star parties and HAA involvement.
In Late may, there's the Cherry Springs Star Party, in northern Pennsylvania, to take place at the darkest sky site in temperate eastern North America. There, when a cloud wafts by at night, it's black.

About 10 members of our club will be heading out on Wednesday or Thursday, and will set up a small piece of HAA territory on the otherwise open field, which accomodates up to 500 astronomers, and also features a Saturday evening public viewing event. Electronic registration is still open until May 10, so you have to act quickly if you are still on the fence. Just $37.

It's a team effort this year, with various people taking on different tasks related to food and shelter, and it should be a great star party.

In early July, there's a chance for a camping trip organized by the HAA. We will set up in a provincial park either on Manitoulin, Tobermory, or near Huntsville, for 4 days of darks skies, and magnificent views of the summer milky way.

At the end of July, Stellafane is the gathering place for amateur astronomers, with particular honour given to those who built their own telescopes. It's held at Breezy Hill in Springfield, Vermont on a moonless weekend in July or August. This year it is from July 31 to August 3. Cost is about $50.

The next weekend, there's Starfest, near Mount Forest, Ontario. It's got daily events August 7-10, and HAA is always well represented.
Advance arrivals as early as Tuesday evening can be rewarded with dark skies. Cost estimate is about $100.

In September, the traditional season-ending camp-out at an Ontario park, will finish the camping for the season. Last year's event was at Silent Lake Provincial Park, which has very dark skies, if not a 360 degree view of the horizon. Last year at Silent Lake, we had 3 good nights of observing, using the day-use parking lot as our setup area. The disadvantage of this park is that we had to set up and tear down each day. That's not a problem with the other parks on the list.

Skies were very dark, although clouds also made an appearance later in the nights. This year the moonless weekend is proceeding up to the Labour Day Weekend, which means we need to plan early to get space in whichever park is chosen, although the best nights will be weekdays before that.

Anytime from August 26 to Labour day will be dark. For those who may not want 3 camping trips in the month of August, there's the possibility of an event from September 25-28 instead. Cost estimate is about $80 for the reservations.

All together, the GWS might funnel the light from 15 dark sky nights. It's practically gleaming with anticipation.

Taking Care of Your Telescope Equipment

by Ray Khan

In the course of doing telescope repairs and maintenance we do see a lot of instances where some preventative measures might have saved a trip to the shop.

Over the years, we have seen some interesting things: A Hornet's nest in the base of a customers Schmidt-Cassegrain telescope drive base. Grasshoppers crawling inside a SCT corrector plate leaving a "wonderful" residue. Dog and Cat hair inside a Dobsonian telescope. Cobwebs in telescope tubes (complete with dead spider!).

So, Here are a few tips on taking care of your Telescope and other Optical Equipment:

1. **Store your equipment in a dry area.** Try to avoid any musty or damp areas as it is possible for fungus to damage your optics over a period of time. Cover your equipment with a breathable cloth material if possible, or at the very least a tarp, or even garbage bag is better than nothing.

2. **Keep dust out of your optical system:** Put a plastic plug in any focuser, or Star diagonal. Also cover the front of your instrument. Most telescopes today come with some sort of dust cover for the Front Objective. For Dobsonians and Newtonians, you may be able to find some Inexpensive plastic covers in the plumbing section (used to cap the ends of pipes).

3. **Store your eyepieces and accessories in Cases.** Avoid putting them in coat pockets, as they will often pick up small pieces of lint, which are difficult to re-

Continued on page 8

Taking Care of Your Telescope Equipment Continued

by Ray Khan

move. That extra Jovian satellite you see, may be as such. The other benefit is that when you are finished observing, you know everything is accounted for and where it should be.

4. **Before storing your equipment after use: Ensure that all surfaces are dry.** If necessary, let the equipment air dry completely, before storing it away. Just use a dry soft cloth on the tube (but be careful not touch the Optics as tempting as it may be) same goes for your eyepieces and other telescope accessories.

5. **Carry a product called a "Lenspen",** available at Telescope and Photo stores, which allows you to remove fingerprints from Eyepieces and Maksutov and Schmidt Cassegrain corrector plates. If fingerprints are left on for a period of time, they will etch into the Coatings. (Great way of identifying a telescope if it is stolen, but not much else!).

6. **Binoculars: Do store them in the case they came in.** Do not leave in your car as changes in temperature can do damage to the cement in the objectives over time. If you want to keep a pair for handy use, better to buy an inexpensive "back up" pair. Also: The knocking around in a car trunk can affect the collimation (causing a double image) of your optics.

So, protect your optical investments and they will reward you with years of observing pleasure!

The Sky this Month—by Greg Emory

The **Messier** List, in current times, consists of 110 items. There are roughly 40 of these visible on the centerfold this month. The chart is for May 15 at 10:00 pm (Local Time).

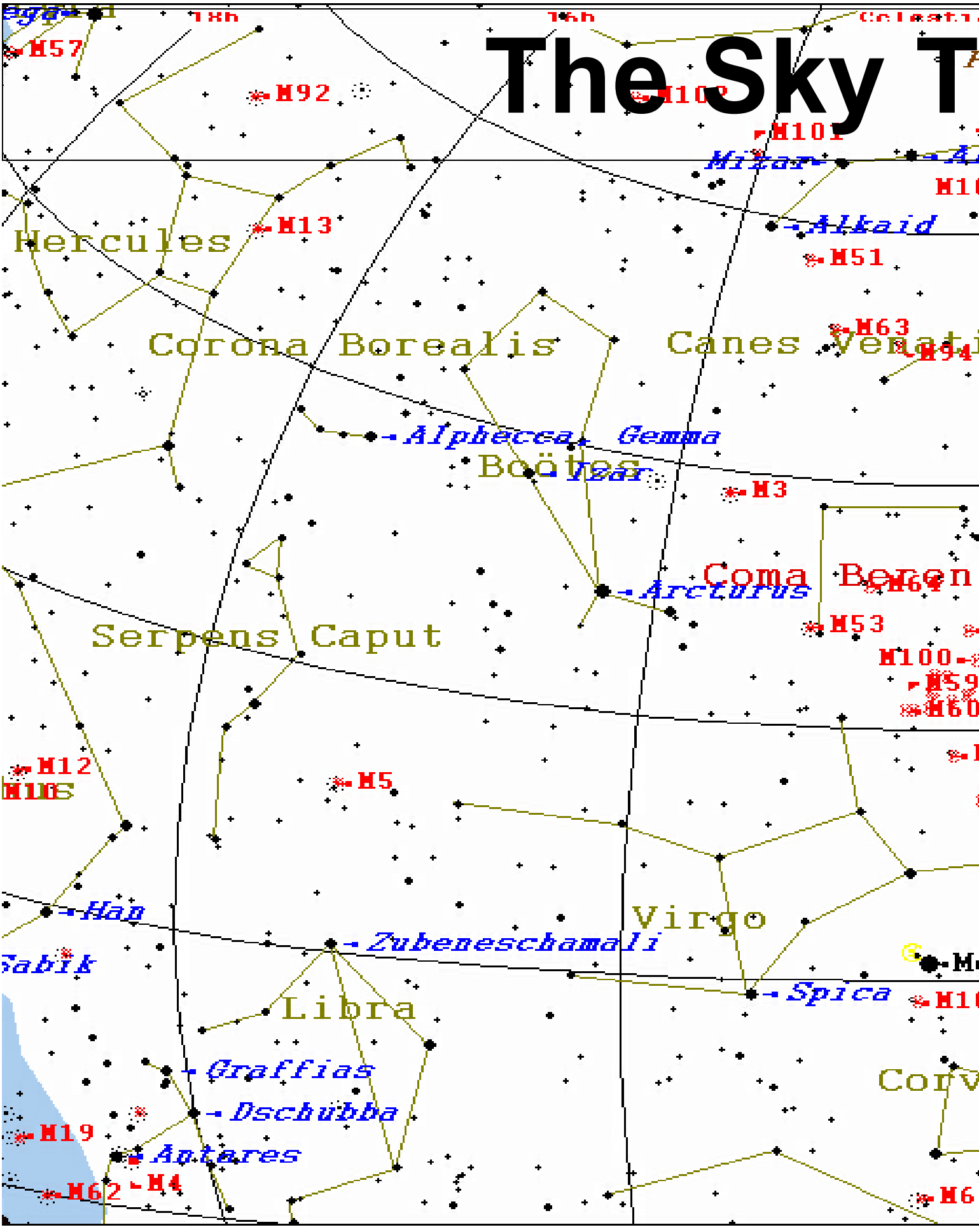
Once again we can see a wide variety of objects this month. Setting in the west we have **Gemini**. **Mars** has traveled eastward over the last month or so. The red planet is still located in the Western skies. It is now in the constellation **Cancer**, a few degrees away from **M44**, the **Beehive** or **Praesepe**, which is a stunning open cluster located in the heart of the crab.

Saturn remains anchored in the forequarters of **Leo**. A short distance from **Regulus** (**α-Leonis**) it is quite easy to find, it is the eastern partner of the bright pair of "stars" more or less straight overhead. Time for viewing **Saturn** is running out, by mid July, **Saturn** will be setting with the **Sun**. As we loose **Saturn**, we gain **Jupiter**. Set in **Sagittarius**, **Jupiter** will be a presence in the Summer **Milky Way**. The 4four larger moons of **Jupiter** are easily seen with binoculars. Their relative positions change noticeably during long observing sessions. **Sagittarius** rises in the east just before 1:00 am in early May. The planet should be in good viewing position by 3:00 am.

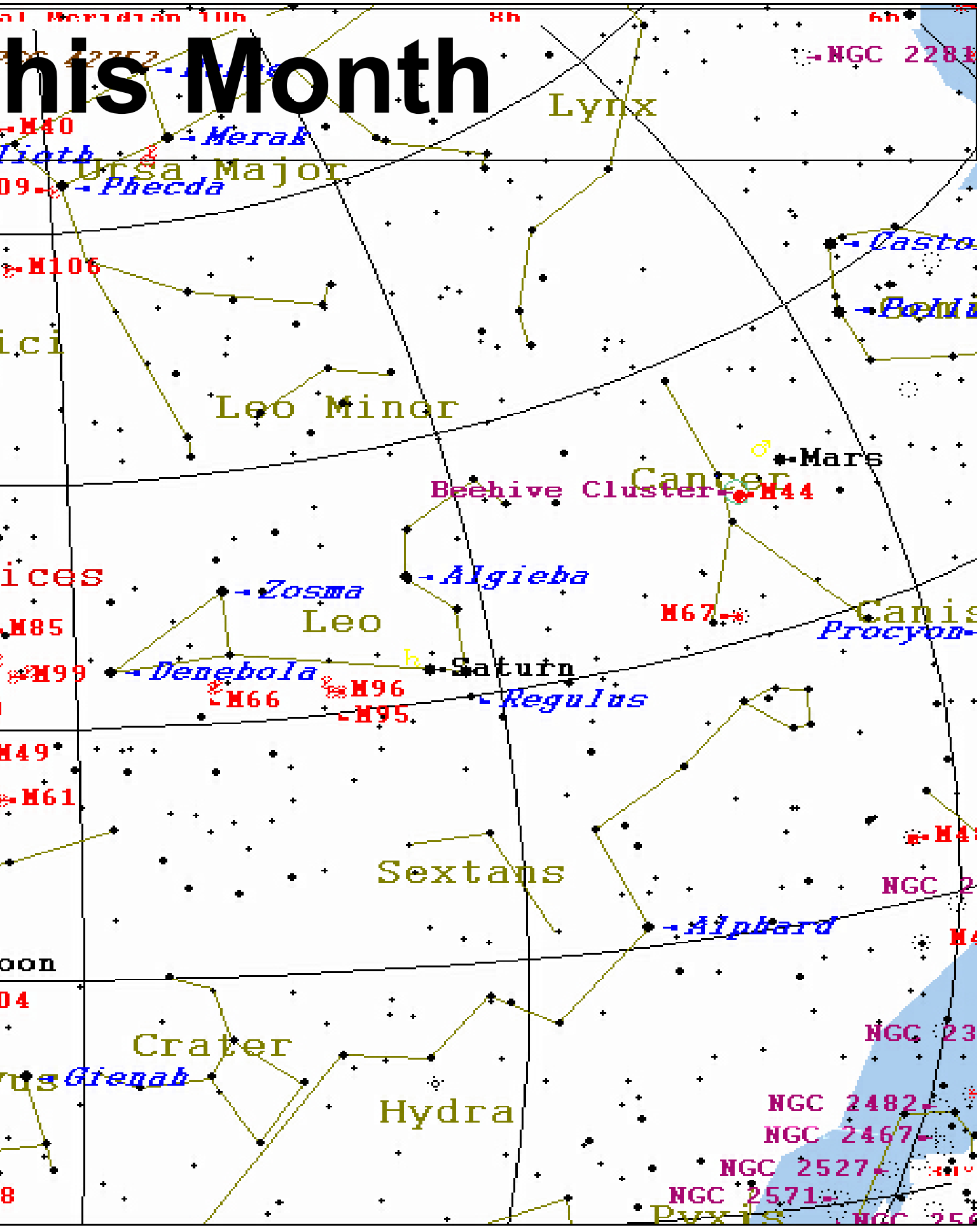
The late night will reward all planet observers. A relatively close grouping (OK 100 degrees may not be close) of planets extends across the sky from **Jupiter** to **Venus**, which is with 10 degrees of the **Sun** in Early May. In the constellations **Capricornus** the planet **Neptune** is hiding, whereas **Uranus** can be found in **Aquarius**. **Venus** is in **Pisces** with the rising **Sun**.

The centerfold of this months EH shows **Coma Berenices** directly overhead. The constellation appears more impressive in the centerfold than in the sky. Under typical skies in the suburban environment, the three brightest stars be hard to see. From a dark site, the three stars mark the location of scores of galaxies and other faint, fuzzy stuff. Although technically the bulk of galaxies beneath **Coma Berenices** are actually in **Leo** or **Virgo**, they are just as easily found coming down from **Coma Berenices**. Moving eastward from **Coma** we find **M3**, a bright **globular cluster**. The cluster **M3** is nice, but I always seem marginally unimpressed. Perhaps it is because I know what is coming, or I am being too picky. The cluster is a nice one to look at and well worth the time or effort. Some other **globular clusters** are coming up as well. The clusters **M5**, in **Serpens**, and **M12** and **M14** in **Ophiucus** are readily seen in small scopes. A very nice **globular** is found in the constellation **Hercules**. Between his arm and shoulder is **M92**. This cluster is bright and resolvable. I have repeatedly in the past spoken or written about **M13**. Forget about **M13**, look at **M92**.

Regardless of which **globular** you are viewing take a few minutes to allow your brain to process what you are seeing. **Globulars** are classified by brightness, how tightly the stars are grouped together and how many of the stars are resolvable as individual stars. Some **globulars** are faint cotton balls with few if any stars resolvable. Others are bright objects which can be resolved to the innermost regions in moderate to large scopes. Take your time when viewing them, you may be surprised at what you can see.


The Sky T
M57
M92
M13
Hercules
Corona Borealis
Canes Venati
Alphecca
Gemma
Bootes
Izar
M3
Arcturus
Coma Berenices
M64
M53
Serpens Caput
M100
M59
M60
M12
M10
M5
Virgo
Zubeneschamali
Spica
Libra
Graffias
Dschubba
Antares
M19
M62
M4
Corv
M6

his Month


Lynx
NGC 2281
M40
Merak
Ursa Major
Phecda
M106
Leo Minor
Mars
Cancer
Beehive Cluster
M44
Algieba
Zosma
Leo
M67
Procyon
M85
M99
Denebola
Saturn
M66
M96
M95
Regulus
M49
M61
Sextans
Alphard
Crater
Hydra
Kraz
NGC 2482
NGC 2467
NGC 2527
NGC 2571
Pyxis

Through the Looking Glass—by Greg Emory

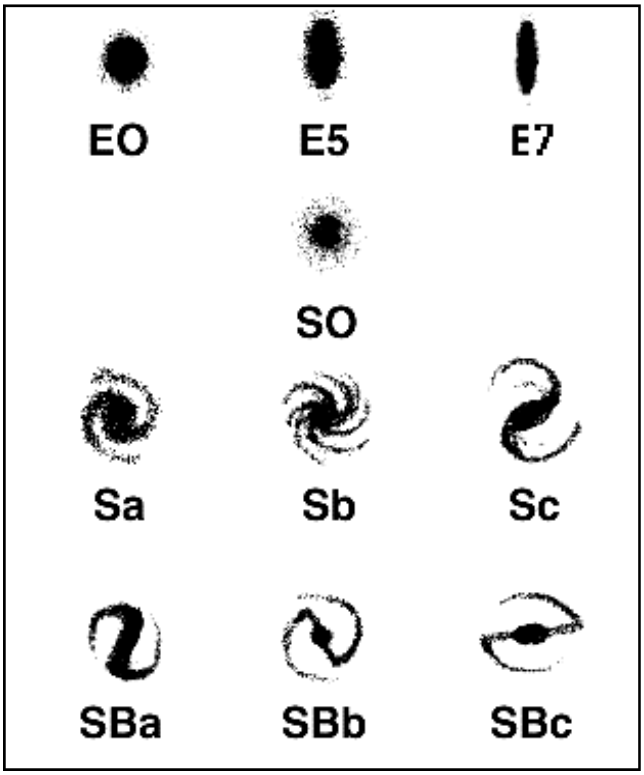
The early spring offers no better time to talk about galaxies. Galaxies in general are one of four classes of a group of objects Astronomers call Deep Sky Objects (DSO). Deep sky objects refer to things which are beyond our solar system. The four members of the group are galaxies, globular clusters, open clusters and nebulae.

When we view any object in astronomy we are in essence, looking back in time. Stepping outside and allowing the warm Spring sunlight to fall upon your face is an act of experiencing history. The warmth of the sunlight left the Sun roughly seven minutes before, while you were still inside looking for your sweater! This may not seem historical to you, however consider this: when we see the Sombrero Galaxy (M104 in Virgo), the light packets (photons) that are striking our retinas to produce the image left the galaxy 50 Million years ago. We see the image of the galaxy as it was 50 Million years ago, we are seeing the past. It is possible to look upon a galaxy and see that galaxy as it was when Dinosaurs roamed the earth.

Galaxies come in five main types or classes. These classifications are elliptical; lenticular; spiral; barred spiral and irregular. Elliptical galaxies are given the class letter E followed by a number. An E0 is essentially a round galaxy. As the number in the designation increases in value, so does the elliptical nature of the galaxy. The galaxy will have a definite oval shape.

A lenticular galaxy is basically a round ball. A spiral type galaxy looks like an octopus with the tentacles wrapping around the body. The Spiral classification is denoted by an S. The number after the S will refer to how tightly the arms are wrapped around the central core. The S0 galaxies will have tightly wound arms, where as an S3 has much looser winding.

The barred spiral galaxies (SB) are very similar to spiral galaxies except that the central core (or body of the octopus) is distorted and is not round. The core tends to be more oblong or cylindrical with the arms emanating from the ends of the distorted core. Again the numerical designation after the SB indicates the way the arms are wrapped around the core.



If any galaxy doesn't fit the above classifications, you have one of two options. The first is it can be classified as irregular (Irr). The other option, if you happen to be a professional Astronomer, is to create a new classification type, usually based on your last name.

If the story and classification issues ended there, then this article would be 250 words or so shorter. All galaxies move through space. As they are moving they also rotate about some axis. For an elliptical or lenticular galaxy, this really doesn't matter to us, a tennis ball or an egg look pretty much the same regardless of which way you look at it. Spiral and Barred Spiral Galaxies don't have this symmetry. Looking down onto the face of a clock we see the hands moving in one direction. If we could view the clock from underneath the hands would appear to move in the opposite direction. This same phenomenon is at play when we view the spiral classes. When viewing galaxies we can see them from the top (North Pole or 0 Degrees presentation) or from the bottom (South Pole or 180 Degrees presentation).

The final complication or consideration when looking at the spiral galaxies has to also do with the angle of presentation. A spiral galaxy is typically shaped like two dinner plates placed on top of one another in opposite directions. Place a dinner plate on the table in the normal manner. Place a second plate, upside down, on top of the first. This is what a spiral galaxy typically looks like in three dimensions. From above or below the plates look round, this is viewing from the North or South poles. The plates look much different if you lower your eye to the level of the table top, however. The edge on view changes the circular profile of the galaxies or dinner plates to a cylindrical or almost linear profile. These views are referred to as 90 degrees presentation or 270 degrees presentation.

Knowns and Unknowns

by Steve Germann

There are known unknowns, and unknown unknowns....

To me, the clouds at night were in the former category. I never knew in advance which night would be clear, but I had a pretty good idea how long it would last if it happened to be clear, thanks to excellent short term weather prediction technology.

However, once I had the scope setup and the sky was clear, I thought it would be clear sailing.

Little did I know about the latter category.

I remember the first time I took the GWS to Binbrook. All the MAK's were dewing over, but the GWS, with its noble white shroud, stood firm and was only taken down when it's owner considered the prospect of being locked in the park overnight.

(I must remember to buy a combination lock). Well, that lasted a good week or two.

The mighty dew-proof GWS served me well after 4 AM on the first clear night of Starfest 2007.

However, the GWS has a 3.5 inch secondary mirror too, and I was dismayed to see it fog up that night at Starfest.

The shroud and built in fan protected the primary mirror pretty well; I never suspected the secondary, facing into the scope, could dew over.

Score one for the unknown unknowns... which then moved over into the first category.

I set about attempting to make sure the secondary never dewed up again.

One of the advantages of attending a star party such as Starfest is the great supply of people who have done recent shopping for astronomy equipment, and are able to share their experiences.

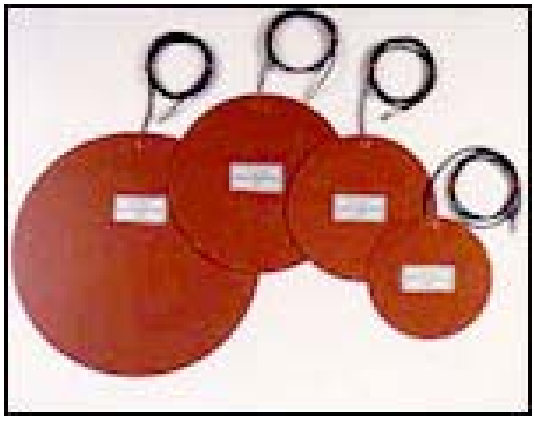
An additional plus is that people tend to visit others with the same kind of scopes, and the scopes are there for all to see, from a hundred yards away (especially the GWS, which was set up on the hill).

I had the pleasure to consult with several large Dob owners who were able to give me advice about accessories for the (at the time, less than one month old) GWS.

The problem of a secondary mirror dewing up was completely unanticipated by me, but fortunately not by the Kendrick Astro Instruments company.

They designed a clever gadget which attaches to the back of the secondary mirror and applies just enough heat to keep it a few degrees above ambient temperature.

This results in almost no air currents, since several small heaters are in direct contact with the back of the mirror. And since the temperature gradient is so small, there's no distortion of the mirror either.



Another plus is that the DG-3 runs on any voltage from 5V up to about 24V, and that includes the 7.2V that comes from a Ni-MH '9V' battery. It runs all night off a tiny 9v battery, which until recently, I have hidden just behind the secondary mirror, out of the light path.

I have 5 such batteries (rechargeable), at the ready for my camping trips. Recharge time is about 14 hours, but not having to run wires to the secondary is a plus.

The next big trip of 2007 was planned for early September, to Silent Lake Provincial Park, and there promised to be more complete-night dark skies to catch, so there was no time to lose.

It turned out that still more unknown unknowns came into play; the GWS secondary mirror is arranged on its support in such a way that the DG-3 did not fit cleanly, and was not only blocking the light path, but was also impossible to secure in place against the secondary mirror, due to the difference in diameter of the support pillar for the mirror and the oval hole in the PC board of the dew guard. There was no time to send it back and wait for a redesign.

Luckily, I have a machinist friend, and a soldering iron. After a few judicious markings with a black marker, and some assistance from him, (who to my horror, just picked up a hand file instead of firing up some fancy electric cutter), the board was appropriately shrunk, and the oval hole enlarged. A few soldered patch wires later and the thing was as functional as on the day I bought it, but it also fit the GWS.

There's a little temperature sensor for detecting the air temperature, and there's a little red LED which lights when there's heat being applied.

To test it, I just touch the temperature sensor for a moment, and the light comes on reassuring me that the battery is still good and that the temperatures are right.

As long as temperatures are falling, the DG-35 has an easy time. It's when the temperature is rising that things can get difficult for it.

Fortunately, a 9v Ni-MH battery has a pretty hefty current available.

Increasing the wattage would require increasing the applied voltage (or making circuit modifications).

If the light comes on and stays on for more than a few minutes, it's time to reach for a hair dryer and give the mirrors a boost of heat.

A dew shield is a common requirement for a SCT or MAK scope, but in the case of a Newtonian, something often overlooked. If your secondary has never dewed up yet, it's even more useful to get a dew guard, because dew, once dried, helps any dust on the mirror stick and not be easily blown away.

Rearranging a store-bought circuit is not for the faint of heart. At the time the LB-16 was a new scope model.

I think by now Kendrick will know which of their devices will fit your scope, and you won't have to encounter any of the now-known unknowns that I came across.

A Thank You Note

By Stephen Hogg

36 Gilbert Avenue
Ancaster, Ontario
April 7, 2008

Mr. Stewart Attlesey,
Hamilton Amateur Astronomers
PO Box 65578
Dundas, Ontario, L9H 6Y6

Dear Mr. Attlesey,

My name is Stephen Hogg and I am in grade seven at Ancaster Senior Public in Ancaster. I participated in the 2008 Bay Area Science and Engineering Fair (BASEF) held at Sheridan College.

I was the recipient of the James A. Winger award sponsored by Hamilton Amateur Astronomers. I would like to thank you for your support at this year's Fair.

My project, Rocket Science: What a Drag, was supposed to discover how the body length of a rocket affected the drag and in turn, the maximum altitude. I found that a longer rocket appeared to go higher than a shorter rocket. However, further experimentation is needed because the shortest rocket went the highest. I think this was due to the day warming up, causing the air to become less dense. What your judge liked in my project was the physics behind the drag concept.

I would like to mention how this project inspired me on further work. I am definitely going to enter next year's Fair, and if I cannot become a veterinarian, I will become an engineer of one kind or another. I think my project's topic was very interesting and I saw through my research just how exciting an engineer's work could be.

Again I'd like to thank you for giving this award and I hope you continue funding BASEF.

Sincerely,

Stephen Hogg

Newly Refurbished Planetarium Opening!

Toronto, May 1, 2008~–~Marc Garneau, Canada's first astronaut in space, unveiled today the newly refurbished CA Planetarium at the Ontario Science Centre. Toronto's only public planetarium now has state-of-the art multimedia technology thanks in part to a five-year contribution from enterprise software company CA Canada.

The new CA Planetarium has a cutting-edge combination of projector technologies, state-of-the-art 3D digital software and imagery based on real-time data that will allow audiences to feel as though they are flying through the universe. The planetarium show provides visitors of all ages with a spectacular view of thousands of objects in space, such as stars and galaxies beyond the Milky Way.

"We are grateful for CA Canada's generous donation to help re-open Toronto's only public planetarium," said Lesley Lewis, CEO, Ontario Science Centre. "Prior to this restoration, our planetarium relied on aged technology that presented constrained views of space. Now, we can offer Canadians an impressive view of our solar system and inspire visitors to see, understand and think about the world in a new way."

National survey: hands-on experiences prompt student interest in science and technology

A survey conducted for CA Canada by The Strategic Counsel released today indicates that nine in 10 Canadian university students say that trips to science centres and museums increased their interest in science and technology.

At a time when many Canadian educators are concerned about students' declining interest in science and technology, the survey reveals that students' interest in these subjects increases with hands-on, interactive experiences.

Among the findings:

- 94 per cent of those surveyed said that trips to science centres and museums increase their interest in science and technology.

- 90 per cent said high school math, science and technology should include more hands-on learning.

More than half (53 per cent) of students who are not studying science or technology said they would be more likely to pursue university studies in these fields if they had been able to do better in math, science or technology in high school.

The survey of 482 Canadian university students also revealed that the top three reasons for not pursuing science or technology as a career choice in post-secondary education are that these fields of study are seen as "too complex," "too boring" and provide "uninteresting" work.

"Students are clearly saying that high school science and technology classes should have more hands-on learning to increase their interest in these subjects, making it more important than ever to bring children on school visits to science centres, planetariums and museums so they can see the excitement of science and technology in action," said Garneau. "The CA Planetarium will allow kids to learn about astronomy and space in a practical, fun and engaging way and help foster interest in learning more about science and technology at a young age."

The refurbishment of the Ontario Science Centre's Planetarium was supported through CA's Together Community Grants, a program that supports organizations that focus on promoting education and technology.

"Over the past three decades, CA has supported many organizations that focus on education and technology, and has helped these organizations promote learning and make science interesting," said Jimmy Fulton, vice-president and country manager for CA Canada. "Our commitment will allow the Ontario Science Centre to continue to pursue its goal of making science accessible and engaging to visitors of all ages, and increase the likelihood that young Canadians will choose a career in science and technology."

The CA Planetarium is part of the Ontario Science Centre's newly renovated Space Hall. Regular daily shows will be available to the public beginning at the end of May.

4-D Ionosphere

by Dr. Tony Phillips

NASA-funded researchers released to the general public a new "4D" live model of Earth's ionosphere. Without leaving home, anyone can fly through the layer of ionized gas that encircles Earth at the edge of space itself. All that's required is a connection to the Internet.

"This is an exciting development," says solar physicist Lika Guhathakurta of NASA headquarters in Washington, DC. "The ionosphere is important to pilots, ham radio operators, earth scientists and even soldiers. Using this new 4D tool, they can monitor and study the ionosphere as if they're actually inside it."

The ionosphere is, in a sense, our planet's final frontier. It is the last wisp of Earth's atmosphere that astronauts leave behind when they enter space. The realm of the ionosphere stretches from 50 to 500 miles above Earth's surface where the atmosphere thins to near-vacuum and exposes itself to the fury of the sun. Solar ultraviolet radiation breaks apart molecules and atoms creating a globe-straddling haze of electrons and ions.

Ham radio operators know the ionosphere well. They can communicate over the horizon by bouncing their signals off of the ionosphere—or communicate not at all when a solar flare blasts the ionosphere with X-rays and triggers a radio blackout. The ionosphere also has a big impact on GPS reception. Before a GPS satellite signal reaches the ground, it must first pass through ionospheric gases that bend, reflect and attenuate radio waves. Solar and geomagnetic storms that unsettle the ionosphere can cause GPS position errors as large as 100 meters. Imagine a pilot flying on instruments descending toward a landing strip only to discover it is a football field to the right.

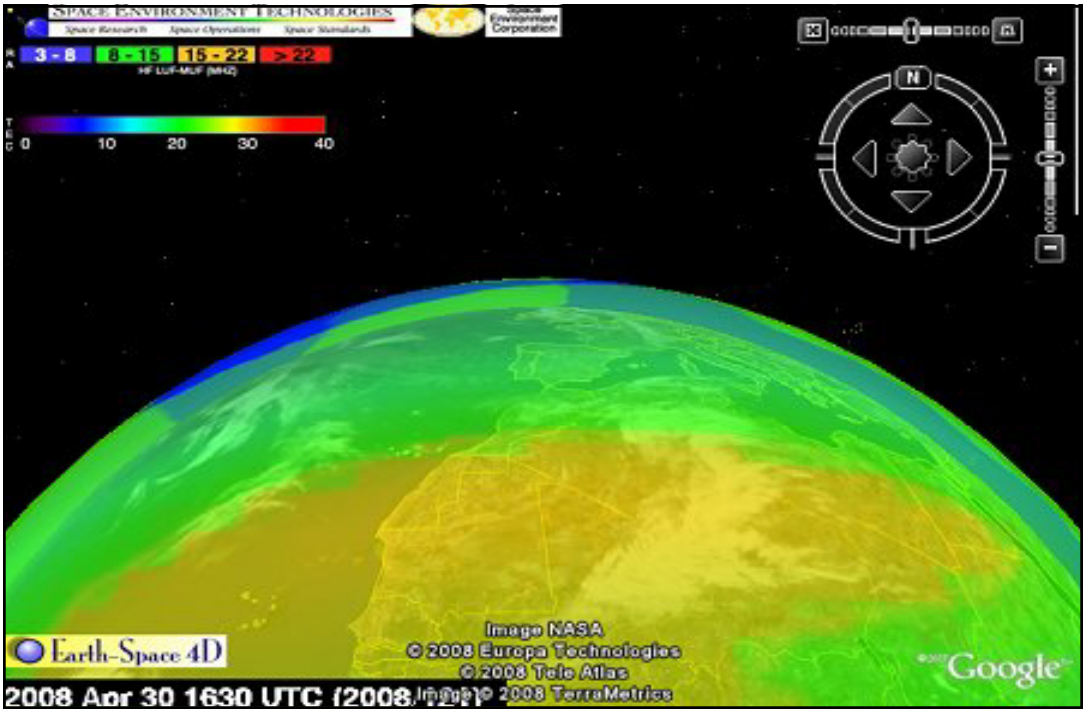
"Understanding the ionosphere is clearly important. That's why NASA's Living with a Star (LWS) program funded this work," says Guhathakurta, LWS program scientist. Space Environment Technologies, Inc. of California received the LWS grant and they partnered with Space Environment Corp. of Utah and the US Air Force to develop the 4D ionosphere.

"The best way to appreciate the 4D ionosphere is to try it," says W. Kent Tobiska, president of Space Environment Technologies and chief scientist of its Space Weather Division. He offers these instructions:

"One, download and install Google Earth."

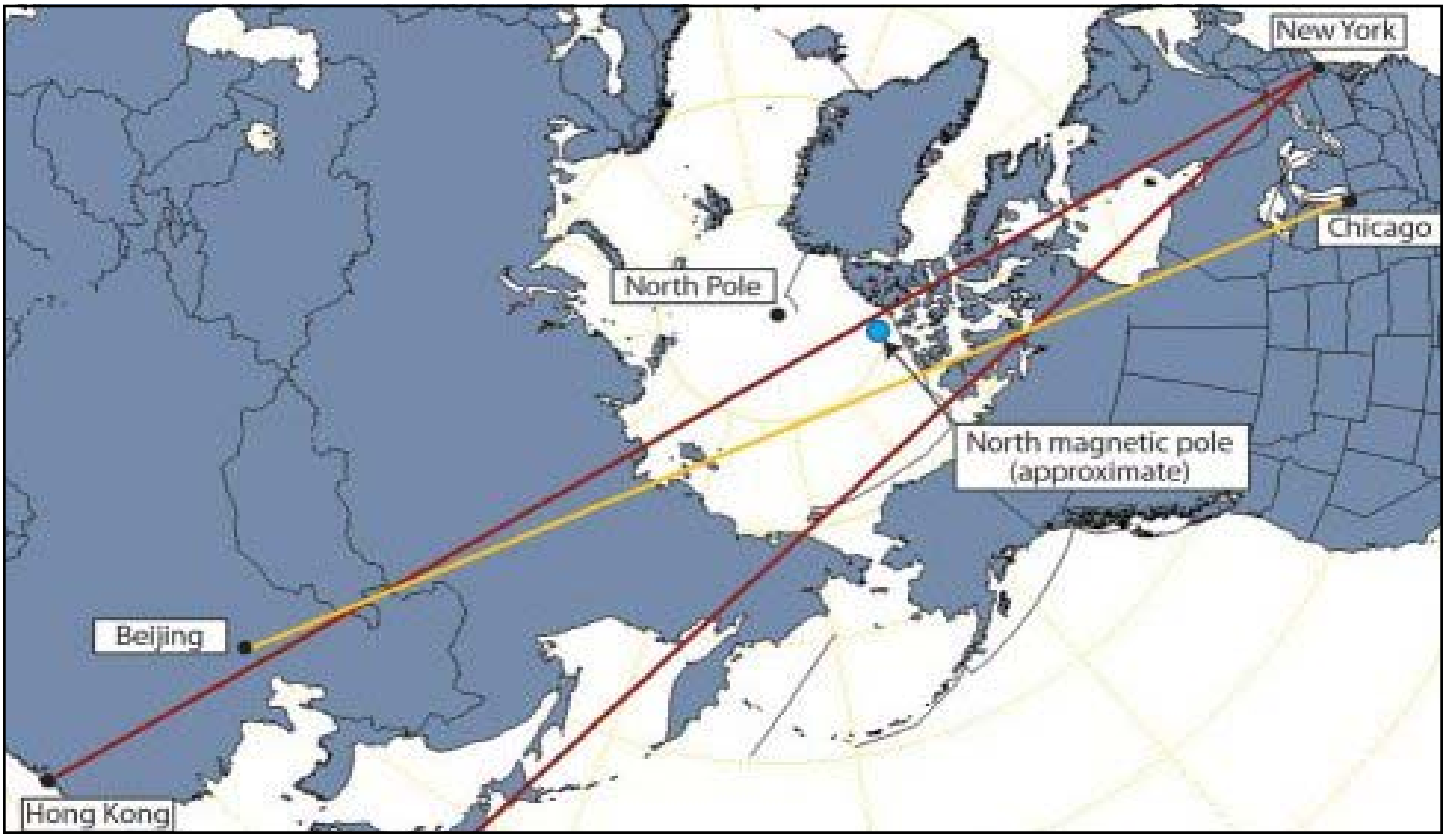
"Two, visit our web site and click on the link 'Total Electron Content.'"

Wait for the file to load and presto—you're flying through the ionosphere: screenshot.



4-D Ionosphere (Continued)

by Dr. Tony Phillips



"Colors represent electron content," Tobiska explains. "Bright red is high density; that's where radio communications are restricted to few or no frequencies. Blue denotes low density; no problem there."

Using the intuitive Google Earth interface, users can fly above, around and through these regions getting a true 3D view of the situation. Make that 4D. "The fourth dimension is time. This is a real-time system updated every 10 minutes," he says.

The 4D model can be fun and even a little addictive, warns Tobiska, who likes to use it to pilot an imaginary plane over the Arctic. "A growing number of commercial business flights are crossing the Arctic Circle," he says. "It's the shortest distance between, say, Chicago and Beijing and many other major cities."

The ionosphere is particularly important to these lucrative flights. While they are over the Arctic, planes lose contact with most geosynchronous satellites and must rely on "old-fashioned" radio communications—a link that could be severed during a radio blackout. Using the 4D model, a flight controller could examine the ionosphere from the flyer's point of view and use that information to anticipate problems that could cause a flight to be delayed or diverted.

The proper name of the system is CAPS, short for Communication Alert and Prediction System. Earth-orbiting satellites feed the system up-to-the-minute information on solar activity; the measurements are then converted to electron densities by physics-based computer codes. It is important to note, says Tobiska, that CAPS reveals the ionosphere not only as it is now, but also as it is going to be the near future. "Forecasting is a key aspect of CAPS available to our customers from, e.g., the Dept. of Defense and the airline industry."

The Event Horizon Archives—Fun in the Sun

By Grant Dixon—February 1995

When you are asked "told" to write an article, you panic, you have a fuzzy brain moment and think, What to write?.

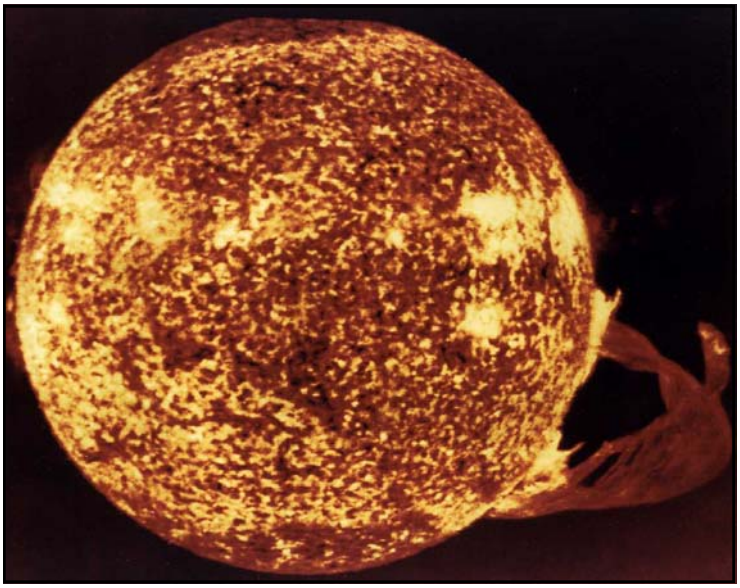
Well, I sit here with a blank piece of paper and think what I should write about. Should it be deep and erudite, or light and whimsical; should it be learned or superficial?

As I type I realize everyone loves the trivial, so why not something about the sun? I have selected three short stories about observing the sun: two anomalies and one just a curiosity.

17th Century Solar Rotation

For almost a century the sun went into a period of very low sunspot activity now known as the Maunder Minimum (1645 1715). Just prior to this, there were two well documented accounts of sunspot activity. One was between 1625 1626 and the other between 1642 1644. In both cases, astronomers were able to ascertain the rotation of the sun.

The surprising finding was that just before the Maunder, the sun rotation sped up by 3%. As far as I know no one has been able to successfully explain this phenomenon!



Rapid Surface Change

On January 22, 1900 at 3:00 p.m., Caroline E. Furness was using the observatory at Vassar College to observe the sun. She observed a sun devoid of spots for 15 minutes and then suddenly a spot appeared.

The sun was then projected onto a screen to make an image of 15 inches in diameter. The spot was now the size of a pinhead and while she observed this one, another and then another appeared, and finally a fourth appeared. Within 10 minutes all had faded with the exception of the first one.

At that time the sun was getting so low the observing session ceased. When Furness returned to observe the sun the next day there were no spots. While the solar surface is very active, I am curious as to why this is the only observance of such a rapid change of sunspot activity.

Fly Me Swiss Air

On January 22, 1959 Yngve Ohman, while observing the sun at the Stockholm Observatory, noticed a black object cross the sun. It created a light surge that lasted two seconds and extended two minutes of arc on either side of the sun. A month later a colleague of Dr. Ohman made a similar observation.

This caused a great degree of puzzlement until someone thought that maybe it was the crossing of planes. The Swiss Air force was coaxed into supplying two jets to take part in an experiment.

The jets made two transits at a distance of about 10 km and the results were consistent with the earlier observations; therefore, the hypothesis was proven to be correct.

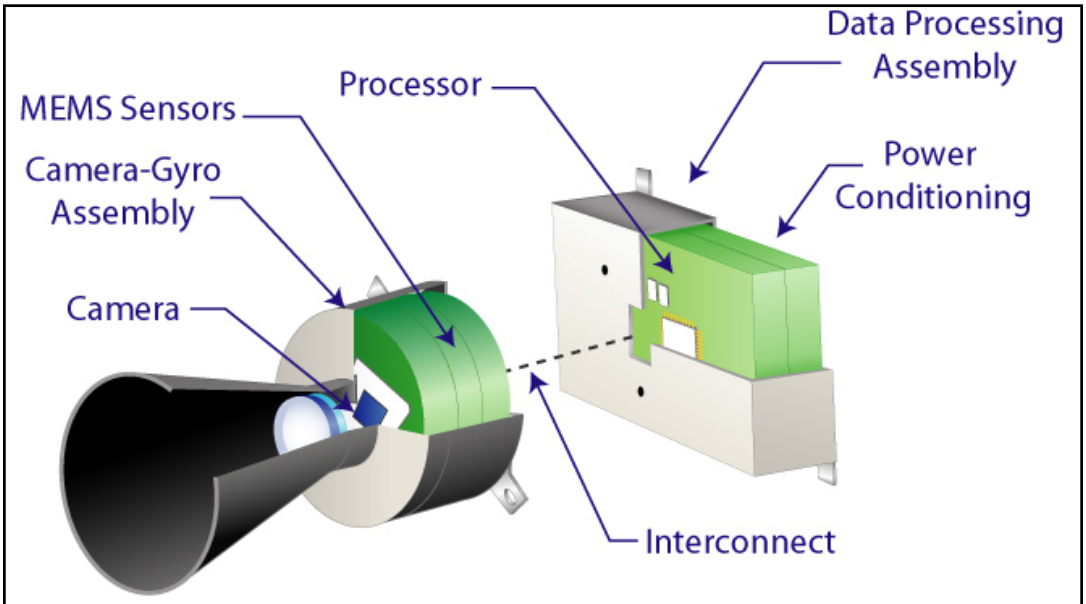
To my knowledge this is the only time fighter jets have been used in a scientific solar experiment.

The Space Place—Stellar Compass for Space Explorers

by Patrick L. Barry

In space, there's no up or down, north or south, east or west. So how can robotic spacecraft know which way they're facing when they fire their thrusters, or when they try to beam scientific data back to Earth?

Without the familiar compass points of Earth's magnetic poles, spacecraft use stars and gyros to know their orientation. Thanks to a recently completed test flight, future spacecraft will be able to do so using only an ultra-low-power camera and three silicon wafers as small as your pinky fingernail.



Compass is built as two separate assemblies, the camera-gyro assembly and the data processor assembly, connected by a wiring harness. The technology uses an active pixel sensor in a wide-field-of-view miniature star camera and micro-electromechanical system (MEMS) gyros. Together, they provide extremely accurate infor-

"The wafers are actually very tiny gyros," explains Artur Chmielewski, project manager at JPL for Space Technology 6 (ST6), a part of NASA's New Millennium Program.

Traditional gyros use spinning wheels to detect changes in pitch, yaw, and roll—the three axes of rotation. For ST6's Inertial Stellar Compass, the three gyros instead consist of silicon wafers that resemble microchips. Rotating the wafers distorts microscopic structures on the surfaces of these wafers in a way that generates electric signals. The compass uses these signals—along with images of star positions taken by the camera—to measure rotation.

Because the Inertial Stellar Compass (ISC) is based on this new, radically different technology, NASA needed to flight-test it before using it in important missions. That test flight reached completion in December 2007 after about a year in orbit aboard the Air Force's TacSat-2 satellite.

"It just performed beautifully," Chmielewski says. "The data checked out really well." The engineers had hoped that ISC would measure the spacecraft's rotation with an accuracy of 0.1 degrees. In the flight tests, ISC surpassed this goal, measuring rotation to within about 0.05 degrees.

That success paves the way for using ISC to reduce the cost of future science missions. When launching probes into space, weight equals money. "If you're paying a million dollars per kilogram to send your spacecraft to Mars, you care a lot about weight," Chmielewski says. At less than 3 kilograms, ISC weighs about one-fifth as much as traditional stellar compasses. It also uses about one-tenth as much power, so a spacecraft would be able to use smaller, lighter solar panels.

Engineers at Draper Laboratory, the Cambridge, Massachusetts, company that built the ISC, are already at work on a next-generation design that will improve the compass's accuracy ten-fold, Chmielewski says. So ISC and its successors could soon help costs—and spacecraft—stay on target.

Find out more about the ISC at nmp.nasa.gov/st6. Kids can do a fun project and get an introduction to navigating by the stars at spaceplace.nasa.gov/en/kids/st6starfinder/st6starfinder.shtml.

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

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Special Notice

Anyone with Internet access can download the latest newsletter (and any previous ones) from the club's website: www.amateurastronomy.org. Having the newsletter available online also allows us to publish it in full colour.

If you do not have Internet access, **you will still be able to pick up a paper copy at each meeting.** Copies of the newsletter will also be available to any newcomers at our meetings. **If you do not have Internet access, and cannot attend the meetings, please call Ann Tekatch at 905-575-5433 and she will place you on the special mailing list.**

The Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA) The HAA is an amateur astronomy club, for people of all ages and experience levels, dedicated to the promotion and enjoyment of astronomy . The cost of the subscription is included in the $25 individual or $30 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

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Next Regular Meeting

June 13th, 2008

7:30 PM @ The Spectator

Article Submissions

The HAA welcomes your astronomy related writings for the Event Horizon newsletter. Please send your articles, big or small, to:

editor@amateurastronomy.org

The submission deadline is two weeks before each general meeting.