Volume 15, Issue 4

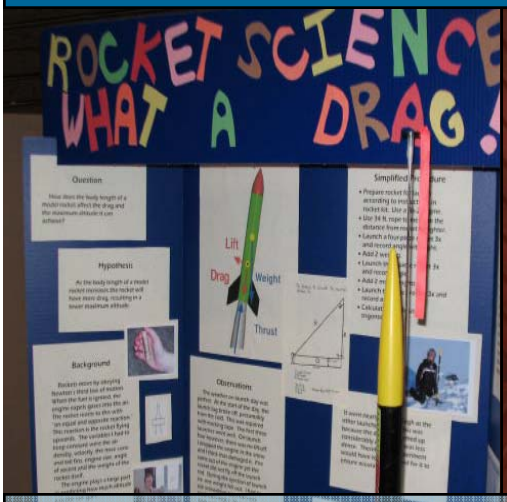
April 2008

HAMILTON AMATEUR ASTRONOMERS

Event Horizon

2008 BASEF Science Fair

Story by Don Pullen Photos by Jim Wamsley



Stephen Hogg— Ancaster Senior Public School

2008 winner of the **James A. Winger Award**

"Honey I shrunk the starch", "Which cleaner is meaner", and "You crack me up" were just some of the interesting titles of the many projects submitted to the 2008 BASEF (Bay Area Science and Engineering Fair).

There were over 230 projects submitted to this year's fair from students in grades 7 through 12 from the Hamilton-Wentworth, Halton, Brant, Haldiman, and Norfolk regions. Most

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From The Editor's Desk

At the Vernal Equinox, a young astronomer's fancy turns to—observing! It is that time of year that the days are getting longer and the temperatures are rising and we begin to think that we might just be able to go out to observe without freezing our buns off. Sadly, the nighttime temperatures are not what we will experience in the summer, however, the spring skies bring old friends back into view and we can start tuning up our gear for those all-night sessions that are so much fun. As well, the star parties are in the planning stages and you should think about making your reservations soon to ensure that you get in. So, get that gear out of the closet, set it up and make sure everything works for a new 'astronomy season'.

Tim Philp, Editor

Inside this issue:

NOTICE

The Event Horizon is looking for articles for future publications. Got some new equipment? Found a supernova? Club members want to hear from you. Contact Tim Philp at tphilp@bfree.on.ca with your submissions.

2008 BASEF Science Fair

By Don Pullen **(Continued from Front Page)**

of the projects were from students in grades 7 and 8, only 30 or so from area high schools. Top awards included all expense paid trips to either the national science fair or to the Intel International Competition in the USA (the latter only for high school students).

This year's event was held at Sheridan College in Oakville at their main Trafalgar campus in the athletic centre. Jim Wamsley and I arrived a little before 8am to check in, grab a coffee and receive our judging instructions. We reviewed the list of projects and created a plan to view 20 or so projects which we thought might fall into our category of Astronomy and Physics. It was pretty obvious there weren't any astronomy related projects, but a number of them were physics based. It was going to be a case of trying to find a worthy project which best fit our category.

The morning session was going to allow the judges to review the projects without the presence of the students. The afternoon session would invite the students to return to their projects and allow them to be interviewed. Instead of following our plan, when we entered the gym, we decided to quickly walk past all the projects to see if any sparked our interest with the idea of short-listing 20 or so projects. After the first 3 or 4, we spotted our first project to look at and instead of taking the minute or two we planned, we stay for about 15 minutes. The rest of the morning went this way and we barely managed to get through all of the projects before lunch. (It didn't help that I spent another 15 minutes chatting with one of my old instructors from Mohawk who was also there judging.)

We did manage to skim over most of the Biotechnology, Earth and Environmental Sciences, Health Sciences, and Life Sciences projects (though

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Treasurer's Report— By Don Pullen

	(Unaudited)
Open Balance (1 march 2008)	**$ 3215.96**
Expenses	**$ 326.70**
Revenue	**$ 137.00**
Closing Balance (31 march 2008)	**$ 3026.26**

Notes:

Major Expenses included: RASC Handbooks Cost of Sales ($169.07), Newsletter printing (Mar) ($70.63), BASEF 2008 Cash Prize ($50.00), BASEF 2008 Book Prize ($37.00).

Major Revenue sources included: Calendar sales ($75.00), Memberships ($50.00), 50/50 (Mar $12.00).

2008 Calendar Sales: Cost of printing (75@$16ea=$1200), Sales ($1375), Profit ($175)

2008 RASC Handbooks Sales: Cost ($169.07), Sales ($200.00), Profit ($30.93)

2008 BASEF Science Fair

By Don Pullen **(Continued from Page 2)**

admittedly a few peaked personal curiosities). We focused mostly on those within the Engineering and Computing Sciences, and the Physical and Mathematical Sciences since these were the groups we were most likely to find a suitable project worthy of the James A Winger award.

As expected, the projects ranged from the most simplest (such as growing mold on bread or making a galvanic battery using lemons, copper and zinc), to very elaborate ones with extensive graphics, documentation and a lot of mechanical assembly. What was surprising was that this diversity was all within the grade 7 & 8 group. We had been expecting that the most sophisticated and elaborate projects would have been submitted by the senior high school students.

After eliminating many other projects during our lunch break, we narrowed our list down to less than a dozen. We took the opportunity to speak with the students of these projects about their projects during the afternoon session. Most of the students we spoke to were very attentive and polite, though some were understandably shy. A few were absent from their display - probably off elsewhere chatting with their classmates since many schools had submitted more than 1 project.

We reduced our list down to a final 3 which had covered various aspects of rocketry (the closest we could find to space and astronomy). One focused on aerodynamics, one on drag and the last on mass. They were all trying to experiment to see which factors would affect flight performance.

The aerodynamics project was very impressive with an extremely well made wind-tunnel for testing his rockets. He had put a lot of work into building the wind tunnel, documenting every stage, and taking photos of his tests. He had purchased balance beams for determining centers of gravity, accelerometers and altimeters for his rockets to record his flight tests which was all carefully cataloged. I had overheard some of the other judges talking about this student possibly winning an engineering award, but I had some doubts about whether it was all designed by the student and certainly wouldn't have been possible without some deep pockets. Not that we were going to discriminate against him for the financial support. However he failed to make a connection between his wind tunnel tests by doing any form of analysis of the wind patterns around the various shapes of nosecones and fins, and the tie-in to his flight tests. There was also an absence of any math to support his conclusions. Being in grade 8 we weren't expecting any detailed fluid dynamics calculations, but even some simple math showing the effects of drag or mass would have had more impact and helped convince us that he understood what he had done.

The project covering mass was a more simple affair where the student had added weights to their rocket and performed a number of launches to see which did the best. She had done a sufficient number of tests for the results to be meaningful, but hadn't factored in consideration of additional drag associated with adding the weight (coils of copper wire outside the rocket fuselage) and hadn't yet discovered the correlation between force, mass and distance. She did measure flight times and correctly concluded that increased flights times were correlated to height (assuming other variables were controlled). But unfortunately there was no attempt at any math to support her claims.

The third project in the rocketry group was also a fairly simple project, but it was the one that most impressed us. This particular student had attempted to measure the effects of adding length to a rocket fuselage and see what impact it would have on drag and performance. He had carefully thought out his experiment and considered things like the extra mass of the extra fuselage segments would have. He even consid-

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Tales From the Far Side of the Eclipse

By John Gauvreau with photos by Bob Christmas, Kerry-Ann Lecky Hepburn

If you were to ask me (and I don't recommend that you do because it will get me talking for hours), I could provide you with recollections of specific nights and observations that stand out as special from my past 30 years in amateur astronomy. A particularly steady night that afforded a photograph-like view of Saturn through a century old 5" refractor comes to mind; watching 28 Sagittarii flicker as it passed behind the ring particles during an occultation by Saturn; the globular cluster M13 through a 24" reflector that showed the propeller arrangement of stars in it so big and clear that you think it must be this easy to see every time, only it's not; or a view through Pete Ceravolo's 8" refractor of Mars during it's close approach in 2003 that showed Valles Marineris so clearly among many other surface features.

Of course the list is longer than that, and each one comes with a story that makes the night and the observation special, at least to me. The night of February 20th has been added to my list with a particular observation and a story that is, again, to me, worth remembering.

Considering lunar eclipses happen every year and that they can, in theory, be seen by half the Earth, it is surprising how rarely circumstances allow for a particularly good view from a specific location. Prior to the eclipse of February 20th it was widely reported that this would be the last opportunity to see a total lunar eclipse from North America until December of 2010, nearly 3 years from now. With the notoriously bad weather we get at this time of year, and with the recent string of cloudy nights that we had just been through, I suppose that I and other members of the HAA were mentally preparing ourselves to wait those 3 more years even as we were packing our gear.

Kerry-Ann Lecky Hepburn

When the day dawned bright and sunny, and then inexplicably stayed clear through the day and past nightfall, hopes soared and an intrepid band of observers gathered at the west side of the Binbrook Conservation Area armed with scopes, binoculars, cameras and plenty of cold weather gear. Personally, I had brought my trusty little 80mm apo refractor. Small but mighty, I have never been disappointed with the views it provides. I also brought by 15x70 binoculars and a mount to put them on, as I have always felt, like many others, that some sights look better through binos than a scope and that lunar eclipses belong on that list.

My gear was in good company with Cassegrains, refractors, dobsonians and other binos, and like those rare nights when a particular events demands our attention, all

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By John Gauvreau

instruments were pointed in the same direction; that of the swiftly darkening moon.

The moon has a diameter of about 3479km and moves in its orbit at approximately 1km/sec. That means it moves its own diameter every hour (3600 seconds in an hour) and takes that amount of time to move from first contact with the Earth's umbral shadow to a point in its orbit where the moon is completely immersed within the umbra.

These partial phases gave latecomers time to set up and the dozen or so visiting members of the public time to wander among the telescopes and learn all about eclipses from our hospitable members. I used the time to repeat the alignment of my telescope after kicking the mount and watching it slide across the ice we had set up on. Once satisfied that my gear would stay put I took a few photos and began to wander among the others members and enjoy their perceptions of the eclipse.

Jim Wamsley took video of the eclipse through his fine 8" Schmidt-Cassegrain and tried out his new mount, which worked very well. Heather Neproszel showed just how wide a view you can get out of a long focal length SCT with a 1 ¼" eyepiece. Don Pullen used the wide field of his 4" refractor to take images of the eclipse and next to him was Ed Smith and his fine 12" reflector (complete with golf bag transport!). Steve Germann brought the Great White Scope (his 16" Lightbridge) and Kerry-Ann Lecky-Hepburn had her smaller 12" version of the same scope. And of course, Jackie Fulton brought the same charm and exuberance that she always has to cheer our club.

With opportunity to use every major type of telescope and all sizes of instrument from small binoculars up to scopes of 16" aperture, it soon became apparent that there really is no one scope that is best. So many very different, yet very good views were to be seen that each member had complimentary words for the others.

If there were time and space (but that's another article on cosmology) I could offer my impressions and pay my compliments to each, but there is, as I said at the beginning of this article, one view that stands out in my mind.

During totality the sky darkened so much that the winter constellations now stood out as vividly as any new moon night, and the dark crisp conditions lured us away from the moon and on to irresistible delicacies of deep-sky targets. Kerry invited us all to look through her 12" dob as it was being used for this purpose in conjunction with the new Ethos eyepiece from Televue. This 13mm eyepiece offers a panoramic 100 degree apparent field of view. Although I had opportunity to try this combination of scope and eyepiece to observe M35 and its companion cluster NGC2158, the double cluster in Perseus and Saturn (which showed narrow rings, an abundance of moons and strong coloured banding on the surface) , it was the view of M42, the Orion Nebula that will stay with me.

The high magnification, contrast and light gathering ability of the scope gave a view of the nebula that was the best I have ever seen. We all know that the nebula is a large complex that appears in several sections due to dark nebula appearing in the foreground, but this was only the second time that I

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clearly and directly sensed the dark nebula to be just that; a whole separate entity sitting in front of, and silhouetted by, the background nebula. And of the two times I have seen this view, Kerry's scope was definitely superior.

There was a rich, complex and three dimensional quality to the scene, with fine detail and texture in the nebula. Perhaps the best that I can say is that of the many hundreds of times that I have seen this favourite old nebula, through many, many different instruments, this view was something that I had never seen before. It was a view that is worthy of joining my list of favourite observations and it was truly a fine use of the dark sky that totality gave us.

Totality itself was a delight as the moon became a richly coloured ruby in the night sky of diamonds. Many commented that the colour was not as deep as they expected. Each eclipse is different, with not just the geometry of the Earth-Moon-Sun line coming in to play, but also the conditions of the Earth's atmosphere that particular day influencing the colour of the moon.

The moon may be bright or dark, the hues rich or pale and the colours may range from yellow to orange to red to brown. I found that his time the moon took on a palette of light yellows, oranges and browns, with a very obvious line of pale, slate-like blue along the edge of the shadow. One observer compared it to a dull daytime sky colour. Just as our atmosphere filters out the blue light to allow the warmer end of the spectrum (and the longer end) to pass through a colour the moon, so too does the high ozone in the upper stratosphere allow just the shorter frequencies to pass through and give us that sometimes visible band of blue.

The phrase of "blood red" that the media has bandied about for the previous couple of days may have influenced people's expectations, but I found the colour to be more than satisfying, especially when viewed with the naked eye.

As the final partial phases passed and more and more moonlight illuminated the landscape again, we finally started to pack up amidst the realization that we had been too preoccupied with the beautiful night to realize just how cold we were.

After all those hours in the outdoors on this frigid Canadian winter night there was one final task to complete the event; an hour spent at the local, ubiquitous coffee shop with hot drinks to warm our hands, sugary pastries to warm our blood, and good conversation to warm our souls. Our night was at an end, and as Shakespeare said in one of his Sonnets, "*The mortal moon hath her eclipse endured".*

I'm sure that each of the other observers that night have their own recollections, all as worthy as mine, and I'm equally sure that the eclipse of February 20th will be the source of enough stories us to keep us happy for now and looking forward to the next eclipse in 2010.

Cherry Springs Star Party

by Glenn Muller

If you enjoy star parties, and don't want to wait for **Starfest**, consider joining the HAA members who are planning to attend the 2008 **Cherry Springs Star Party**

This star party runs from **May 29th to June 1st** and is being held in the dedicated astronomy field at Cherry Springs State Park, high in the Pennsylvania hills. About a four hour drive from Hamilton, the location is a preserved dark sky site with rustic facilities and beautiful scenery.

The fee for the event, including camping, is $37 US per person, or $52 per family. There will be vendors; **Televue, Denkmeier, Hands-On Optics,** and speakers. In fact, Televue's **Al Nagler** is the keynote speaker, this year.

For more information, Google "Cherry Springs Star Party " or contact Glenn and Gail Muller at mullers@primus.ca

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By Don Pullen **(Continued from Page 3)**

ered the changing drag associated with temperature variations and the effect it had on his flight testing. He did use some trigonometry and algebra to calculate altitudes, to support his expected results and compared them against actual performance. This was very impressive for a grade 7 student.

While we had to think carefully about comparing the impressive aerodynamic display against the other 2 projects, we really didn't have any hesitation to declare this last project as the winner. He had a good understanding of the fundamentals: mechanically, scientifically and mathematically.

So Jim and I were pleased to announce that S**tephen Hogg from Ancaster Senior Public School was the 2008 winner of the James A Winger award.**

Jim did a good job of representing the club and presented Stephen with the $50 cash prize and a copy of NightWatch autographed by Terrence Dickenson. Hopefully this will spark a desire to expand his rocketry interests to include astronomy.

A thoroughly enjoyable day and well organized by the BASEF people and the various sponsors. I was impressed by the interested students and have high hopes that many will pursue futures in one of the sciences. I think I speak for both Jim and myself saying that we would be pleased to do this again next year. It's a great project for the club to be sponsoring. And while we may not be growing our membership extensively through this endeavor, we are helping to support local students and encouraging futures in science. They are all truly winners in this respect.

The Sky this Month—by Greg Emory

As I write this article, the Leafs are golfing, The Canadiens finished first in their Conference - spring has finally arrived! The change to Daylight Savings Time makes us wait a little longer in the evening before we can get out and do some viewing, but oh what viewing we have.

The centerfold of this month's Event Horizon is set for April 15 at 10:00 pm (local time). Regardless of your likes or desires for viewing, we have examples in the sky to meet your needs.

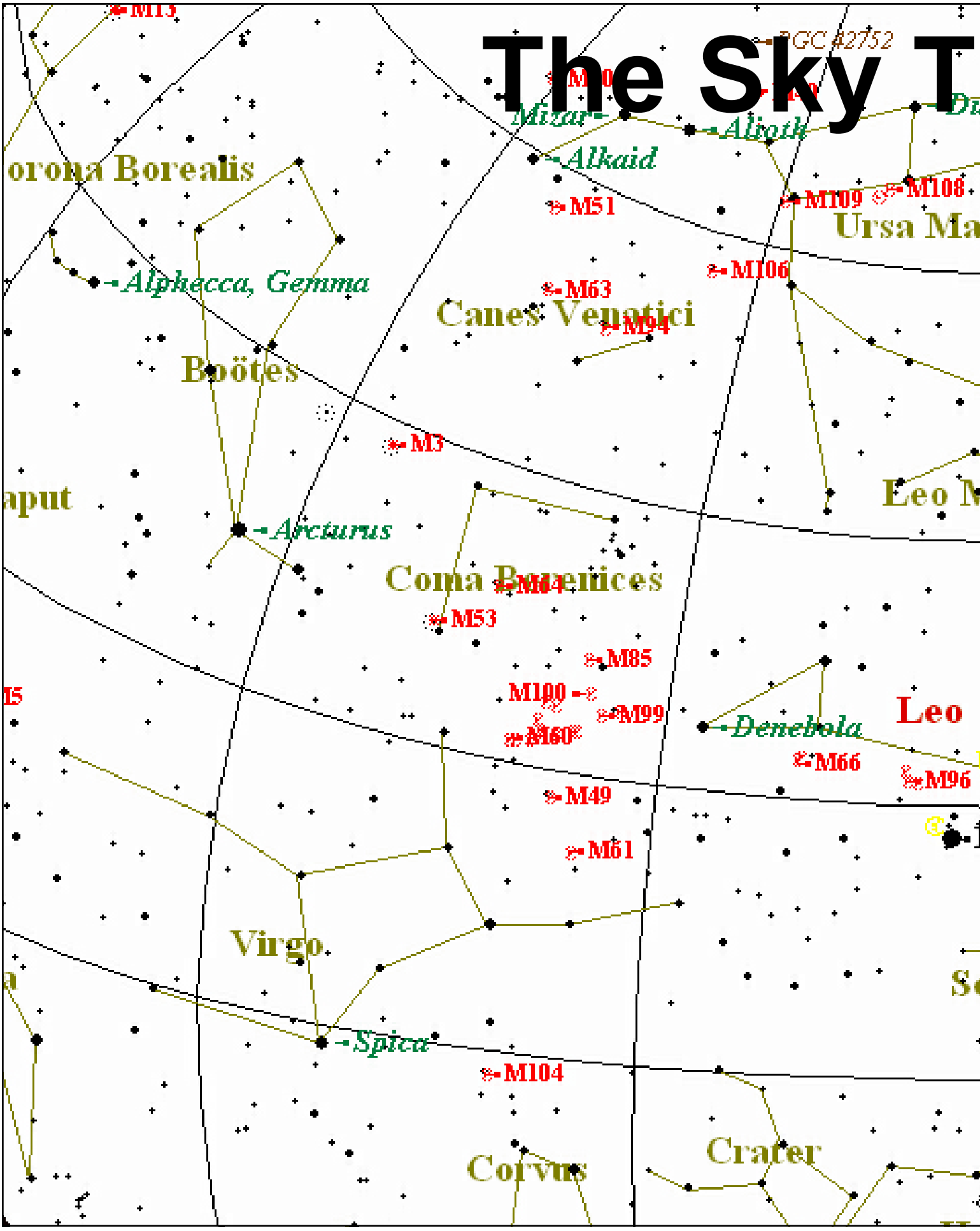
Far towards the western horizon we have the Winter **Milky Way** yielding its final show. This region of sky is home to open **clusters** and **nebulae**. The open **clusters** have been described by various authors and astronomers as "jewels against a velvet background" or something similar, with varying degrees of eloquence. The **nebulae** seen in this region of the sky (**Orion**, **Monoceros**) are the birthing places of the new **stars** in our **Galaxy**. The **nebulae** are comprised dust and gas, a lot of which is the mortal remains of their long dead ancestors. Continuing with the analogy, the glowing gas and dark obscuring dust is the embryo of the yet to be born **star**.

The center portion of the centerfold is dominated by **galaxies**. **Galaxies** come in many sizes and shapes, and all offer something to the observer. Large, face on spirals are beautiful to see, where as finding and seeing a dim edge on spiral is rewarding in that you found it at all. If galaxies are your thing, **M51** or **M101** are good examples of large face on spirals, with **M51** being my favourite for this time of year. The **galaxy** near the southern boundary of **Virgo**, **M104**, is stunning. An edge on spiral with prominent dust lanes that reveals itself in small to medium sized scopes – you don't need to order the new 20" truss-Dob "Herniator" for this target. Of all the **Hubble** images taken, a shot of **M104** was recently voted the best by a panel of astronauts.

Moving our focus to the East, we have **globular clusters** to look at. The bright orange star, **Arcturus**, is part of the constellation **Bootes**. A nice **globular cluster**, **M3**, lies between the top of **Coma Berenices** and **Bootes**. Although it is technically in the constellation **Canes Venatici** to the north, this magnitude 6.4 **globular** is one of the deep sky objects that I now associate with spring. The other **globulars** are **M13** and **M92** in the constellation **Hercules**. **Hercules** is just partially on the eastern boundary of this month's centerfold. Many of these **globulars** are bright enough, and can be partially or fully resolved with **binoculars** or a modest sized **telescope**.

There is another type of **nebula** for us to see, although it is better viewed in May/June. At some point in time for a typical **star**, the processes that fire the **star** become different. At this point if the **star** is the size of our **Sun** or smaller it will become a different type of **star** by throwing off the outer layers of gas from the star (like Canadians throwing off their parkas once it gets above 0^{o}C). These outer layers expand through space, glowing from ionizing radiation. These are **planetary nebulae**. If the **star** was much larger than our **Sun** to begin with, it may go through another process, which results in a **Supernova**. After all the wailing and gnashing of teeth of the **Supernova**, a beautiful dust/gas cloud may remain behind. This is a **Supernova Remnant** (**SNR**)

The word **planets**, derives from the Greek for wanderer. The **planets** are always out and about. But this month we don't care about 6 of them. **Saturn**, in the constellation **Leo** is directly overhead. This is optimal viewing for this planet. **Saturn's rings** are slowly closing. They will not be as remarkable to view as they are now for about 5 years to come. The **moon**, almost full is quite close to **Saturn** in mid-month, the end of month or early May is best to see this remarkable planet.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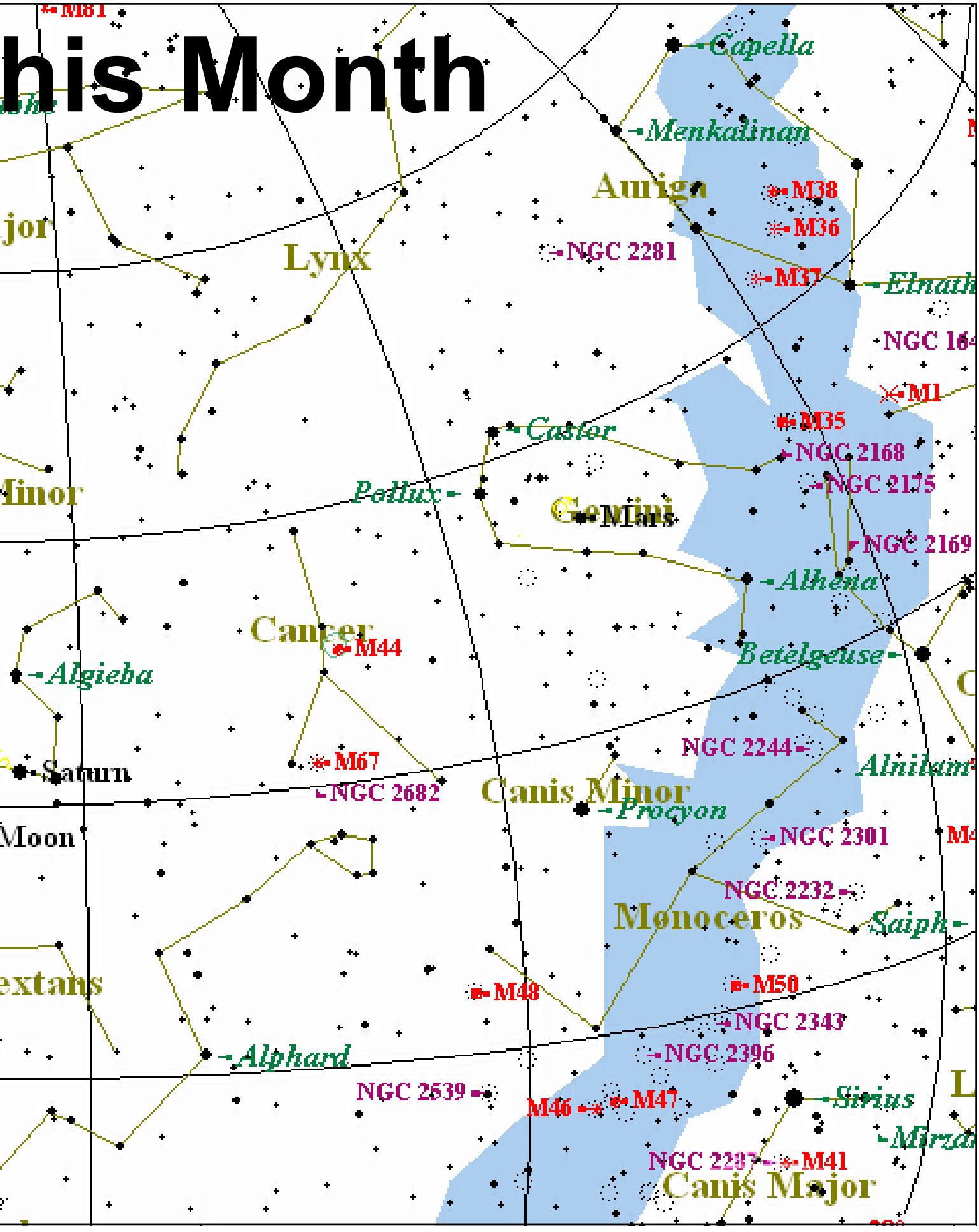
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Sirius
Mirza
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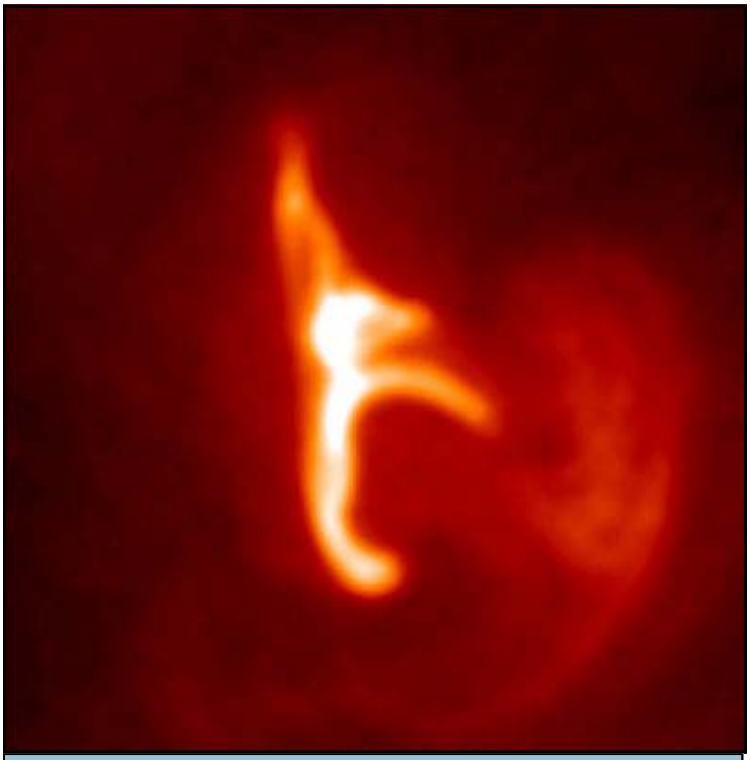
M41
Canis Major

Focused Solar Explosions get Millions of Degrees Hotter

NASA/Goddard Press Release

A NASA-funded researcher has discovered that solar flares -- explosions in the atmosphere of the sun -- get much hotter when they stay "focused".

"A flare typically divides its energy between directly heating the solar atmosphere and accelerating particles," said Dr. Ryan Milligan of the Oak Ridge Association of Universities, Tennessee, who is stationed at NASA's Goddard Space Flight Center in Greenbelt, Md. "This flare seemed to focus on one task, devoting all its energy to heating, allowing it to become millions of degrees hotter than its multitasking cousins." The result was presented at the Royal Astronomical Society's National Astronomy Meeting 2008 at Queen's University, Belfast, United Kingdom.



An image of the solar flare taken using the X-Ray Telescope onboard Hinode on June 7, 2007. This shows the flare loops in the solar atmosphere at temperatures exceeding 10 million degree Celsius. Credit: JAXA

Solar flares are caused by the sudden release of magnetic energy. The largest can release as much energy as a billion one-megaton nuclear bombs. However, the flare observed in this study was a less powerful "micro" flare. NASA researchers want to understand flares because they generate radiation that can be hazardous to unprotected astronauts, like those walking on the surface of the moon.

Flares normally occur above loops of electrically conducting gas, called plasma, in the sun's atmosphere. When a typical flare goes off, it heats the plasma and sends beams of electrons racing down the sides of the loops. The electron beams evaporate more plasma from the sun's visible surface, which expands back up the loops.

"This evaporated plasma has traditionally been believed to be the source of the hottest temperatures seen in solar flares," said Milligan. "However, the flare in this new observation reached a temperature of almost 27 million degrees Fahrenheit -- some nine million degrees hotter than expected for a flare of this size -- without any evidence for beams of accelerated electrons."

Milligan used the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI) and Hinode spacecraft to make his observation of the microflare on June 7, 2007. RHESSI revealed that the flare had a peak temperature of 27 million degrees, and also that the flare showed no evidence for high-energy electrons. Hinode was able to show the effects of the energy released at various layers in the solar atmosphere. In particular, the Extreme-ultraviolet Imaging Spectrometer instrument was used to detect signatures of plasma evaporation from the sun's surface through Doppler shifts of emission lines. The low-velocities observed confirmed the RHESSI observation that high-energy electrons were not present.

"If our assumption is correct, then this result tells us that the energy released during a solar flare is more efficient at achieving a higher temperature if the energy is used to directly heat the plasma in the sun's atmosphere, instead of being divided between heating and particle acceleration. This very effect has recently been shown in computer simulations of energy release during microflares," said Milligan.

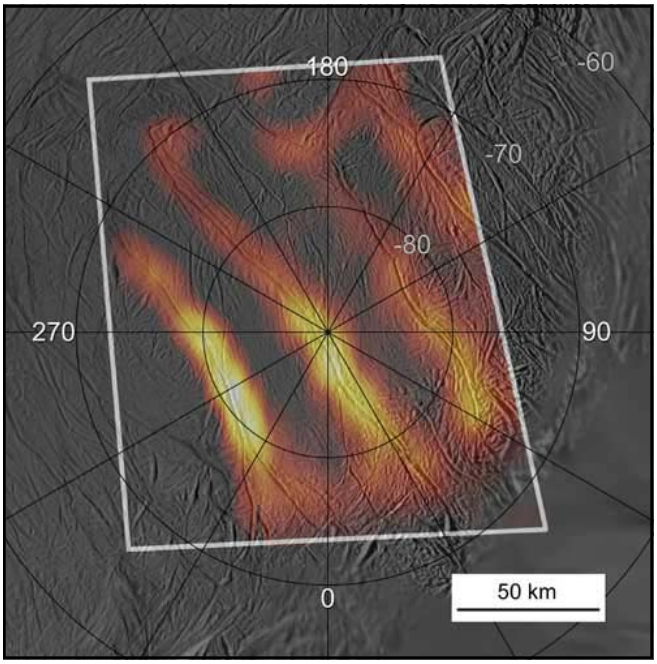
The research was funded by the NASA Postdoctoral Program administered by the Oak Ridge Association of Universities, Tennessee.

Hinode is a Japanese mission, collaborating with NASA and the Science and Technology Facilities Council, United Kingdom, as international partners. The RHESSI project is a NASA Small Explorer mission managed by the Space Sciences Laboratory of the University of California, Berkeley. The Explorers Program Office at Goddard provides management and technical oversight under the direction of the Heliophysics Division of the Science Mission Directorate at NASA Headquarters in Washington, D.C.

Life on Enceladus - Warm Geysers Raise Hope

NASA/Goddard Press Release

The most detailed temperature map to date of the "Tiger Stripe" region on the south pole of Saturn's moon Enceladus reveals that the area is even warmer than previous measurements indicated. Jets resembling geysers are erupting from cracks in the icy crust of this region, so named because the fissures look like the stripes of a tiger.



The temperature measurements were made by the Cassini spacecraft's Composite Infrared Spectrometer (CIRS) during the spacecraft's close flyby of the moon on March 12, 2008. The warmth suggests the possibility that there might be liquid water beneath the ice. Liquid water, together with abundant organic material detected by Cassini as it flew through the jets, would make Enceladus a promising place to search for extraterrestrial life.

"Enceladus has got warmth, water and organic chemicals -- some of the essential building blocks needed for life," said Dennis Matson, Cassini Project Scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "We have quite a recipe for life on our hands, but we have yet to find the final ingredient -- liquid water, but Enceladus is only whetting our appetites for more."

"This latest flyby is the closest we have been to Enceladus while mapping its temperatures," said CIRS Principal Investigator Michael Flasar of NASA's Goddard Space Flight Center in Greenbelt, Md. "Seeing them as high as 180 Kelvin (minus 136 Fahrenheit) in the surface cracks near the south pole is amazing, because the temperatures expected on a quiescent Enceladus are only 60 K (minus 352 F). Some very energetic process below the surface is generating a lot of heat and spewing out the molecules and particles that are seen by the other Cassini instruments when the spacecraft passes over the south polar region. Enceladus continues to surprise and fascinate." The CIRS team is based at NASA Goddard.

This new view shows that at least three of the south polar fractures are active along almost their full lengths -- the fourth one, on the right, was only partially covered by this scan. The infrared radiation was mapped by CIRS at wavelengths between 12 and 16 microns. The infrared data, shown in false color, are superimposed on a grayscale image mosaic of the south pole obtained by Cassini's cameras on July 14, 2005, during the previous close Enceladus flyby. The warmest parts of the fractures tend to lie on locations of the plume jets identified in earlier images. Numbers on the map indicate latitude and longitude.

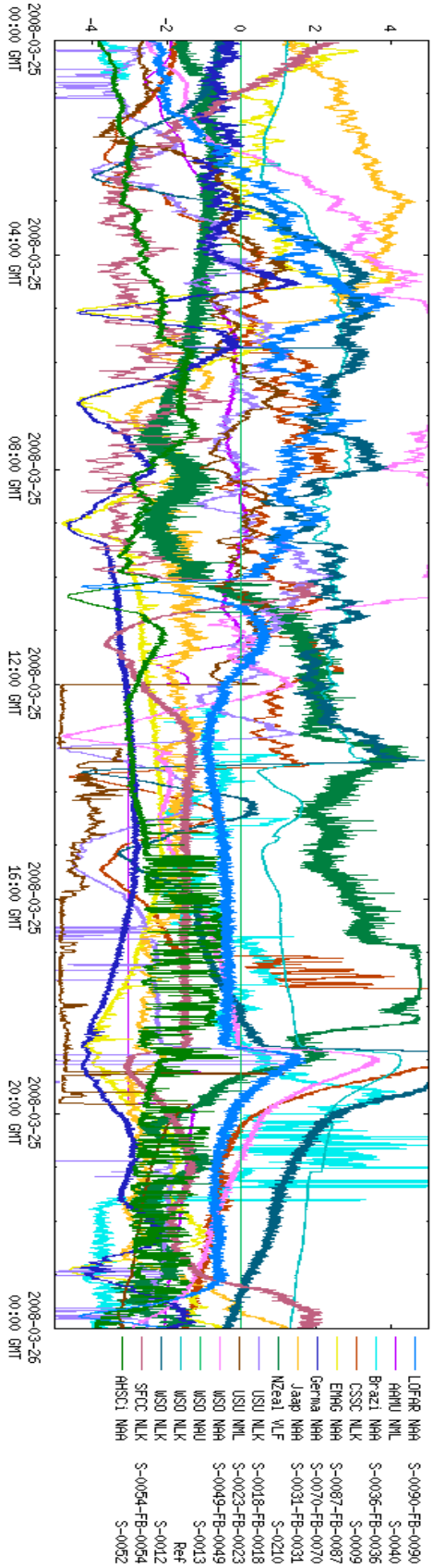
"These spectacular new data will really help us understand what powers the geysers. Plus, the surprisingly high temperatures make it more likely that there's liquid water not far below the surface," said John Spencer, Cassini scientist on the CIRS team at the Southwest Research Institute, Boulder, Colo.

Cassini flew through the jets during this flyby of the moon, and the spacecraft's Ion and Neutral Mass Spectrometer saw a much higher density of volatile gases, water vapor, carbon dioxide and carbon monoxide, as well as organic materials, some 20 times denser than expected. Organic materials contain carbon and are necessary for life as we know it. Mission scientists say the organics "taste and smell" like some of those found in a comet. The jets themselves harmlessly peppered Cassini, exerting measurable torque on the spacecraft, and providing an indirect measure of the plume density.

This map was made by scanning the south pole during the period from 16 to 37 minutes after closest approach to Enceladus, at a distance between 14,000 and 32,000 kilometers (about 8,700 and 20,000 miles) as Cassini rapidly receded from its close (50-kilometer or 32-mile) flyby.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington, D.C. The Cassini orbiter was designed, developed and assembled at JPL. The Composite Infrared Spectrometer team is based at NASA's Goddard Space Flight Center, Greenbelt, Md.

LOFAR II, Detects Solar Flare—by Mike Jefferson



LOFAR II caught the biggest solar flare in the new cycle (since the beginning of January) up to March 30/08, on March 25th, 2008.

Both the GOES satellite system and LOFAR II had logged some B-activity from 18:26 - 18:29 UTC on March 25. Then the M-class flare erupted @ a 1.7 reading. GOES caught this flare at 18:36 – 18:56 UTC and LOFAR II detected it from 18:46 – 20:03 UTC. This was followed by some evidence for a B-class 7.6 on March 26, being caught by GOES from 21:12 – 21:29 UTC and LOFAR II @ 22:10 UTC.

There was medium-to-high weakening of shortwave propagation @ 5, 000 kHz for several days following the M-class event. The SOHO satellite recorded more polar hood activity in both the North and South Hemispheres. However, the weather was too uncooperative to verify the existence of any auroral activity from the ground.

I sent our findings off to Dr. Doug Welch, at McMaster University, and he congratulated us on our work. He thinks our data is of a high calibre and says our receiving equipment is working very nicely.

He asked if I had any evidence of the gamma-ray burster that had 'surfaced' @ 06:12 GMT on March 19. After much data searching and analysis, we concluded that it was lost in the white noise of the NAA probe-signal. Although, several Finnish 16” optical telescopes captured faint light echoes and one did not. It was concluded that the gamma-ray – x-ray signal component was just too small for this billion-light-year-distant Wolfe-Rayet object to be detected by our equipment. It has been dubbed GRB 080319B. I had also alerted Deborah Scherrer, our principal investigator, to the possibility of having detected this thing. She contacted the head of Stanford's AWESOME programme to see if any of the Alaskan stations had detected anything and he replied in the negative. Her response was “...shucks!” It was obvious that she was really hoping their network would 'bag' a GRB, as well as the “M-class 1.7”.

To conclude my report, I think this is the most significant 'catch' in this area to date. Outside of the findings of the nearby David Dunlap Observatory, over many years, and the recent flare reports of the now-inactive Dr. Douglas Welch radio-telescope, there is not another comparable finding from any astronomical telescope in the Hamilton-Wentworth Region of which I'm aware - since the days when Reverend Dr. D. B. Marsh established The Astronomical Society of Hamilton(1901).

Member of the Month— Chris Kubiak

by Ray Badgerow

Chris Kubiak has been a member of the Hamilton Amateur Astronomers for quite a long time. He comes to the world of amateur astronomy from interests in a number of related areas.

His prime interest from way back is computers and their programming. It is for this reason that he is our 'techno-whizz' "Dr. Chandra" who was responsible for making our LOFAR II radio - x-ray telescope fully automatic. Has he turned it into HAL 9000?

Today, there is almost no manual work that needs to be done to it, other than data analysis, which is the fun part, anyway. "The LOFARII computer has been named 'Chris' in his honour" due to his abilities in fully automating the data collection.

He is also very business-minded. Besides his analytical work in the computer world, he spends a great deal of time operating his own entrepreneurial business interests in other areas.

When it comes to the 'astronomical' aspects of his life, his interest is in all facets of the activity. He likes to observe whenever and wherever he can get the time and opportunity to do it. After observing sessions/general meetings, he enjoys the social aspects of 'conversation/meals/coffee' get-togethers with other club membership at one of our local haunts.

Chris was born in Lodz, Poland in the early 1970's. At about the age of seven years, his family came to Canada to visit with family and decided to stay here

First remaining in Montreal, PQ, for a few months, the Kubiak family decided to move near Mud Street on the Hamilton Escarpment with an aunt and uncle for several years. After this, they moved to their own house in East Hamilton and now Chris is located in Stoney Creek.

Chris attended St. Bernard's Elementary School (which has since been sold) where he met Mark, "The Third Man" of the "Casey Van Broekhoven Musketeers".

Following this, in the 1980's, he graduated to Cardinal Newman High School. At about the same time he entered Polish Scouts. However, it was at Cardinal Newman that he met Casey Van Broekhoven, the teacher of Electrical-Electronics, and this provided the opportunity for Chris' interest in astronomy to be born.

At this time, Cardinal Newman H. S. formed an astronomy club. It was headed by Casey, and Chris and Mark both joined it. At the time, the club built it's own telescope which is now in Casey's proud possession.

Chris' post secondary education was at Mohawk College, here in Hamilton. His specialty and graduating qualifications are in computer systems technology. It is this background that has made him so valuable to our club because it is this knowledge that made it possible for him to automate LOFAR II to the degree at which it presently operates.

Some people in the Hamilton Amateur Astronomers may feel that Chris is a little 'loony' and there is a story to this term. When 'Casey's' telescope was being constructed, a problem arose with the alignment of the secondary mirror with the primary optic. One 'wag' in the club suggested using several cemented 'loonies' to act as good spacers for the secondary. This worked so well that it piqued Chris' curiosity in the construction of the telescope and in astronomy itself.

He remained with telescope, astronomy and the club until high school graduation and is still best of friends with Casey and Mark today.

And so, it gives me great pleasure to present, to you, our Member of the Month, Chris Kubiak.

Forget Me Not

by Glenn Muller

My log entry for March 5th, 2008 is marked as an evening of clear sky between two brutal snowstorms. I keep the observatory "shoveled" for just such opportunities and, on this night, I was hopping around Orion when a bright point of light moving through Taurus caught my eye.

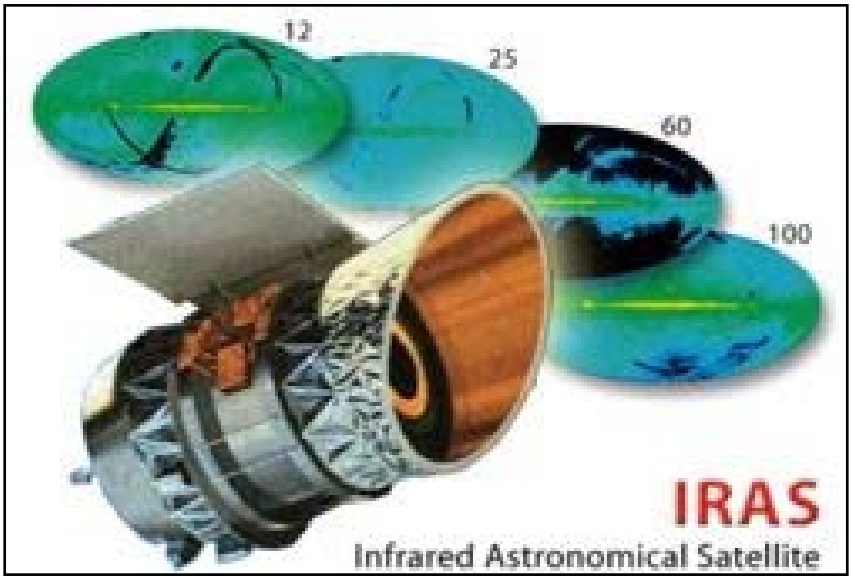
Attaining close to magnitude –1, I thought it might be an Iridium flare but none were noted for that time, at my location, on the Heavens-Above website. In fact, no satellites of that magnitude seemed to fit the bill.

I fired up Starry Night, centered the view pane on Taurus for 7:05pm, and let the program run. Within moments my moving star sailed past Aldebaran and the software identified it as IRAS. A search of the Heavens-Above database for IRAS indicated that a satellite by that name had indeed passed over Grimsby at 7:09pm but was only forecast to be magnitude 6.1.

The discrepancy suggested a satellite unable to hold its attitude, and since the acronym had peaked my interest I opted for further investigation. What I found turned out to be rather neat.

IRAS , the acronym for Infrared Astronomical Satellite was the first Space–based telescope to survey nearly the entire sky at infrared wavelengths. It was launched as a joint project of the USA, UK, and the Netherlands on January 25, 1983 aboard a Delta 3910 rocket from Vandenberg Air Force Base.

Once into its sun-synchronous near -polar orbit, the satellite mapped 96% of the sky four times, at 12, 25, 60 and 100 micrometer wavelengths with resolutions ranging from 30 arcseconds at 12 micrometers to 2 arcminutes at 100 micrometers. IRAS utilized a survey array of 62 rectangular infrared detectors in staggered rows so any point source that crossed the focal plane would be seen by at least two detectors in each wavelength band.



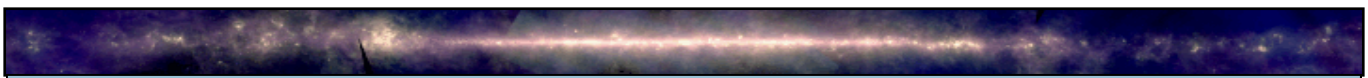
During the course of it's ten-month mission, nearly 350,000 sources of infrared emission were discovered, of which 75,000 are believed to be starburst galaxies still enduring the star-formation stage. It also found a dust disk around Vega and acquired the first images of the Milky Way's core.

The length of the mission was determined by how long the satellite's 475 litres of superfluid helium could maintain the cooling system. To work effectively at infrared wavelengths the telescope, an f/9.6 Ritchey-Chretien design with an 0.57 m aperture, 5.5 m focal length and beryllium mirrors, needed to maintain a consistent temperature of 2 kelvins (about −271 C). The last of the helium evaporated on November 22, 1983 at which point the temperature of the telescope rose and prevented further observations.

Utilizing data from the mission, a team from Leicester University also discovered three asteroids one of which is the parent body of the Geminid meteor shower, six comets, and a large dust trail associated with comet Tempel-2.

The work started by IRAS has been continued by several Space infrared telescopes such as the Infrared Space Observatory, the Spitzer Space Telescope, and the AKARI Space Telescope.

Twenty-five years ago, this pioneering instrument was at the cutting edge of astro-technology. Now, as a multi-million dollar piece of unlikely salvage, IRAS maintains a silent orbit but, occasionally, it winks at those who would look up as if to say, "Forget me not".



A mosaic of IRAS view of the Milky Way. Most of the emission is thermal, from interstellar dust warmed by absorbed starlight.

Light Pollution—Not Always Solved by a Filter

by Tim Harpur

After months (sorry to say, but true) of not imaging with the astro gear I finally forced myself out under what I had thought were reasonably clear skies. The air was steady - not a twinkle in the sky, and only a sliver of a setting moon. I set up to image at a location I hadn't tried before - a dog park just north west of Burlington on King Rd. I had hoped it would be remote enough from the cities of Burlington and Hamilton to allow me to image with the aid of my light pollution filter.

I was wrong.

It appears that we have a need to light up the country side. Yes - there were a couple of fully illuminated street lights at the dog park presumably to keep the strays happy. I set up in such a way as to avoid these lights as much as possible - only to find that passing cars (of which there were quite a few) would come very close to aiming their headlights directly at my camera as they passed. Some passer-bys preferred to stop their vehicles (bathing my camera in light), as they were curious as to what I was doing. And if that wasn't enough, there was still the ever present skyglow of the nearby cities.

I kept my exposures short to avoid saturation - almost an hour's worth of 2 minute exposures. After stacking I got the following picture - it's sad to say, but even a filter doesn't help much when the light pollution is this rampant.

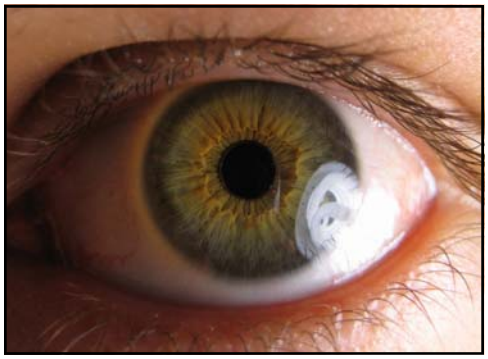
Even after colour and contrast processing, light pollution is too extreme to remove without losing the already very faint targets of the shot.

The Event Horizon Archives— Aging Eyes

By Rob Roy—April 1996

Nothing is more impressive than a low-power, wide-field view of the Milky Way. There is, however, a personal lower limit on the magnification that should be used on any given instrument. It depends on the size of your eye's pupil, and that gets smaller as you get older .

The usual recommendation for the lowest magnification is 3.5x per inch (1.4x per cm) of aperture; this is so the exit pupil of the instrument will not exceed 7mm, the generally accepted diameter of a dark-adapted, fully expanded pupil of a human eye.



There is considerable disagreement on the subject, even among experts in the field. A very popular and respected author says that an exit pupil larger than the eye's pupil means that some of the instrument's light collecting power is wasted. Furthermore, he contends that an exit pupil of about one millimeter smaller than the eye's is preferred for astronomy.

On the other hand, a prominent manufacturer of small instruments and eyepieces states that this is but one of many telescope myths. It is of little or “There is considerable disagreement on the subject, even among experts in the field” no concern for refractors, since both image brightness and resolution are as large as possible at that magnification. For reflectors, larger exit pupils do waste light because the black spot in the exit pupil becomes larger. This black spot is caused by the obstructing secondary mirror. He claims that a reflector's low-power limit is reached not by the size of the exit pupil but only when this black spot becomes obtrusive.

Traditional "night glasses" (7X50 binoculars) are called that because they yield a 7mm exit pupil (50mm aperture/7 power.) Depending on whether you believe it fact or myth, they are perfect for the average dark-adapted eye. In defense of it being fact, I have never heard of a pair of binoculars with an exit pupil larger than 7 m m .

In any age group there is considerable variation in pupil size. For example, at the peak age of 15, the dark-adapted pupil can vary from 5mm to 9mm with different individuals. After 25 years of age the average pupil size steadily decreases, though not at a steady rate. An examination of the accompanying table shows that it takes only 5 years, to age 30, to drop 0 . 5 m m , yet it takes 20 y e a r s , from 60 to 80, to decrease that 0.5mm. The rate of shrinking of the pupil obviously slows down. This unavoidable reduction in aperture demands that visual observers match the exit pupil of their telescopes to the size of their dark-adapted pupil.

The table is set up to show the age at which you can expect to have a given pupil size from 7.0mm to 4.5mm. The last two columns give the factors for the lowest useful magnification for that pupil size, if indeed a larger exit pupil offers no gain in starlight. A quick calculation shows that an average 20 year old could go as low as 28x on an 8" (20cm) scope, whereas the average 80 year old would be wasting precious light outside the pupil if she/he went much below 4 3 x .

Remember, these ages versus pupil sizes are only averages. The next time you are observing at a dark site, take along a millimeter rule and get a friend to measure your pupil diameter, then choose the magnification that will optimize the exit pupil at your eyepiece.

Here's hoping that you'll be pleasantly surprised with a larger-than average-for-your-age pupil size!

Pupil Size	Approximate Age	Lowest effective Magnification per in. of aperture	Lowest effective Magnification per cm of aperture
7	<25	3.5	1.4
6.5	30	3.8	1.5
6.0	35	4.1	1.6
5.5	45	4.5	1.8
5.0	60	4.9	2.0
4.5	80	5.4	2.2

The Majesty Factor—The Nexus of Power, Contrast, and Field.

by Al Nagler Submitted by Ray Khan—used with permission

For deep sky viewing of star fields, open and globular clusters, nebulae and galaxies, choose the highest power that frames the subject, so long as the sky background does not reach black, and the atmosphere does not degrade the resolution. The smaller exit pupils permit a darker sky background which achieves greater contrast against the fixed brightness of stars, while the greater magnification reveals more structural details on extended objects. Using eyepieces with larger apparent fields increases the magnification potential.

The result is an increase in what I would call the Majesty Factor, the nexus of contrast, power and field.

It's clear that the largest possible apparent field for a given true field yields the most magnification for greater resolution, with a darker sky background for more contrast as a result of the smaller exit pupil. I believe this combination of contrast, power and field causes the typical "wow" reaction — the Majesty Factor. I think Tom Trusock said it most succinctly in his Starfest (Canada) report:

"The same true field at higher magnification means that you'll see blacker skies and more detail." Dennis di Cicco in his 5-star review of Ethos in his October 2007 Sky & Telescope review noted something similar: "Observing with the 12-inch scope, I typically bounce between a wide-field eyepiece for star-hopping and a high-power one for detailed views. But the Ethos gave me both. The field was large enough to star-hop, and the magnification was high enough to bring out faint stars and resolve details in galaxies and star clusters." (He coincidently also illustrated field sizes using the Double Cluster.)

Let's try to quantify the so-called Majesty Factor. While we cannot quantify the majesty of a great symphony, work of art or edifice, I think a meaningful Majesty Factor is quantifiable for those great deep sky views. Here's how:

Let's consider a range of possible eyepieces with apparent fields of 50°, 60°, 68°, 82° and 100°. Now let's pick an object, (like the Double Cluster) and let's say it's properly framed in the field of a 50° Plössl with a 26-mm focal length in an f/4 telescope so the exit pupil = 6.5-mm. Let's arbitrarily assign a factor of 1 to the power (magnification) of this telescope and a factor of 1 to represent the contrast for the 6.5-mm exit pupil. Therefore, for the given true field, the Majesty Factor = 1 (power factor) x 1 (contrast factor) = 1.

Now let's replace the Plössl with a 100° (apparent field) Ethos with a 13-mm focal length. This yields the same true field of view at twice the power with twice the apparent field and half the exit pupil. The 3.2-mm exit pupil is only ¼ the area of 6.5-mm, so the sky background darkens by a factor of 4 (contrast factor). The magnification power factor yields twice the detail or resolution. Therefore: 2 (power factor) x 4 (contrast factor) = 8x Majesty Factor

Working out the math for all the apparent fields listed above, we have:

***Majesty Factor* for Various Apparent Fields for Eyepieces Yielding Same True Field**

Apparent Field (°)		Power Factor		Contrast Factor		Majesty Factor
Plössl	50	1.00	x	1.00	=	1.00
Radian	60	1.20	x	1.44	=	1.73
Panoptic	68	1.36	x	1.85	=	2.52
Nagler	82	1.64	x	2.69	=	4.41
Ethos	100	2.00	x	4.00	=	8.00

A simple rule of thumb is that for any two eyepieces having the same true field of view, the *Majesty Factor* equals the cube of their apparent field ratios. Example is $(100°/70°)^3=2.92$.

"Majesty Factor" Summary

To illustrate the dramatic effect of combining a larger apparent field (yielding greater deep sky details) with smaller exit pupils (yielding fainter stars with darker sky background) we propose the "Majesty Factor". We define it simply as the cube of the ratio of any two different apparent field eyepieces having the same field stop diameters (same true field). Examples:

$(100°/70°)^3 = 2.92$ "M.F." or $(70°/50°)^3 = 2.74$ "M.F." or $(100°/50°)^3 = 8$ "M.F."

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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

May 9th, 2008

7:30 PM @ The Spectator Auditorium

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.