Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 8 No. 9 Sept 2014

The so-called “super-moon” of Aug 10, 2014 rose over the escarpment east of my home well above the normal murk near the horizon because the cliff cuts off about 15° of sky from my location. The Moon and stars are high enough to be above much of the atmospheric turbulence as long as the sky is clear in that direction. The only downside was that Perseid numbers were reduced by bright moonlight. To add insult to injury, the rest of the week during the Perseid shower was cloudy and rainy so the night of the perigean Moon was the only night when a few Perseid fireballs were recorded. Composite image f.l. = 400 mm ISO 1600, exp = 0.6 s for background and 1/1600 for Moon.

Sept 2014 Contents

Venus/Jupiter Conjunction Aug 18

Robert A. was dodging fog on the morning of Aug 18 but persevered to get some nice shots of Venus next to Jupiter with an 85 mm lens and a 300 mm telephoto. His story follows:

It was pretty surreal driving along and watching them rise above the trees and farmland. They sure we're bright.
I was in and out of fog so it was difficult to find a high enough spot to photograph them without the mist diffusing their luminosity or fogging up my lenses.
Luckily the junction of 87 and Fordwich line 30 provided the clearest and highest elevation before I hit the wall of massive fog that thwarted your attempts Brett.
Setting up I disturbed the farmers dog as he started barking at me but no harm, the farmer was already up milking his cows! He must have been thinking, those crazy city folk!.
Boy, what you have to do to get those Astronomy shots eh!. ..LOL.

Robert

Canon 60Da from the boonies North of Fordwich on way back to the "Tub"! No clouds and no fog, luckily! **Image above**: 85mm @ f/4 for 1/4s, ISO 400. **Image left:** 300mm @ f/5 for 1/2s @ ISO 400 Look close at Jupiter.

BAS Executive 2013-2015

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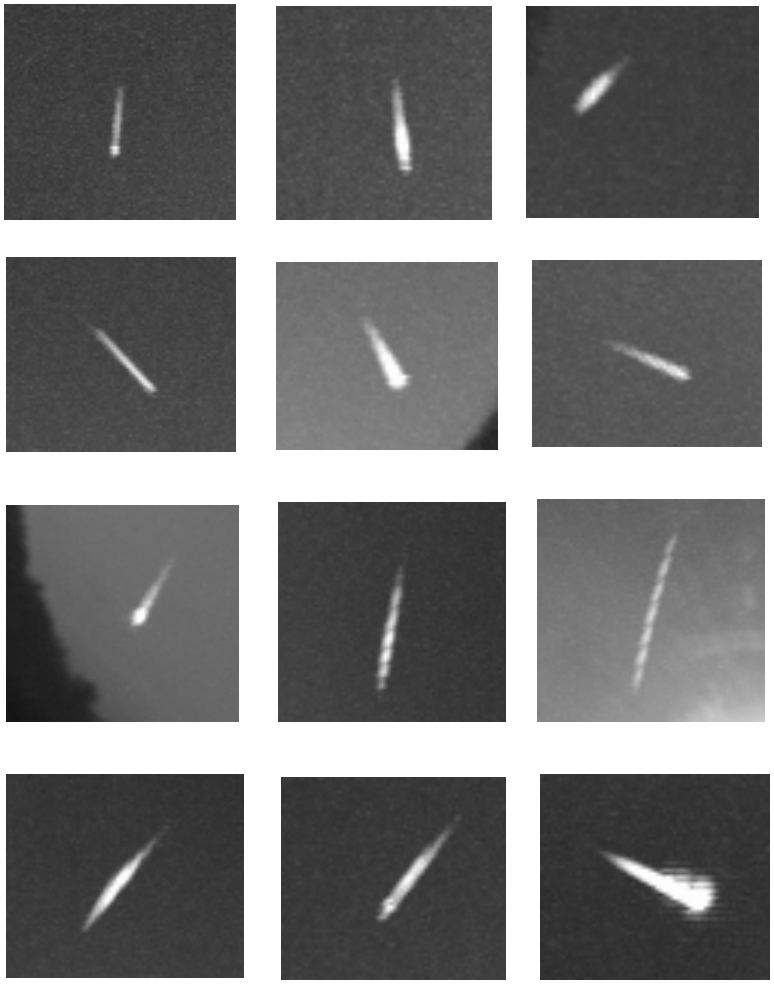
From the "Top": by Aaron Top, president, BAS
See pg. 4 for Aaron's column this month.

Perseid report:

ES Fox meteor camera comes through

The Moon might have been full during the Perseids this year and it may have been cloudy and rainy for much of the week during the peak, but the ES Fox meteor camera operated by UWO was busy recording bright fireballs through breaks in the weather from Aug 9 to Aug 18. It recorded **36 fireball meteors** above the moon light (12 shown below). Jason Gill from UWO kindly sent me pretty much the whole batch of Perseid fireball images when I asked for copies of one or two.



BAS Events in Sep

Sep 3 Wed **BAS meeting** ES Fox 7 pm **Tom Field Spectroscopy Webinar**
Sep 5 Fri (FQ+3) **Public viewing** Grey Roots Museum 9 pm (Members with scopes please)
Venus 0.7° from Regulus 5 am
~~**Sep 6** Sat (FQ+4) **OSFN star tour/talk** ES Fox7:00 pm **(alt. date Sep 20 (LQ+4)** postponed TBA~~
Sep 17 Wed (LQ) **3rd Anniversary of Fox Opening** Happy Birthday Fox Observatory!
Sep 27 Sat (NM+3)**BAS viewing @Fox** @dark Members and guests welcome.

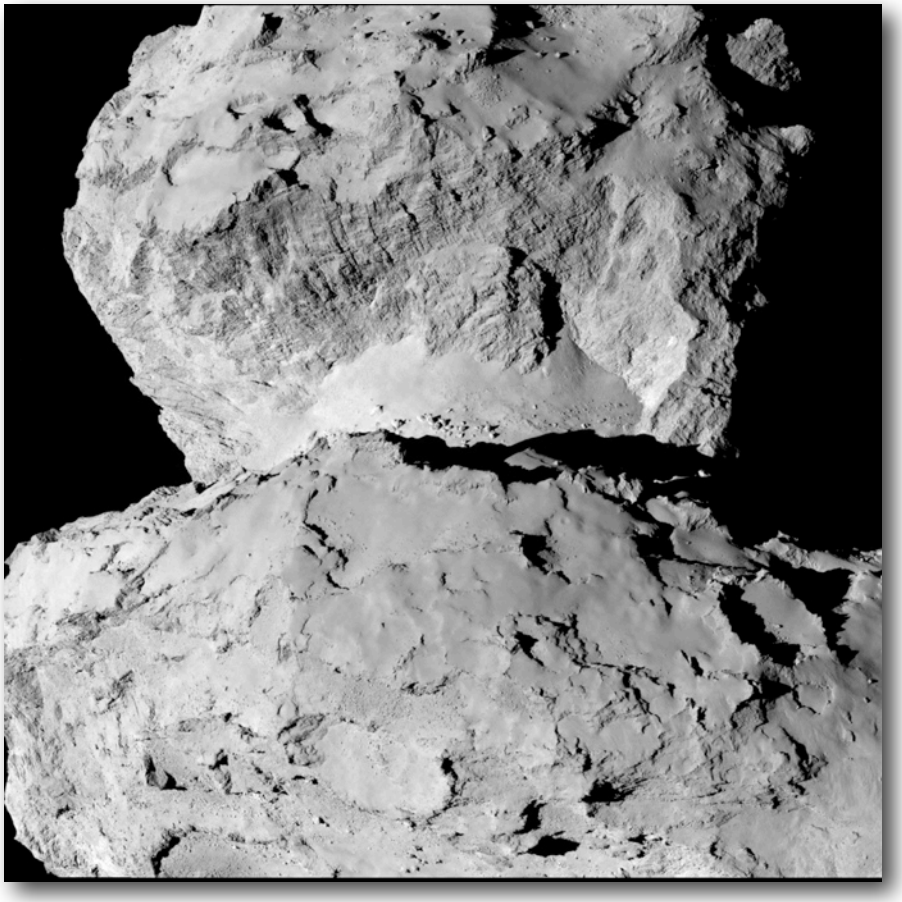
Interesting Astronomical Events in Sep

Sep 9 Tue (FM) ☹ Night of the **Full Moon** "Harvest Moon"
Sep 12 Fri (FM+3) Saturn's Moon Rhea occults a background star -rare! 8:38 DST in E. Canada
Sep 20 Sat (LQ+3) Mercury 0.5° from Spica low in West after sunset
Sep 24 Wed (NM) ☻
Sep 28 Sun (NM+4) Moon occults Saturn, Ceres and Vesta all on same day (none visible locally)

From the Editor:

What an amazing month it has been for Space Science and Astronomy! Along with the regular goings on like Curiosity on Mars, New Horizons getting closer to its target, and discoveries of triple black holes, we have a spacecraft now in orbit around a comet looking for sites to put down a lander. On Aug 6 Rosetta and its attached (for now) lander Philae, went into its initial orbit around Comet 67P/Churyumov–Gerasimenko, (henceforth called 67P/C-G). SGN has tried to keep up with the developments in these pages but the information was becoming "obsolete" by the day. You can stay up-to-date on our BAS website on the HOME page as news breaks. Exciting times! And more to come...

Orbit Achieved Aug 6, 2014



After a decade-long journey chasing its target, ESA's Rosetta has today become the first spacecraft to rendezvous with a comet, opening a new chapter in Solar System exploration.

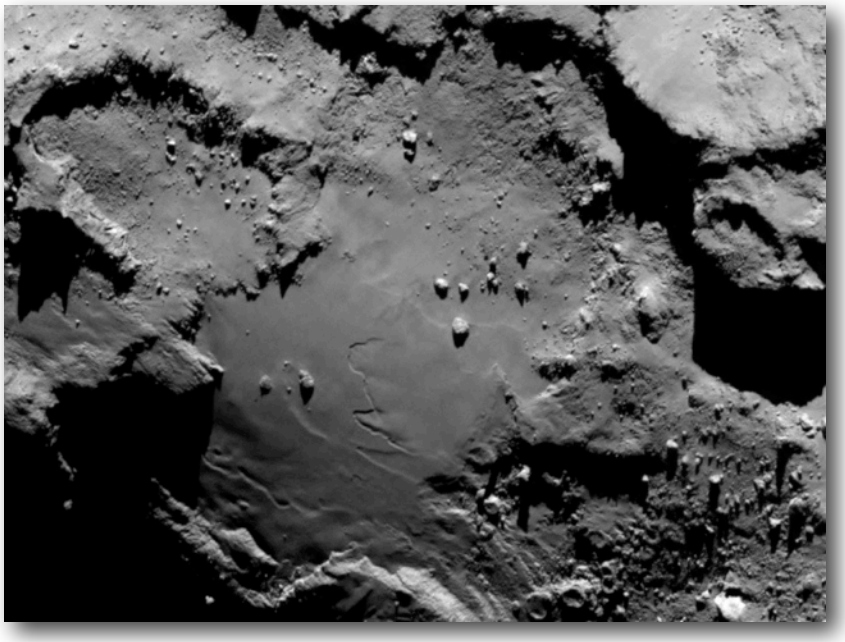
Comet 67P/Churyumov–Gerasimenko and Rosetta are now 405 million km from Earth, about half way between the orbits of Jupiter and Mars, rushing towards the inner solar system at nearly 55 000 km/h.

The comet is in a 6.5-year orbit and Rosetta will accompany it for over a year as they swing around the Sun and back out towards Jupiter again. Comets are considered to be primitive building blocks of the solar system and may have helped to 'seed' Earth with water, perhaps even the ingredients for life. But many fundamental questions about these enigmatic objects remain, and through a comprehensive, in situ study of the comet, Rosetta aims to unlock the secrets within.

The journey to the comet was not straightforward, however. Since its launch in 2004, Rosetta had to make three gravity-assist flybys of Earth and one of Mars to help it on course to its rendezvous with the comet. This complex course also allowed Rosetta to pass by asteroids Šteins and Lutetia, obtaining unprecedented views and scientific data on these two objects.

"After ten years, five months and four days travelling towards our destination, today saw the last of a series of ten rendezvous manoeuvres that began in May to adjust Rosetta's speed and trajectory gradually to match those of the comet.

The comet began to reveal its personality while Rosetta was on its approach. Images taken by the OSIRIS camera between late April and early June showed that its activity was variable. The comet's 'coma' – an extended envelope of gas and dust – became



rapidly brighter and then died down again over the course of those six weeks.

In the same period, first measurements from the Microwave Instrument for the Rosetta Orbiter, MIRO, suggested that the comet was emitting water vapour into space at about 300 millilitres per second. Meanwhile, the Visible and Infrared Thermal Imaging Spectrometer, VIRTIS, measured the comet's average temperature to be about –70ºC, indicating that the surface is predominantly dark and dusty rather than clean and icy which would have been colder.

Then, stunning images taken from a distance of about 12 000 km began to reveal that the nucleus comprises two distinct segments joined by a 'neck', giving it a duck-like appearance. Subsequent images showed more and more detail. "Our first clear views of the comet have given us plenty to think about," says Matt Taylor, ESA's Rosetta project scientist. "Is this double-lobed structure built from two separate comets that came together in the solar system's history, or is it one comet that has eroded dramatically and asymmetrically over time? Rosetta, by design, is in the best place to study one of these unique objects."

Today, Rosetta is just 100 km from the comet's surface, but it will edge closer still. Over the next six weeks, it will describe two triangular-shaped trajectories in front of the comet, first at a distance of 100 km and then at 50 km. At the same time, more of the suite of instruments will provide a detailed scientific study of the comet, scrutinizing the surface for a target site for the Philae lander.

Eventually, Rosetta will attempt a close, near-circular orbit at 30 km and, depending on the activity of the comet, perhaps come even closer. As many as five possible landing sites will be identified by late August, before the primary site is selected in mid-September and deploying Philae is expected for 11 November. "After landing, Rosetta will continue to accompany the comet until its closest approach to the Sun in August 2015 and beyond, watching its behaviour from close quarters to give us a unique insight and realtime experience of how a comet works as it hurtles around the Sun."

Up-to-date images will be presented at the ESA Portal here:
http://blogs.esa.int/rosetta/

Summer Time Star Gazing From The Fox and The Bruce Peninsula National Park

From the "Top":

by Aaron Top, pres. BAS

Hello fellow astronomers and new guests as well. I hope you have all been enjoying your summer :D As for me, I have managed to get out to the Fox Observatory several times now as well as to other summer star gazing activities. I'll start with the Dark Sky weekend July 25-27. I, along with other BAS members were at the Bruce Peninsula National Park for the Dark Sky Weekend. Although the weather did not fully co-operate, I think we managed to stay in good cheer and had a great time! We also got to see one superb lightning storm along with hiking to the trails, checking out the Grotto etc. On Friday, the first night, we did set up the Webster 28" but were battling the clouds for any sucker holes we could get. We managed to catch a few objects. On the Saturday (Day 2) it rained in the morning and became overcast for the rest of the day until a violent thunder storm arrived late in the afternoon. It lasted until midnight when it then cleared. Only Brett and I were still awake so we decided to go down to Horse Lake with our chairs. I set up my camera and he was busy with his binos for about an hour and half before it clouded over again. Nonetheless despite the weather it was super time with great friends.

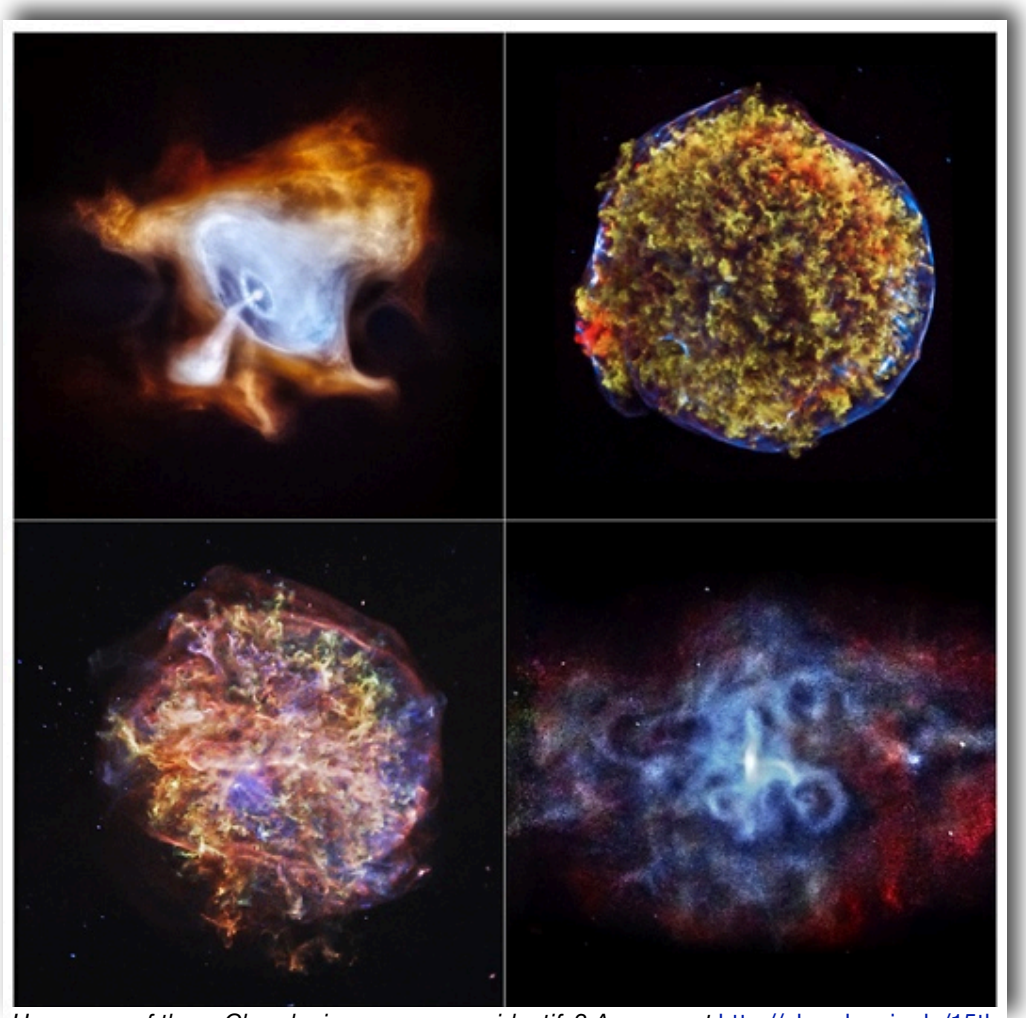
[There were a total of 9 BAS members that showed up at various times over the weekend, but some left early because of the poor weather conditions. Those that arrived Friday had about 2 dozen visitors that night who did get looks at Saturn and a few other objects through breaks in the clouds. Although the viewing with the new mirror was generally reported to be excellent, it was not a good test viewing for the newly-aluminized 28" mirror. That will probably happen during Starfest. -ed]

Aaron's images on this page indicate how lucky we are to have the dark skies that we do in this area. Both images were taken at the Fox Observatory July 23, 2014.

Image upper right: Andromeda Rising: Canon 60Da, 200 s image, ISO 5000, f = 26 mm, f/4.5. M31 is obvious near centre, but look also for the Double Cluster in Perseus and the entire "W" of Cassiopeia.

Image lower left: MW in Cepheus: Canon 60Da, 260 s image, ISO 5000, f = 47 mm, f/5.6. The elephant Trunk Nebula (IC1396) is near centre.

Chandra X-ray Observatory Celebrates 15th Anniversary



How many of these Chandra images can you identify? Answers at http://chandra.si.edu/15th

Fifteen years ago, NASA's Chandra X-ray Observatory was launched into space aboard the Space Shuttle Columbia. Since its deployment on July 23, 1999, Chandra has helped revolutionize our understanding of the universe through its unrivaled X-ray vision.

Chandra, one of NASA's current "Great Observatories," along with the Hubble Space Telescope and Spitzer Space Telescope, is specially designed to detect X-ray emission from hot and energetic regions of the universe.

With its superb sensitivity and resolution, Chandra has observed objects ranging from the closest planets and comets to the most distant known quasars. It has imaged the remains of exploded stars, or supernova remnants, observed the region around the supermassive black hole at the center of the Milky Way, and discovered black holes across the universe. Chandra also has made a major advance in the study of dark matter by tracing the separation of dark matter from normal matter in collisions between galaxy clusters. It also is contributing to research on the nature of dark energy.

To celebrate Chandra's 15th anniversary, four new images of supernova remnants – the Crab Nebula, Tycho, G292.0+1.8, and 3C58 – are being released. These supernova remnants are very hot and energetic and glow brightly in X-ray light, which allows Chandra to capture them in exquisite detail.

"Chandra changed the way we do astronomy. It showed that precision observation of the X-rays from cosmic sources is critical to understanding what is going on," said Paul Hertz, NASA's Astrophysics Division director in Washington. "We're fortunate we've had 15 years – so far – to use Chandra to advance our understanding of stars, galaxies, black holes, dark energy, and the origin of the elements necessary for life."

Chandra orbits far above Earth's X-ray absorbing atmosphere at an altitude up to 139,000 km (86,500 mi), allowing for long observations unobscured by Earth's shadow. When it was carried into space in 1999, it was the largest satellite ever launched by the shuttle.

"We are thrilled at how well Chandra continues to perform," said Belinda Wilkes, director of the Chandra X-ray Center (CXC) in Cambridge, Massachusetts. "The science and operations teams work very hard to ensure that Chandra delivers its astounding results, just as it has for the past decade and a half. We are looking forward to more ground-breaking science over the next decade and beyond."
Originally called the Advanced X-ray Astrophysics Facility (AXAF), the telescope was first proposed to NASA in 1976. Prior to its launch aboard the shuttle, the observatory was renamed in honor of the late Indian-American Nobel laureate, Subrahmanyan Chandrasekhar. Known to the world as Chandra (which means "moon" or "luminous" in Sanskrit), he was widely regarded as one of the foremost astrophysicists of the 20th century.

"Chandra continues to be one of the most successful missions that NASA has ever flown as measured against any metric – cost, schedule, technical success and, most of all, scientific discoveries," said Martin Weisskopf, Chandra Project Scientist at the Marshall Space Flight Center in Huntsville, Ala. "It has been a privilege to work on developing and maintaining this scientific powerhouse, and we look forward to many years to come."

NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, controls Chandra's science and flight operations.

For Chandra images, multimedia and related materials, visit:
http://www.nasa.gov/chandra
Additional information on Chandra and the 15th anniversary can be found at:
http://chandra.si.edu/15th

J.D. Harrington
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In the Namib Desert, H.E.S.S. Observes Celestial "Tygers"

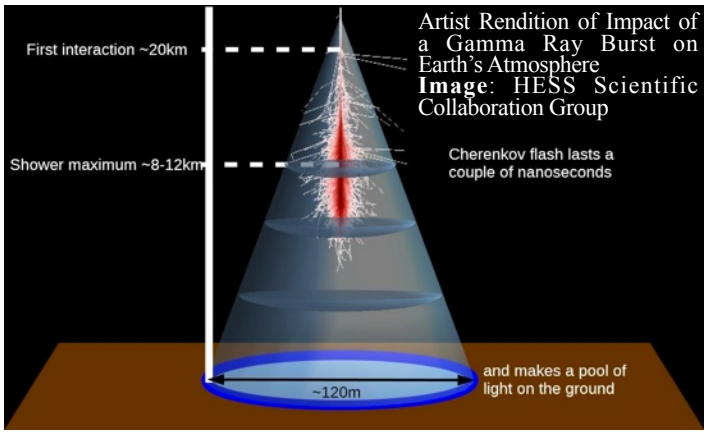
"*Tyger Tyger, burning bright,*
In the forests of the night;
What immortal hand or eye,
Could frame thy fearful symmetry?

In what distant deeps or skies.
Burnt the fire of thine eyes?
On what wings dare he aspire?
What the hand, dare seize the fire?"

William Blake, " The Tyger"
"Songs of Experience" 1794

Below: *H.E.S.S. II, "High Energy StereoScopic Telescope Array", near Gamsberg Pass, Namibi* **Credit***: H.E.S.S. Scientific Collaboration Photo*

This event is almost too scary and simply underscores the dangerous universe in which we live. Fifty thousand years ago, on the other side of our galaxy opposite to our Sun, a magnetar, (an incredibly dense neutron star), experienced a star-quake and a single-centimetre crack occurred in its surface crust. It is estimated that the quake would have registered 23 on the exponential Richter scale! In just a fifth of a second, the magnetar released more energy than the Sun does in 250,000 years! That incredible energy was carried away as an intense gamma ray burst and, on December 27th, 2004, it reached our solar system. At the time, NASA had a gamma ray telescope in orbit, called Swift. The gamma ray flux was so intense that, even though Swift wasn't pointed toward the magnetar, its gamma ray detectors were overwhelmed. Indeed, the Earth's magnetic field oscillated like a spring board for many minutes, and the upper levels of our atmosphere were partly ionized. Had this magnetar been closer to us than 8,000 LY and its magnetic axis pointed toward our solar system, then it would have caused major atmospheric damage and genetic mutations in our biosphere. Had the English poet, William Blake, known about magnetars in the late 1700's he would probably have had them in mind when he penned his masterful poem, "The Tyger". This poem, more than any other, reminds me of the powerful physical forces playing out in our universe.

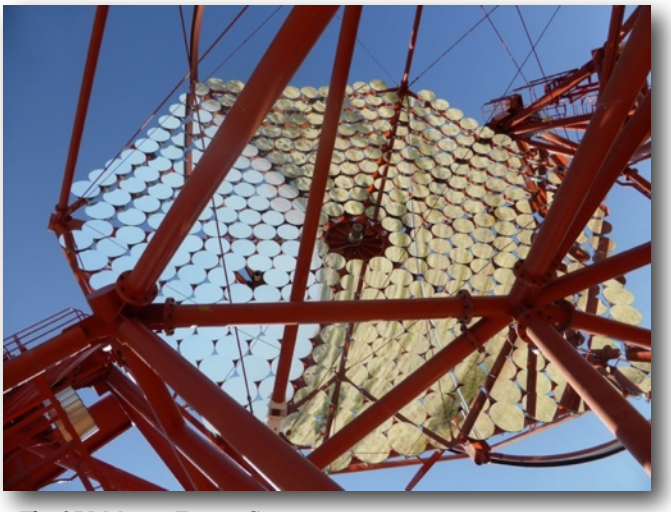


Artist Rendition of Impact of a Gamma Ray Burst on Earth's Atmosphere **Image**: HESS Scientific Collaboration Group

In "The Tyger", Blake captured a universal essence of human perception. Our human capability to perceive dualities; that is, to see both "heaven and hell", "beauty and power", and "good and evil" in the same phenomenon. In this brief poem, Blake contrasts the stunning beauty and symmetry of the "Tyger", with its the embodiment of fearful power. The cosmos is literally scintillating with outbursts of extreme energies. These high energy pulses can originate from rotating neutron stars, (pulsars or magnetars), or from compact quasars, called "blazars", or from Type II supernovae explosions. All of them provide awesome examples of the immense energies released in certain extreme astrophysical events. However, viewed from a respectful distance, the physical objects within which these high energies are fashioned are quite beautiful, much like Blake's Tyger.

When gamma rays strike the Earth's upper atmosphere, at about 10 km altitude, the energetic collisions generate an air shower of secondary particles such as high speed electrons. This shower of secondary particles is accompanied by a faint, bluish "light-pool" of Cherenkov radiation (named after Pavel Cherenkov). If a large enough telescope with a sensitive detector is built in a dark site and is located within this "light-pool", its detector will see this faint air shower of Cherenkov radiation. However, a single telescope does not have the resolution to reconstruct the exact geometry needed to pin-point the celestial origin of the original gamma rays. To solve this problem, an array of telescopes, separated by the right distance, permits a stereoscopic reconstruction of the shower's geometry. Properly interpreted, this information can identify the gamma ray's location on the celestial sphere. Such a telescope array has been built at a dark sky site in Namibia, near Gamsberg, located about 100 km SW of the capital city of Windhoek. It is called the High Energy StereoScopic System (or H.E.S.S.-II) and it is comprised of 5 separate telescopes. This past June, Paula and I, along with 6 other Canadians, were on an extended visit to Namibia and South Africa. We visited H.E.S.S. and Albert Jahnke, the Managing Director, kindly provided an in-depth tour of this fascinating facility.

The H.E.S.S. facility is the largest gamma ray observatory in the world and is operated by a collaboration of 170 scientists, representing 32 scientific institutions from 12 different countries. The system consists of four 12 metre telescopes and a huge 28 metre telescope which weighs 600 tons, and consists of 875 reflective mirror facets, each 0.9 metre in size. These facets are equipped with 2 actuators that can tilt each facet to an accuracy of 1 arc second and are focused for an object distance of 10 kilometres, corresponding to the altitude of air shower of Cherenkov radiation.



The 875 Mirror Facets Comprising the Reflecting Surface of the H.E.S.S. 28 m Reflector (Cunningham Photo)

Central to the operation of the H.E.S.S. system is the innovative camera. This camera is the size of a garage door and weighs almost 3 tons. It is attached at the prime focus position above the mirror, at the height of a 20 storey building when the scope is pointed at the zenith. This camera is designed to record fleeting gamma ray bursts and able to record the faint Cherenkov radiation with exposures of a few billionths of a second.

In its short career H.E.S.S. has made numerous discoveries in high energy astrophysics. To name just a few, H.E.S.S. has discovered high energy gamma ray emission from the gas clouds surrounding the Milky Way's central regions; discovered for the first time gamma radiation from the radio galaxy, Centaurus A; discovered gamma radiation emanating from the energetic pulsar at the heart of a supernova remnant located in the Carina Arm of our galaxy; increased the known number of extragalactic BL Lacertae objects that are high energy gamma ray emitters; and discovered unusual flaring activity in a blazar where the active jets are oriented along our line of sight, thus permitting better modeling of the structure of the jets. In terms of citations, H.E.S.S. is ranked in the top 10 of observatories in the world and that ranking list includes the space telescopes, HST, and Spitzer, and the ground based telescopes of Paranal, Kitt Peak, Mauna Kea, and the Canary Islands. Namibia has the perfect climate for locating a gamma ray telescope and H.E.S.S. demonstrated the wisdom in building it there. Indeed, Namibia has the inside track to be chosen as the site for the next generation of ground-based gamma ray telescopes, called the Cherenkov Telescope Array. The decision will be announced in October, 2014 and we wish them success ! Our day at H.E.S.S. was amazing !

***Above**: As we enter the H.E.S.S. facility a family of warthogs scatters (Cunningham Photo)*
***Below:** H.E.S.S.'s View of the Gamma Ray Sky (supplied photo)*

Albert Jahnke,
H.E.S.S. Managing Director

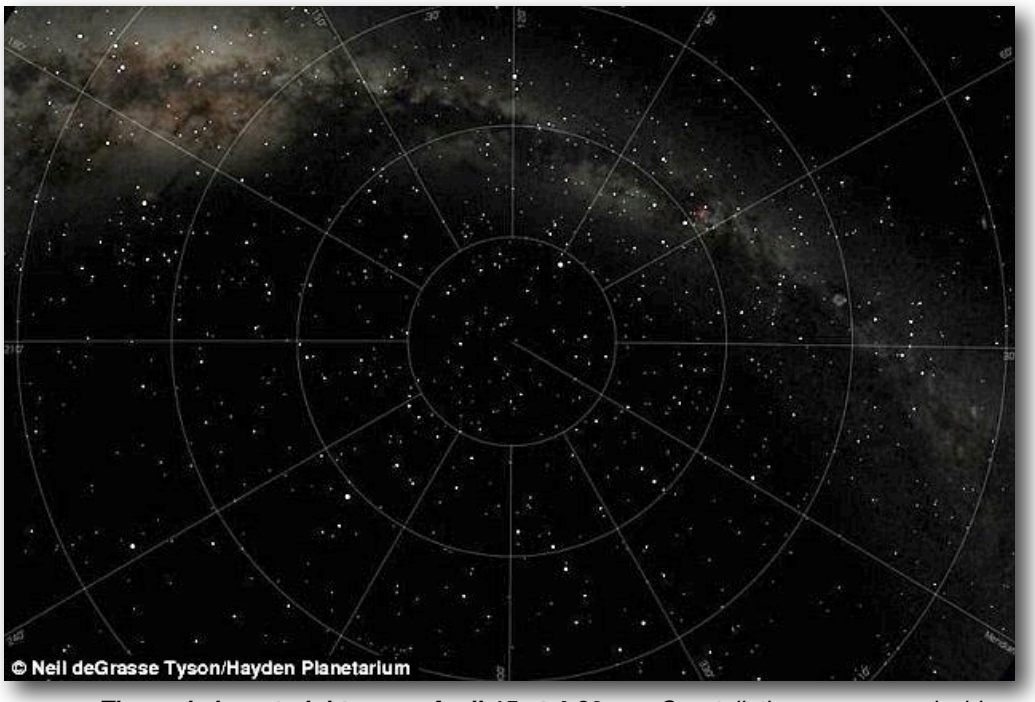
Neil deG. Tyson vs Titanic Director James Cameron

At the Aug 3 meeting, the highlight of the night (along with the popcorn!) was the clip of Neil deGrasse Tyson relating the story of how he "fixed" the night sky scene at the end of the *Titanic* movie. The original full interview with Stephen Colbert is hilarious and worth the hour or so of time you need to see it. (Make up a bag of popcorn and enjoy!)

***Nothing right about this sky**. No constellations are recognizable on this sky image. Note the circle of stars just left of centre which is an obvious reflection about a vertical axis. Someone's idea of a stellar Rorschach test?*

The story started when Dr. Tyson noticed something funny about the sky scene near the end of the film as Titanic is sinking. Tyson makes the point that because the time of the event (4:20am on April 15, 1912) is well documented it should be easy to recreate the night sky as seen on that occasion. "It was the wrong sky!" he says. Furthermore part of the sky is just mirror-imaged to fill in the screen. "Not only the wrong sky, but lazy!" he adds.

Tyson wrote a letter (on his "finest stationary") to director James Cameron, complaining but got an evasion. "It was done in post-production". That got Dr. Tyson even angrier. He wrote more letters but got no response at all to those. Finally, at a dinner meeting with Cameron several years later at the Hayden Planetarium (Tyson gleefully pointed out that it was on his home turf!), he brought up the issue again. Said Dr. Tyson: "'My issue here is not that the sky was wrong, it was that you got everything else right.'"



***The real view straight up on April 15 at 4:20 am**. Constellations are recognizable on this sky image and so is the winter Milky Way. Tyson generated this star map on request from Titanic Director Jim Cameron's staff for an accurate stellar portrayal of the view at the time of Titanic's sinking. Stories of the sinking from eyewitnesses confirm the fact that the sky was clear on that occasion.*

How Cameron responded was described by Stephen Colbert as "retreating into his bank account". Said the *Titanic* director: "The last time I checked, *Titanic*, worldwide, had grossed 1.3 Billion dollars. I wonder how much more money the film would have grossed if I got the sky correct." Tyson, to say the least, was deflated but he was not going to give up.

Cameron said: 'Neil deGrasse Tyson [later] sent me quite a snarky email saying that, at that time of year, in that position in the Atlantic in 1912, when Rose is lying on the piece of driftwood and staring up at the stars, that is not the star field she would have seen. 'And with my reputation as a perfectionist, I should have known that and I should have put the right star field in.'

Dr. Tyson said his tenacity finally paid off, saying that he was 'nipping at his [Cameron's] heels' for ten years.

It happened when Cameron decided to issue a 10-yr anniversary 3D version of *Titanic*. Dr. Tyson relates how he received a phone call from the production department of the film. "Mr. Cameron is releasing a director's cut of the film and he tells us that you have a sky we can use." The new 3D version of *Titanic* – complete with the astronomically correct night sky – came out in April 2012.

Good work, Dr.Tyson!

Building a 12-inch f/6 Truss Tube Telescope -One Amateur's Odyssey *by John Hlynialuk*

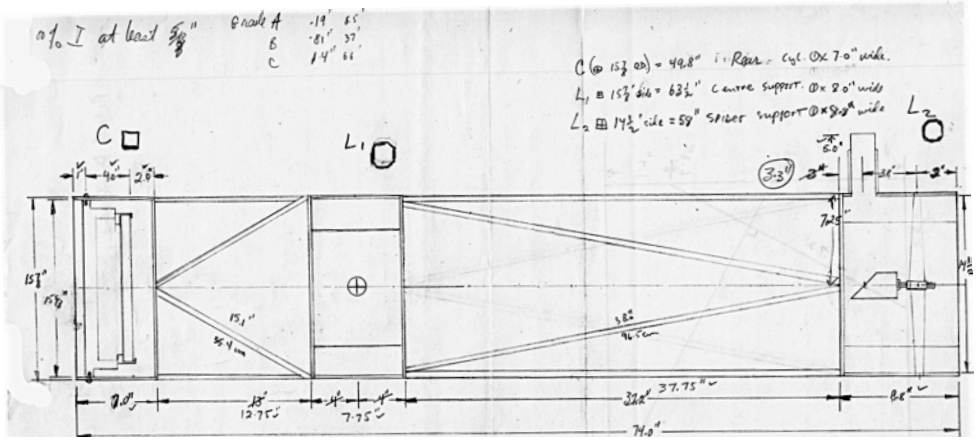
Being a struggling teacher in the 70's/80's and raising a family and all that, meant that not a lot of money was available for telescope purchases. I decided that building one was the best way to get a large telescope and all things considered, I settled on a 12.5 inch telescope that would be equatorial, (no Dobs for me, I wanted to do photography!)

This two part series (second installment next month) is the story of that build. I hope it will give you an appreciation for what was the standard practice a generation ago when amateur astronomers wanted large optics. Along the way, there will be some interesting information about how telescopes work and what you need to know when you are looking for one of your own (to buy, probably, not build).

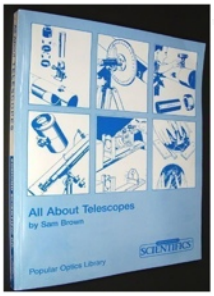
Sam Brown's ***All About Telescopes*** was the standard reference for several generations of telescope builders and is still in print and useful (about $30 from Amazon.com). I used the chapter on ray-tracing to help get the size of secondary mirror and dimensions of the focuser. I picked a truss tube scope design early on because of its strength and light weight. (Diagram below).

Many amateurs would start with a glass blank and grind their own mirror but that introduces another level of complexity. I had no desire (or room) for a mirror-grinding setup and test bench with associated equipment, so I purchased a suitable mirror from a well-respected optical company in the US. Coulter Optics were making a name for themselves producing large dobsonian mirrors (13's and 17's) and they guaranteed a high-quality 12.5 inch for about what it would cost for a blank, grinding abrasives, and final aluminizing that needed to be done on a home-made mirror. It was an easy decision to pay a little extra ($20) for a custom f/6 mirror that fit my needs -it came aluminized and ready to install!

A focal length of 75.8" (1925 mm) determined other dimensions like the length and diameter of the tube, the size of the secondary and its location and the size of the focuser. The mirror cell, focuser and secondary holder were purchased from Kenneth Novak Co., also American, an actual "mom and pop" supplier of quality optical parts. I paid a bit more for these but they have held up wonderfully for 34 years so far. I have rarely had to re-grease the focuser for winter use, for example. Sadly, both Coulter and Novak are no longer in business, Coulter went bankrupt in 1995 and Novak (the company) stopped production when Novak (the owner) died a few years ago. In any case, I got one of Coulter's last "good" full-thickness mirrors before they started mass-producing their thinner dob mirrors and quality declined somewhat.

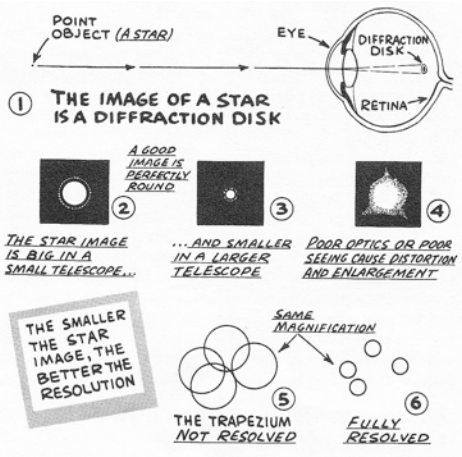


One of many design sketches that helped lay out the components. This one shows the Serrurier truss tube structure that connected three "cylindrical" sections (C, L1 and L2) where the critical parts like secondary mirror and focuser (L2), the fork bearings (L1) and the mirror cell (C) were attached. The "cylinders" ended up being two octagons and a square.



Sam Brown's *All About Telescopes* (still available) has some dated sections but it is still an excellent reference. I used it to do the ray-tracing that was necessary to define the dimensions of the components. One section I did not need were the chapters on mirror grinding and polishing. Recognizing that I did not have the patience for this tedious job, I decided to buy a 12-inch mirror and matching secondary from the well respected opticians at Coulter Optical. More about the Coulter Optical story can be found here: https://sites.google.com/site/coulterodyssey/index

Example of Brown's wonderfully graphic style. Follow the numbers to get the story.



Focal Length: The Most Important Mirror Dimension

Focal Length of a telescope mirror is a good indication of how long the tube will be (if the design is not a folded optics design like a Cassegrain). So a focal length of 75.8 inches (my mirror) means a tube about 5 ft long.

F/ratio is found by dividing the focal length by the aperture and determines the size of the images produced among other things. An f/2 for example gives a wide-field and is then referred to as a rich-field telescope. The majority of amateur reflectors at the time I built Cyclops (an f/6) were f/8 or larger. Schmidt-Cassegrains like those made by Celestron and Meade were f/10. I chose an f-ratio of f/6 to keep the tube length on the short side so it would be lighter and more portable. It also meant a smaller, less expensive observatory when I got around to building one. I did not select a rich-field telescope, because at low f-ratios, an aberration called coma appears that makes stars at the edges of field of view appear like seagulls. Nowadays, many eyepieces correct for this aberration, but it took Al Nagler to design his special eyepieces to start the revolution.

Magnification is determined most simply by dividing the objective focal length by the eyepiece focal length. So my telescope with a 25 mm eyepiece, and 1925 mm focal length (75.8 inches x 25.4 mm per inch) would give 1925÷25 = 77 power. One of my favourite comet and galaxy hunting eyepiece is a 55 mm (2-inch) Plossl that gives 35 power -a "poor-man's" rich-field telescope.

Before the days of the red-dot finder, a regular small refractor was usually used as the finder scope. The one I constructed from surplus optics is still in use and is composed of an objective lens from an overhead projector and a B&H 16 mm film projector lens for an eyepiece. The 2.5-inch (6.25 mm) diameter objective has 14-inch (350 mm) focal length and the Bell&Howell film projector lens "eyepiece" (125 mm focal length) gives about a 3X finder with a 6° field of view. Nice for centering after the red-dot gets you in the general location. Thick-walled aluminum tube was turned to fit the optics and with a minimum of shims, everything fits together very well. The two-inch B&H "eyepiece" has a nice wide FOV. Image shows it pulled out of the tube.

Image Top Right: The first generation 12-inch ("Cyclops-1") was a massive affair that had NO aluminum parts in the structure except the finderscope. I knew how to weld steel so that was the default material. Aluminum took special welding techniques that I had not mastered (to this day). If I had know then that Aluminum could be worked with ordinary carbide-tipped wood-working tools I might have reconsidered the choice of building in steel.


"Cyclops-1" circa 1984 at Starfest

The sections to which the trusses were attached (they were welded) were fabricated from long strips of steel plate I found at a local junkyard. I simply grooved them at the appropriate place and folded the strip into an octagon shape for both the eyepiece end and the centre bearing section. The lower mirror cell end was made into a square (I got tired of making octagons) and a triangular support was welded in place inside the square to attach the three struts of the mirror cell. The finished tube was not light but strong! I could just carry it single-handed (minus mirror), but manipulating the tube into the fork bearing was a two-person job.

Image top right is from Starfest 1984 or so. Cyclops-1 was a heavy weight and tipped the scales with the base support at around 400 pounds. But it was still portable and with a little help could be rolled up onto a trailer that got it to lots of places! The telescope did not track, but it was equatorial with a permanent 45° polar axis that had a threaded support that provided small changes in elevation. Short exposure photos of the Moon, Sun and bright planets were possible but nothing longer than a fraction of a second or so.

First Light:

The first light of the assembled 12-inch telescope (I did not christen it "Cyclops" till later and there was no Champagne involved -at least no bottles got broken) was on Aug 18, 1980 at 9:15 pm (34 years to the day that I write this). And the first object was the FQ Moon. (The Moon has always been a favourite...) The first star viewed was Vega and I recall its bright electric blue colour to this day. M13, the Great Cluster in Hercules was next on the list that night but the Moon was brightening the sky so the view was surpassed on later occasions with darker skies. Other objects I viewed were Alcor/Mizar, Arcturus, the Double-Double -easily split with a 20 mm Kellner eyepiece. I also looked at Albireo and the Ring Nebula and spent a long time sweeping through the Milky Way clouds in Cygnus. I quit at 11:30 pm when clouds rolled in.

The nice f/6 focal ratio gave a reasonable field of view and I recall some excellent views of the Sagittarius clusters and nebula. My favourite is still a cluster in Scutum, M11, the Wild Duck Cluster.

The rudimentary mounting shown above was desperately in need of a clock drive. I had purchased a high-quality Byers 9-inch gear but I did not install it. That required some mount modifications and a slightly longer polar axis that I did not get around to making until I decided to create "Cyclops-2". I still needed a scope that tracked for ease of viewing and longer exposure photography so I purchased a nice, almost-new, C-8 which became my travel scope. That scope has since "travelled" to St.Paul MN without me, but my son who lives there uses it when he can for viewing. I have replaced it with another Celestron, a 9.25 inch EdgeHD. **[Part 2 will appear next month.]**

First Quarter Moon: SImilar to the view on Aug 18, 1980, this is one of the first images taken with my new 9.25-inch Celestron EdgeHD. Aug 4, prime focus 2350 mm, f/10, exp = 1/16 s, ISO 200. Visible near bottom is the large crater Clavius and the prominent smaller one above it is Tycho, its rays visible centre right. Upper left is Copernicus (half in shadow and to its right is Eratosthenes. The Moon is always interesting when the deep sky is not available.

Cygnus (Cyg)

β Cygni - Albireo
ε Cygni-Gienah
α Cygni - Deneb
γ Cygni - Sadr
π Cygni - Azelfafage

Cygnus is a beautiful, easily recognized constellation in the form of a giant cross; it is sometimes called the Northern Cross. Deneb, a brilliant white star of magnitude 1.3 (18th of the 20 brightest stars), marks the top of the cross. There are many bright stars in Cygnus; it lies directly in the Galactic Plane and is therefore embedded in the Milky Way. Sweep this entire area with binoculars and note the many stars and clusters. The triangle outlined by α, γ and ε Cygni encloses the region known as the "[Northern] Coal Sack," a dark area in the Milky Way caused by an obscuring cloud of cosmic dust with no nearby stars to illuminate it. 61 Cygni, a double star, is the first star whose distance was measured.

DOUBLE STARS

	Mag.	Sep'n (s)	Location	Remarks
β	3.1-5.1	35	192928	Gold-Blue; beautiful contrast; one of the finest doubles.
δ	2.9-6.4	2	194445	Pale Green-Ashen
μ	4.7-6.1 -11.5-6.2	1-50-200	214228	Quadruple
o2	3.7-6.5 -5.0	107-337	201247	Yellow-Blue-Blue; triple.
τ	3.9-6.3	0.8	211338	
ψ	4.9-7.4	3	195552	White-Lilac.
16	6.3-6.4	38	194151	
17	5.0-10.5	26	194534	Red-Blue; fine field low power.
26	5.3-9.3	41	200050	Yellow-Blue.
52	4.3-9.2	6	204431	Yellow-Blue.
59	4.9-9.3	20	205947	
61	5.5-6.4	26	210538	First to have distance meas.

MESSIER OBJECTS (Cyg)

	Mag	Location	Remarks
M 29	7.1	202238	Open Cluster.
M 39	5.2	213048	Open Cluster.

MESSIER OBJECTS (Lyr)

	Mag	Location	Remarks
M 56	-	191530	Globular Cluster.
M 57	9.3	185233	Planetary Nebula. The famous "Ring Nebula"; resembles a perfect smoke ring with 15th magnitude star at center. The annular shape is visible in larger telescopes; in a small telescope it appears as a faint misty patch.

Other Objects of Interest in Lyra

R Lyrae - An irregular variable, mag range 4.0-4.5. Location 185344.

W Lyrae - Long period (196 d) var. max mag 7.9. Location 181337.

RR Lyrae - A very rapidly pulsating variable (period 0.567 days) that is the prototype of this class of variables. Magnitude range 6.9-8.0. Location 192443.

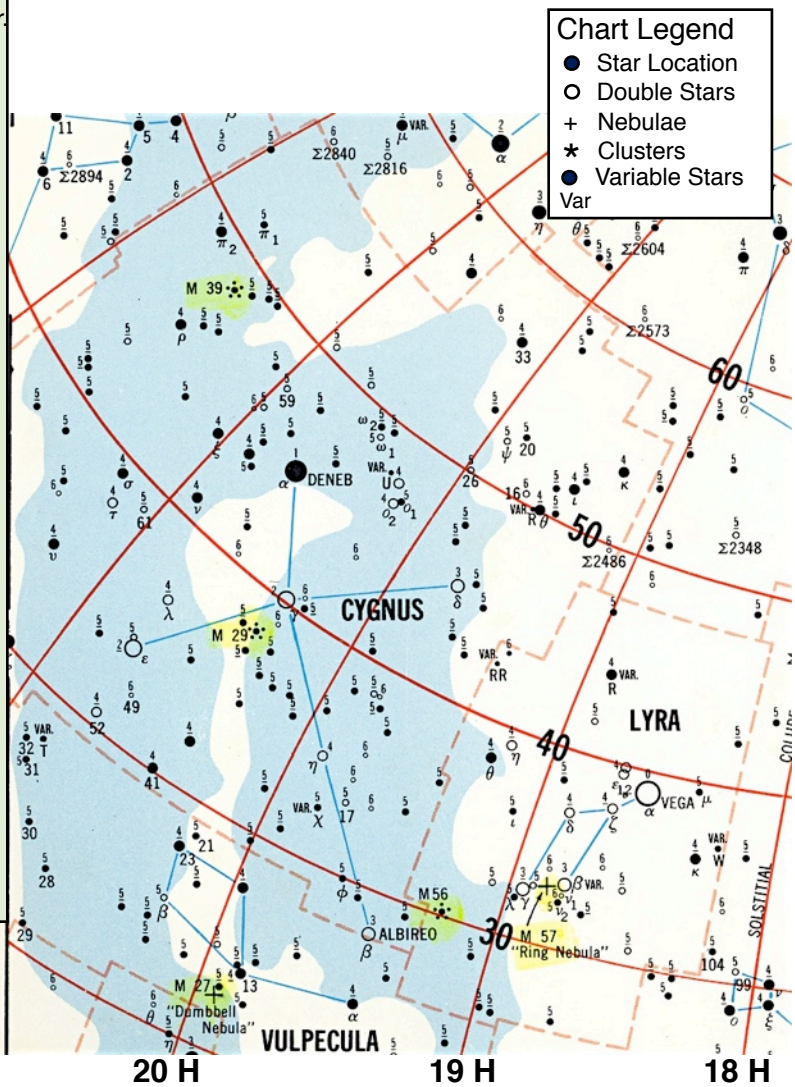
Lyra (Lyr)

α Lyrae - Vega
γ Lyrae - Sulafat
β Lyrae - Sheliak

Lyra is easily identified because of Vega, a brilliant white star of magnitude 0.1, the fourth brightest star in the sky and the second brightest visible from northern latitudes. Four smaller stars lie in a faint but conspicuous parallelogram just to the southeast of Vega. Although a small constellation, Lyra is rich in stars; sweep slowly with binoculars, particularly the area between β and γ Lyrae. Do not fail to observe β Lyrae, an eclipsing binary whose light changes are visible to the naked eye, the magnitude varying from 3.4 to 4.3. ε-Lyrae is the famous "double double"; persons with very keen eyesight can see the two components. They are easily split with binoculars. In a telescope, each of the components itself becomes a double.

DOUBLE STARS

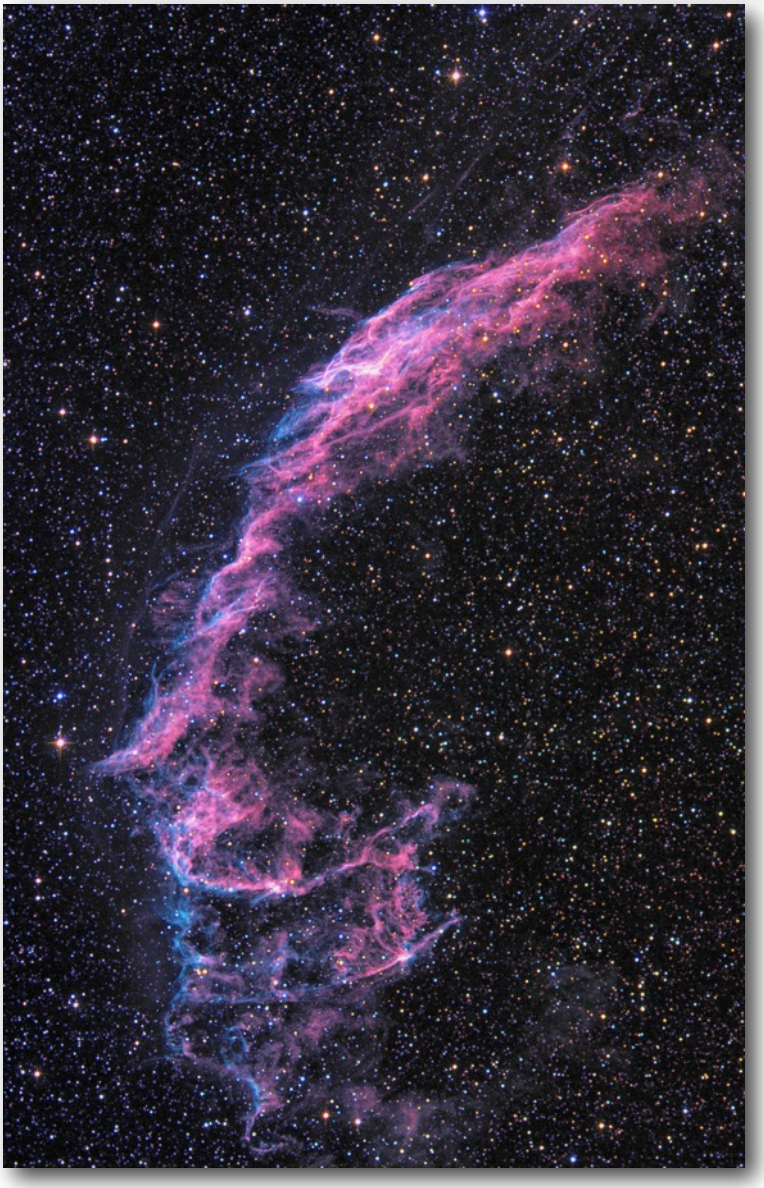
	Mag.	Sep (s)	Location	Remarks
α	0.1-10.5	56	183539	Bluish White-Orange.
β	3.0-6.7- 9.2-9.8	46-67 -86	184933	Quadruple.
ε	4.2-5.5	150	184340	ε1, 5.1-6.0, 3", Pale Green-Pale Blue; ε2, 5.1-5.4, 2", Both Wh.
ζ	4.3-5.7	44	184338	Topaz-Green; beautiful contrast.
η	4.5-8.0	28	191239	



Cygnus and Lyra contain three of the most viewed objects in the sky and only one is a Messier object, M 57, the Ring Nebula (Lyra). The other two are NGC 7000, the North America Nebula and the Veil Nebula which has five NGC numbers NGC 6960, 6962, 6979, 6992, and 6995.

From Wikipedia:

NGC 7000 (North America Nebula) is one of the most well-known nebulae in Cygnus, because it is visible to the unaided eye under dark skies, as a bright patch in the Milky Way. However, its characteristic shape is only visible in long-exposure photographs – it is difficult to observe in telescopes because of its low surface brightness. It has low surface brightness because it is so large; at its widest, the North America Nebula is 2 degrees across. Illuminated by a hot embedded star of magnitude 6, NGC 7000 is 1500 light-years from Earth. [Image by Brett Tatton -see below for details -ed]



The Veil Nebula (NGC 6960, 6962, 6979, 6992, and 6995), is found to the south of Epsilon Cygni. NGC 6960 appears imbedded in the 4.22 magnitude double star 52 Cygni. [Did you even notice that it was a double? -ed]. The Veil is a 5,000-year-old supernova remnant covering approximately 3 degrees of the sky and it is over 50 light-years long. Because of its appearance, it is also called the Cygnus Loop. The Loop is only visible in long-exposure astrophotographs. However, the brightest portion, NGC 6992, is faintly visible in binoculars, and a dimmer portion, NGC 6960, is visible in wide-angle telescopes. [The Webster-28 shows all parts quite well, but what do you expect from a 28-inch telescope. -ed]

Two Astrophoto Contest Entries last year by imagers Brett T. and Paul Z. showed the N. America and Veil Nebulas.

Image above: NGC 7000 by Brett Tatton taken with a Canon 60Da with package zoom lens set to about 140mm. 300 second exposure ISO 1600 f/5.6 controlled by BYEOS....some processing by BYEOS and some by Frank Williams. Imaging done piggyback on BAS mount at ES Fox Observatory.

Image left: NGC 6992 by Paul Zelichowski using his Hubble Optics Hyperbolic Newtonian Astrograph 12" f/4.27
Camera: SBIG STL11000M w/Baader filters
Exposure: HaRGB 160/40/40/63 min.
Location: Starbase 6 (Kincardine)

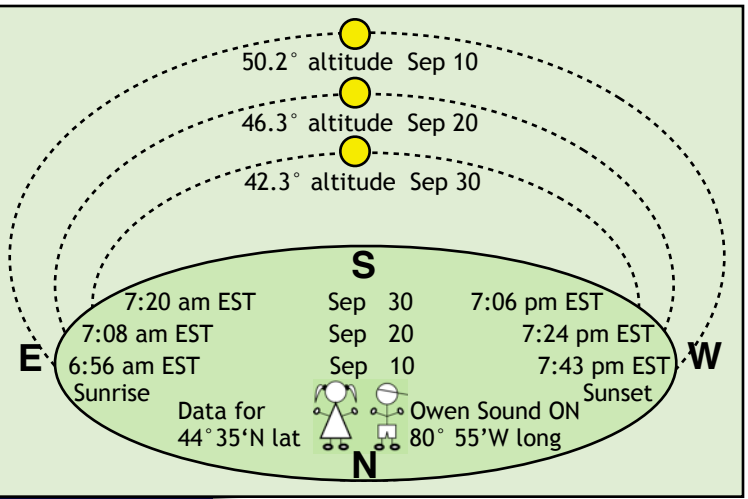
Sep **02** 07:11 **FQ Moon** rises locally at 2:46 pm DST
05 16:00 Venus at Perihelion
07 23:29 Moon at Perigee: 358 388 km (third perigean Moon of 2014)
08 21:38 **Full Moon** rises 7:25 pm DST "Harvest Moon"
10 22:00 Uranus 1.1° S of Moon (occultation) we see only reappearance at 8:41 pm DST; Moon 17 min. above horizon -difficult!
12 20:38 **Saturn moon Rhea occults 10.2 mag star**
14 21:01 Aldebaran 1.4°S of Moon
15 22:05 **LQ Moon** rises locally at 12:02 am DST
20 06:39 Jupiter 5.4°N of Moon
09:56 Mercury 0.5°S of Spica
10:22 Moon at Apogee: 405 846 km
21 14:52 Regulus 4.7°N of Moon,
Mercury 0.6° S of Spica (after sunset)
Zodiacal Light in E. bef. dawn twilight next 2 weeks
18:00 Mercury at Greatest Elong: 26.4°E
22 22:30 **Autumnal Equinox** Sunrise 7:10 am, set 7:21 pm
24 02:14 **New Moon** rises locally at 7:34 am DST
25 20:48 Spica 2.6°S of Moon
26 05:32 Mercury 4.2°S of Moon
27 17:00 Mars 3.0°N of Antares
28 00:46 **Saturn 0.8°S of Moon**: Occn. Not vis.locally. Ceres and Vesta also occulted tonight, not visible here.
29 13:01 Mars 5.6°S of Moon

BAS Events

Sep 3 Wed **BAS meeting** ES Fox 7 pm **Tom Field Spectroscopy Webinar**
Sep 5 Fri (FQ+3) **Public viewing** Grey Roots Museum 9 pm (Members with scopes please)
Venus 0.7° from Regulus 5 am
~~**Sep 6** Sat (FQ+4) **OSFN star tour/talk** ES Fox7:00 pm **(alt. date Sep 20 (LQ+4)**~~ **postponed date TBA**
Sep 17 Wed (LQ) **3rd Anniversary of Fox Opening** Happy Birthday Fox Observatory!
Sep 27 Sat (NM+3)**BAS viewing @Fox** @dark Members and guests welcome.

Planets

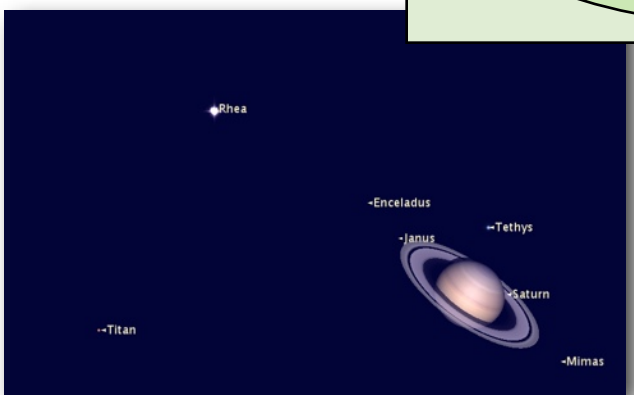
MERCURY, is not easy to see from the Northern Hemisphere this month and it stays buried in WSW twilight. It is near the crescent Moon Sep 25 low in the west near the Sun. **VENUS,** -3.9 drops quickly towards the glare of the Sun and it will pass behind it in mid-Oct. September is not a good month for Venus watching. **MARS** (magn. 0.7) hangs around above the western horizon all month tracking eastward. It has a nice appulse with Antares on Sep 29. A crescent Moon is nearby as well. **JUPITER**, (-1.8) is higher in the morning sky reaching 25° at start of twilight at month-end. It is moving slowly away from the Beehive Cluster and towards the head of Leo. **SATURN,** (mag 0.6) continues its downward slide towards the western horizon this month. By month end it is setting around 9 pm DST. Ring tilt is still around 20 degrees. Crescent Moon slips past Sep 27/28. Both **URANUS,** (5.8) and **NEPTUNE,** (7.8) rise in mid-evening in September. Both **asteroid, Vesta (6.9)** and dwarf planet, **Ceres (8.1)** are in the western sky in Libra and set about two hours after the Sun. Charts are available on the BAS website. **PLUTO** (mag. 14) is above the horizon most of the night -look above M22 in Sagittarius. Pluto finder charts for 2014 are now found on the BAS website. The diagram below gives the sunrise/sunset times and the Sun's altitude on three dates this month. The Sun reaches equinox on Sep 22. Fall begins. The moon phase graphic below shows lunar phases for each night of September. Moonrise times for NM, FQ, FM and LQ are given in the Calendar listing at left.



Special Events

Two Challenges:

1: Moon of Saturn Occults a Star: On Sep 12 at 8:38 pm DST, Saturn's second brightest moon Rhea occults a 10th magnitude background star. Starry Night for Owen Sound shows Rhea missing the star but even a miss will be interesting to watch as the two merge into one point of light. The total light will drop by 2.5 magnitudes -a noticeable change which may up to a minute depending upon the exact shadow path. This event is like a lunar eclipse but the star is not our Sun and the Moon is not ours either. (OK, so the geometry is the same -moon crosses star- if nothing else.)



2: See our Moon Occult Uranus: This one is much tougher -the Moon rises just 6 minutes before and only the reappearance on the dark limb is visible from here. The Moon is only 0.3° high at the time of Uranus' reappearance which won't be instantaneous. This one is tough and needs a perfectly clear flat eastern horizon! See if you can spot 5.7 magnitude Uranus after the Moon is high enough to clear the murk on the horizon. Should be easier then.

Sept 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2 FQ	3	4	5	6
7	8 FM	9	10	11	12	13
14	15 LQ	16	17	18	19	20
21	22	23	24 NM	25	26	27
28	29	30				

By permission Univ. of Texas McDonald Obs.

BAS Member Loaner Scopes

Solar H-alpha scope now out on loan.

Our Lunt solar scope can be borrowed by BAS members but there is a waiting list! Contact Aaron to get your name on it. We now have a suitable mount for it as well. A short training session will be provided on pickup.

One 12-inch Dob available.

Only one 12-inch loaner telescope is available for the summer. (The other is at Lion's Head "POD" Two of our two **8-inch dobsonians** are presently out on loan. Contact Brett T. or Aaron T. for on availability. Scopes come in periodically so keep checking with Brett or Aaron if you are interested in a loaner.

SGN Classified Ads Section

(Now also on our website)

FOR SALE: Televue Pronto Price reduced to $600 !

2 element E.D. Refractor, 2.7" / 70mm diameter. f.l. 480mm, f/6.8. with 1-1/4" Star Diagonal, with 45 degree Prism diagonal (for terrestrial viewing), with TeleVue Red dot finder, complete with TeleVue Soft Case. Asking $600.-- Contact Anton VanDijk 519 376-9912 ravand@rogers.com

September meeting FREE Stuff and SWAP Table

Lots of odds and ends have been donated to BAS that are surplus to our needs. At the Sep meeting we will have those items on display. Bring your own items as well (clearly identified) and indicate your asking price or just put them on the FREE table. Contact John (stargazer@wightman.ca) if you have any questions.

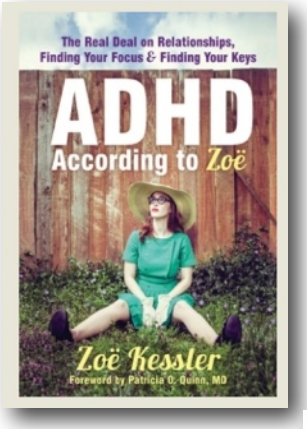
Here is a partial list of components that are available:

- several 2-inch refractors with 0.965 eyepieces,
- wood and aluminum tripods for previously-mentioned refractors
- eyepieces, barlows, extension tubes for 0.965 focusers,
- 90° and 45° diagonals (1.25 inch),
- 90° diagonals (2 inch),
- 1.25 inch short focuser (curved base, not adaptable for 2-inch)
- 2 and 3 inch telescope tubes,
- miscellaneous small finder scopes and brackets,
- miscellaneous adapters.

You are welcome to bring your own stuff to give away or to sell.

Contact John H. by email if you have something to bring.

For Your reading Pleasure/Enlightenment:

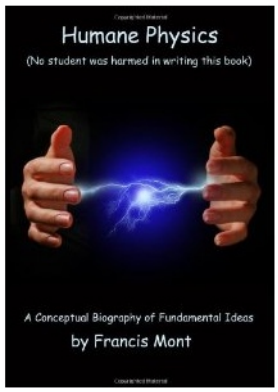


ADHD According to Zoë

See www.zoekessler.com for more or contact her directly for a copy.

Humane Physics

Physicist Francis Mont has published the first of two volumes on the history of Physics and has a book store just south of Chatsworth. Contact Francis directly for a copy or go to www.montland.ca



Col. Chris Hadfield at Jasper DS Festival

If you happen to be out in Jasper Park this October, the 10-day dark sky celebration includes lots of stargazing and other events. Edmonton's Symphony String Orchestra will play, so will Chris Hadfield on the last weekend. Jay Ingram, Alan Dyer, Peter McMahon, (Wilderness Astronomy Contributing Editor for Sky News), Wilfred Buck,(Cree Aboriginal Story Teller) will be there too.

Nighttime viewing at various dark sky sites is featured, as well as daytime solar viewing. The October 23 partial solar eclipse will be observed from Jasper, where the event runs from 2:38 to 5:14 with the sun 10° high at the end. At maximum, about 65% of the sun will be covered. There are many free events, but tickets for the Hadfield event are steep. Expect to shell out over $100 plus HST for the cheap seats. VIP seating is twice that.

The Cartoon Corner