The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER JUNE 2007

The next meeting of the Pretoria Centre will take place at Christian Brothers College, Pretoria Road, Silverton, Pretoria

Date and time	Wednesday 27 June at 19h15
Chairperson	Lorna Higgs
Beginner's Corner	"Interactive Q & A " by Jan Plomp
What's Up	by Hein Stoltsz

++++++++++ LEG BREAK - Library open ++++++++++++

MAIN TALK

"Neutron stars"

by

Dr Chris Engelbrecht (University of Johannesburg)

The meeting will be followed by tea/coffee and biscuits as usual.
The next social/practical evening will be held on Friday 22 June at the Pretoria Centre Observatory, which is also situated at CBC. Arrive anytime from 18h30 onwards.

INSIDE THIS NEWSLETTER

Last month's meeting — Lorna Higgs

Despite the freezing weather, we had nearly 40 attendees at the May meeting, which was chaired by Lorna Higgs. She reminded members to provide nominations for the annual Jack Bennett Award and called for volunteers for the new Pretoria Centre committee from July.

We started late, as we were hoping that the presenter of What's Up would arrive, but he was very badly delayed and everyone would have had to consult their Sky Guide for information about what to look for in the probably clear skies in June. (The Sky Guide does not explain about all the layers of clothing required for winter viewing!)

Michael Poll gave a talk about variable star observing for Beginner's Corner. It was very practical, with a short description of the types of variable stars and then how to find some of them. He stressed that we in SA are ideally situated for observing stars that are not visible from USA and Europe, so we can contribute much to science by spending a short time at intervals of weeks on estimations of magnitude. He explained how to estimate magnitude (easier than it sounds!) and how to find the correct speck of light (not so easy at first!) with a small telescope. A number of people were interested enough to ask questions and we hope that this means that there will be more from Pretoria observing these stars, contributing to research and receiving public recognition on the variable star website.

The Main Topic was presented by Prof. André Buys – Leonardo da Vinci's Telescope. André started by mentioning that many think that Galileo invented the telescope, but he acknowledged that he had worked with a design by a Dutch telescope builder. André then showed us that mirrors and lenses have been used since at least 3000BC and they could have been (and probably were) combined to make telescopes at any date since then. He described the different types of telescope – from the early Galilean, through the Kepplerian, Newtonian and Herschellian. Next, he started to analyse writings that could have indicated the use of telescopes for astronomical observations. Bacon, as far back as 1267, could have done so. Leonardo da Vinci certainly observed the skies, especially between 1506 and 1512 and some of his descriptions of "waves" (craters and ridges??) and "spots" (craters??) on the moon seem to indicate that his observations were too detailed to be done with a naked-eye. His drawing of part of the moon accurately showing the mare (and possibly the crater, Copernicus??) also seems to indicate assisted viewing. André showed us one of Leonardo's unlabelled drawings of a mounted tube. Many seem to think that this is a mortar, but, although the mounting is similar, the shape is different to his other drawings of mortars (issuing bombs) and there is no steadying ratchet mechanism for use during firing (as there is in the other mortars). André then investigated the possibility that this is a telescope. Leonardo's mastery of perspective drawing enabled André to produce an accurate 3-D scale drawing and start to manufacture the "telescope". The brass tube, in two parts, is mounted on a wooden base and even includes the four square holes (purpose unknown). The mirror in use at present is an aluminised glass one, because André is having trouble grinding a mirror out of speculum (67% copper and 33% tin alloy) that was used for mirrors in Leonardo's time (by his own lens and mirror maker). The alloy, which has been poured into moulds of Leonardo's design, is very brittle and the first three broke. (Hold thumbs for the current fourth attempt!) Four lenses of different strengths are mounted in the four holes (of unknown purpose) for manual use while viewing objects behind the viewer. André could have continued with the second part of his talk, but warm tea or coffee and warm beds were calling and we have postponed the rest of the talk to a later date. There was a queue to try using the telescope, which certainly works as one, even if it was supposed to be a mortar!

The evening proved to be very enjoyable and informative and gave us a personal link to an amazing personality from history. (Not many 21st Century amateurs have used Leonardo's 16th Century equipment!)

Last month's observing evening — Michael Poll & Johan Smit

A lovely clear evening for observing, not a cloud in sight, and not too much winter chill either. In the north west, almost the slimmest of crescent moons was hanging near the horizon, with its night side plainly visible from earthshine. Next to the dark limb of the moon was the 1.7 magnitude star beta Tauri (Elnath), which the moon passed in front of soon afterwards – a beautiful occultation. The disappearance occurred shortly after 18h15. However the re-appearance was not seen as it occurred after moonset.

We had an active and enthusiastic gathering for the evening, 30 or so people came, including some newcomers, and we were pleased to host a number of children from Laerskool Rayton, who were brought by Charl de Jager in celebration of Science Week. (During the evening it was arranged that the Centre would take telescopes to the school at sometime in the future).
The children arrived while Johan was busy aiming the Centre 12" telescope at Saturn. They all had their first view through a telescope at this target, and, needless to say, were very impressed. Because Saturn was such a sensation for them, the telescope spent most of the time on the planet. It was pleasing to note that for nearly 2 hours this old instrument kept the planet in view, a view which was enjoyed many times over by every-one. After Saturn, the 12" was moved to Jupiter, where it stayed for the rest of the night to give every-one a chance to have a good look at that also. Judging by the OOHH's, AAHH's, WOW's and other descriptive (some unprintable) sounds made by many it was definitely impressive.

With so many people, a smaller number of objects than usual were viewed, as each person had to see the sights available. Saturn was to the east of, and slightly higher than Venus. It is also to the west (lower left) of Regulus the brightest star in Leo, and so the constellation of Leo now looks somewhat unusual. The rings of Saturn are still well seen, although they will be closing more over the next year or two.

Venus was showing a distinct "half moon" phase (the exact half phase, called dichotomy, occurs at greatest elongation, which is on June 9th - it will show a crescent phase thereafter).
Jupiter was soon up in the south east, in the telescope the brightness of the planet seemed to be overwhelming the equatorial cloud belts, the latter were not easy to discern, and one of them seemed to be double. (Can any one confirm?). Jupiter's four bright moons were two on each side of the planet, equally spaced, and were in the form of a shallow arc.
One of the best parts of the Milky Way, the part from Crux to the False Cross, with its included clusters, is now high in the south in the evenings. The clusters principally looked at were the open clusters Theta Carinae (IC 2602) and NGC 3532, and the globular cluster Omega Centauri (NGC 5139). When Scorpius was higher, we looked at the open clusters NGC6231, M7 and M6, and the globular cluster M4. Alpha Centauri, the showpiece double, was also noted.
After most had left, Johan and Hein stayed behind and did some binocular sky-touring, giving Johan's newly designed and built binocular stand a proper test. The stand performed very well with Johan's 12 x 50s. but after looking with Hein's 15 x 70 binoculars, the 12x50's suddenly seemed a bit dim and inadequate! Johan suspects that, with the new stand, a binocular upgrade is imminent!

Lastly Hein managed to locate M104 (Sombrero galaxy) (NGC4594) with his 8" Dobsonian. Even though M104 was only seen as a faint smudge in our light polluted skies, the fact that it is a galaxy located 50 000 000 light years away makes it very special just to be able to see it.

Erratum : conjunction of Mars and Uranus on 2007 April 29th

Mars and Uranus were 40 arc **minutes** apart (2/3rds of a degree) on April 29th 2007, not 40 arc seconds as stated in last month's report.

Alpha Centauri A, B and C revisited, part 1 — Michael Poll

Alpha Centauri is the brightest star in the constellation of Centaurus, and, with a total magnitude of -0.1 it is the third brightest star in the sky. However at a declination of 60° south the star is not visible north of 30° north latitude (the latitude of Cairo). Alpha Centauri is probably the best known binary star in the southern sky. Its double nature was discovered in December 1689 by Father Guy Richaud in Pondicherry India, while he was following a comet. The system was shown to be triple with the discovery of Proxima Centauri in 1915 by Robert Innes working at the Union Observatory in Johannesburg.

The two bright components of the star, which are easily separated in a small telescope, are called Alpha Centauri A and Alpha Centauri B. The star is a showpiece double that is often shown to members of the public, at the same time explaining that it is the nearest star to us apart from the sun. It is then usually explained that A and B are gravitationally bound and therefore are an example of a true binary, having a common centre of gravity, (they "orbit each other") as opposed to being a line of sight binary.

The distance between A and B varies between 11 AU and 36 AU. (An astronomical unit (AU) is the average distance between the Earth and the Sun, and is approximately 150 000 000 km. By comparison, Saturn averages 9.5 AU from the sun and Pluto averages 39.5 AU from the sun). This writer, at least, has also been stating (exclaiming!) that period for the pair is 80 years, (actually 79.92 years) (correct); that the stars were furthest apart in 1980 and are now closing (correct); and that they will be at their closest around 2038. The latter comment needs clarification.

The orbit of A and B about each other is inclined by only 11 degrees to our line of sight (i.e the orbit is not far from being edge on to us), so from the perspective of the Earth, the path of the one star about the other describes an eccentric (i.e. an elongated) ellipse on the sky. The critical point about their separation is that the time that they are actually ***closest to each other in space*** (**periastron**) is ***not*** the same time that they ***appear*** to be closest together when viewed from Earth. The view of the system that we see from Earth is only the ***apparent*** separation, and the closest *apparent* approach occurs more than two years after periastron. (See figure).

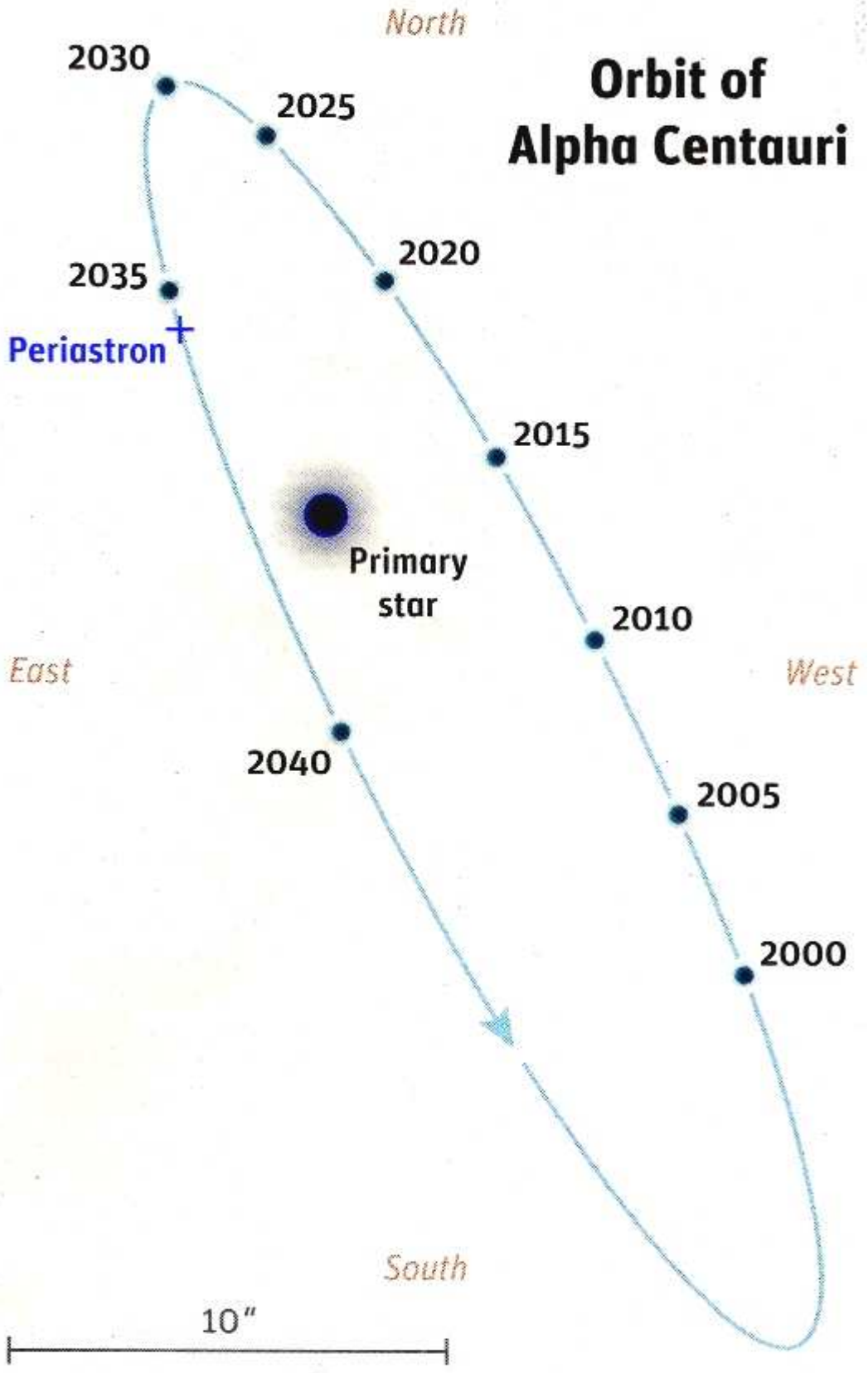
The two stars were last at periastron in 1955, and they will next be closest to each other (i.e. periastron again) in June 2035. As viewed from Earth, the two stars were last at their closest in 1957. They were at their widest in 1980, and so have been closing ever since then. This does not mean that they will continue closing until reaching periastron in 30 years' time. As can be seen from the figure, from our viewpoint, they will close up until 2015, open up again until 2029, and thereafter start closing again to their closest, which occurs in November 2037.

When A and B are at their widest (as in 1980) the stars are 21.8" (minutes of arc) apart, which is about half the average apparent diameter of Jupiter. By 2005 the separation was down to 10", and is currently slightly less than this value. They continue to close until the next minimum separation, of 4.0", which occurs late in 2015. They open up again to 10.4" in mid 2029, and then are closing until 2037. At their apparent closest they are 1.7" apart.

In the figure, the date given is for the beginning of the year indicated. The 80 year orbital period means that changes in separation and position ***relative to each other*** can be seen in a comparatively short time. (Shades of Halley's Comet – "Once in a lifetime"!)

The third component of the Alpha Centauri system is Alpha Centauri C, more commonly known as Proxima Centauri. This star lies about 2° south west of A and B, and is about 15 000 AU (about 0.2 light years) from the main pair. Proxima shares a common motion with Alpha A and B, but studies in the early 1990s queried whether Proxima was gravitationally bound or not. The stars are widely separated, and it has been estimated that it would take Proxima 1 000 000 years to complete, an orbit around the main pair, so that is not easy to make meaningful predictions. If it was not gravitationally bound, (and therefore was not part of the system) it might even leave the system altogether in the intervening years. However, data from the Hipparcos satellite has been used to study the motions of the three stars, it seems almost certain that Proxima *is* gravitationally bound, but only just.

References to follow with Part 2.



Note: The figure shows the orbit of the secondary component B relative to the primary component A. It is an ellipse, seen almost edge-on. The stars actually both move in different elliptic orbits around their common centre of gravity. The larger the mass ratio m_A / m_B for two stars A and B, the smaller the orbit of A is in comparison with that of B. The convention in diagrams is to fix A and show the orbit of B relative to A. During the orbital period, observers will only notice a change in **relative** positions. If these relative positions were plotted, the plot would look like the orbit in the figure.

The James Webb Space Telescope

The James Webb Space Telescope (JWST) is a large, infrared-optimized space telescope, scheduled for launch in 2013. JWST's instruments will be designed to work primarily in the infrared range of the electromagnetic spectrum, with some capability in the visible range. JWST will have a large mirror, 6.5 meters in diameter and a sunshield the size of a tennis court. Both the mirror and sunshade won't fit onto the rocket fully open, so both will fold up and open only once JWST is in outer space.

JWST will observe primarily the infrared light from faint and very distant objects. But all objects, including telescopes, also emit infrared light. To avoid swamping the very faint astronomical signals with radiation from the telescope, the telescope and its instruments must be very cold. Therefore, JWST has a large shield that blocks the light from the Sun, Earth, and Moon, which otherwise would heat up the telescope, and interfere with the observations.

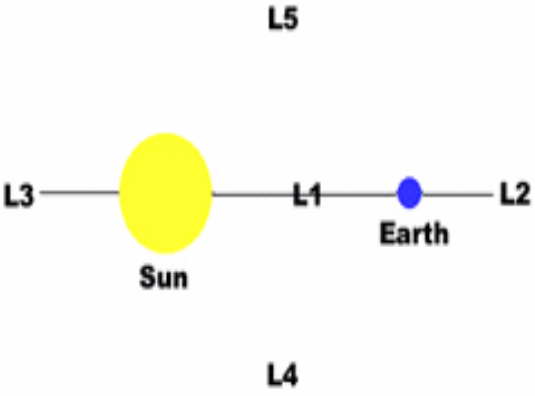
In order for this to work, JWST must be in an orbit where all three of these objects are in about the same direction. The most convenient point is the second Lagrange point (L2) of the Sun-Earth system, a semi-stable point in the gravitational potential around the Sun and Earth, about 1.5 million km from Earth. There it will be in Earth's shadow. (However, see 2 below.)

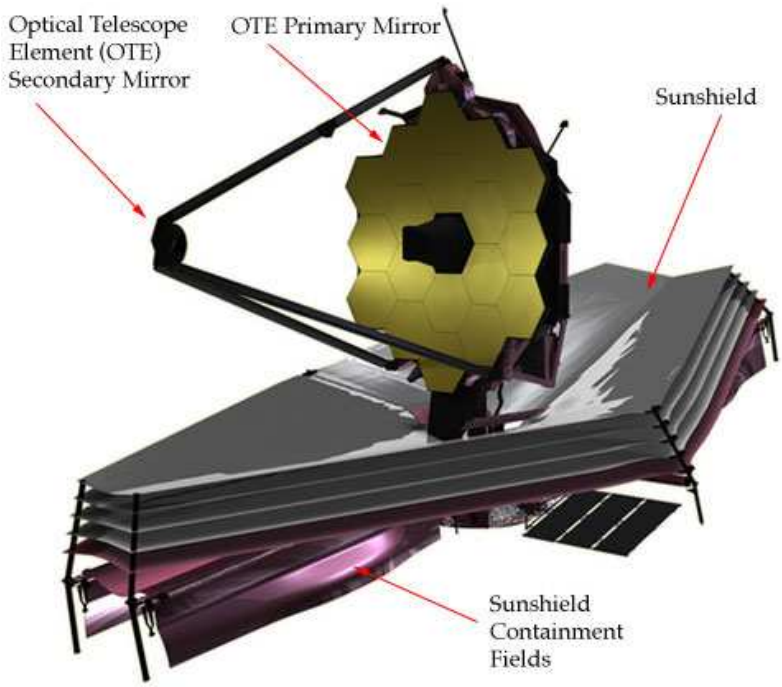
Editor's notes:

1. Its aperture is $(6.5/2.4)^2 = 7.3$ times the aperture of the Hubble Space Telescope (the largest telescope ever launched into space), and $(6.5/0.85)^2 = 58.5$ times the aperture of the Spitzer Space Telescope (the largest infrared telescope ever launched into space.)
2. Using elementary trigonometry, I calculated that an observer on the opposite side of Earth than the Sun and who is farther than 1.37 million km from Earth, would see some sunlight coming from the solar limb. An observer moving with L2 around the Sun would therefore also see it, i.e. an observer moving with L2 would see a permanent annular eclipse of the Sun - eclipsed by Earth. If you doubt this, do the calculation yourself. The sunlight that gets to L2 will power the solar cells, but it makes the screening of the telescope more difficult.

JWST website: **http://www.jwst.nasa.gov/** There are also instructions to build a cardboard model of the JWST on this website – a nice little project for young children.

Lagrange points website: **http://map.gsfc.nasa.gov/m_mm/ob_techorbit1.html**





Top: An illustration of the five Lagrange points.

Right: An artist's illustration of the James Webb Space Telescope.

New stars discovered in solar neighbourhood

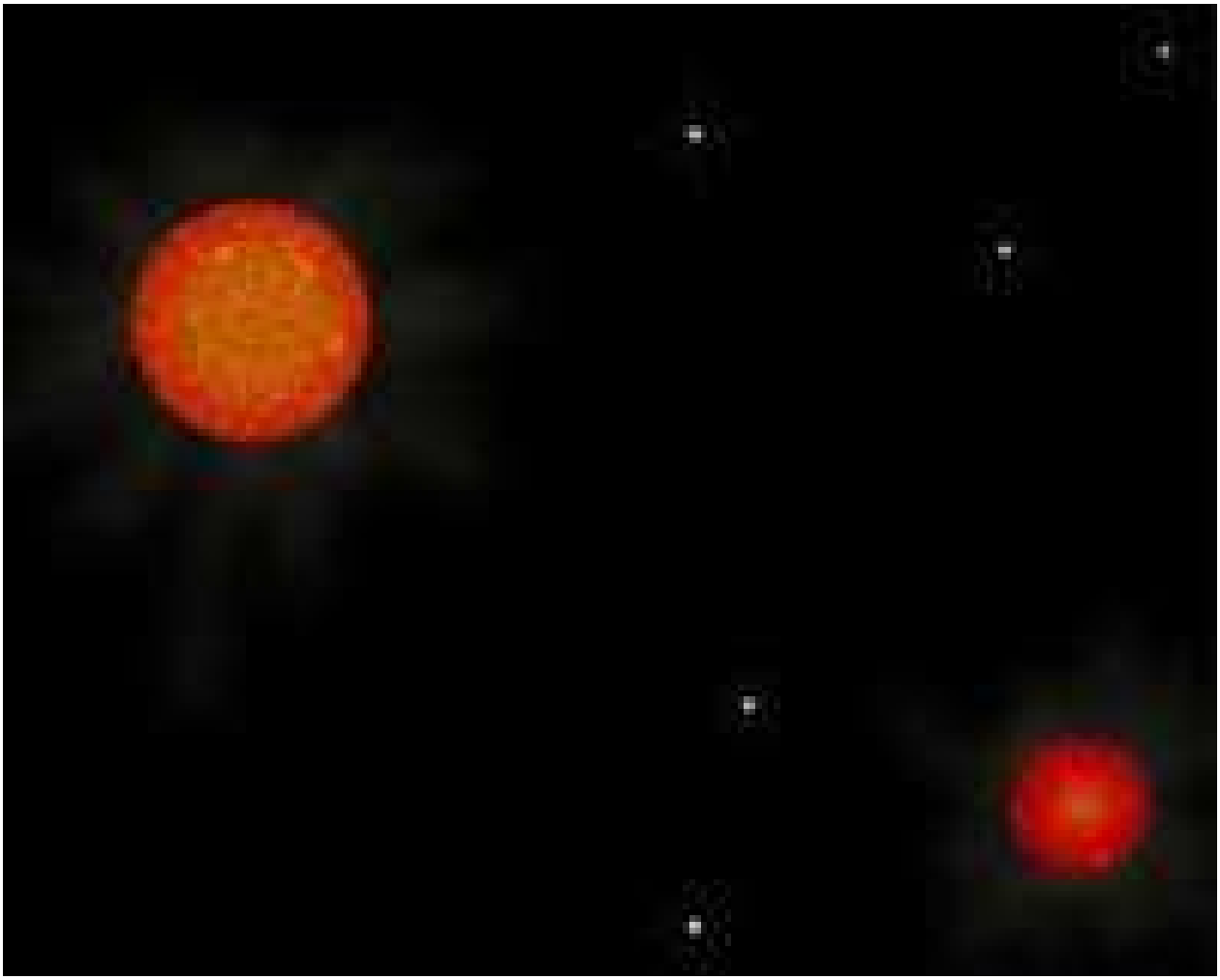
Astronomers have identified 20 new stellar systems in our local solar neighborhood, including the twenty-third and twenty-fourth closest stars to the Sun. The discoveries were made by a group called the Research Consortium on Nearby Stars (RECONS). When added to eight other systems announced by this group and six by other groups since 2000, the known population of the Milky Way galaxy within 33 light-years (10 parsecs) of Earth has grown by 16 percent in just the past seven years.

The 20 newly reported objects are all red dwarf stars, which now comprise 239 of the 348 known objects beyond our Solar System within the 10-parsec boundary. "Red dwarfs are among the faintest but most populous objects in the Milky Way," an astronomer explains. "Although you can't see a single one with the naked eye, there are swarms of them throughout the galaxy."

The binary red dwarf in the artist's representation below is SCR 0630-7643 AB, a system discovered and measured by the RECONS survey. The measured separation of the two stars is 0.90 arc seconds; at a distance from Earth of 8.8 parsecs (28.7 light-years) as obtained by RECONS, this equates to 7.9 Astronomical Units between the two, a bit less than the distance between the Sun and planet Saturn. The orbital period of the red dwarfs is roughly 50 years.

For more information, see website

http://www.spacedaily.com/reports/Twenty_New_Stars_In_The_Neighborhood_999.html



THIS IS YOUR LAST NEWSLETTER, UNLESS YOUR MEMBERSHIP FEE IS PAID BY JUNE 30.

Report back on Scope-X 2007 held on Saturday 21 April 2007

We were privileged and delighted to have Richard Berry from the USA as the special guest of Scope-X this year. Richard is a full-time writer specializing in astronomy, telescopes, and digital imaging. Richard also helped with judging the Amateur Telescope Making exhibits.

Who is Richard Berry?

As far back as he can remember, Richard Berry has been an amateur astronomer.
He built his first telescope at age 13, and since that time, he has built a dozen more telescopes.
In the decades since writing his first book, Build Your Own Telescope, thousands of people have built telescopes based on the plans in the book.

His telescope building activities led directly to an interest in astrophotography, and that in turn led to experience and expertise in digital imaging and image processing.
Today Berry is a full-time writer specializing in astronomy, telescopes, and digital imaging.
He consults for publishers, creates computer software, and works with telescope manufacturers to produce products designed to meet the demanding requirements of amateur astronomers.
Richard is also a popular speaker on a variety of astronomy-related topics at gatherings of amateur astronomers and star parties.

In 1976, Berry joined the staff of the fledgling “Astronomy” magazine. During sixteen years as its editor, he built the magazine up from a struggling start-up to the largest circulation astronomical magazine in the world.

He also founded “Telescope Making” magazine and for ten years edited the journal that was a driving force behind breakthroughs in telescope design that have fueled the growth of amateur astronomy.

In 2002, Berry received the Astronomical League Award for outstanding service to the field of amateur astronomy.

He has also received the Clyde Tombaugh Award for technical innovations in astronomy, the Clifford W. Holmes Award for the advancement of amateur telescope making, and for his contributions to the public understanding and appreciation of astronomy, the Astronomical Society of the Pacific’s Dorothea Klumpke-Roberts Award.

The Astronomical League presented him with the Omega Centauri Award at the Texas Star Party in recognition of his furthering astronomy and amateur telescope making through writing, editing, and teaching.

In addition, the International Astronomical Union has honored him by designating Asteroid 3684 as Berry.

In the second edition of his book, “The Handbook of Astronomical Image Processing”, Berry explores the increasingly sophisticated world of digital imaging and image processing software that astronomers, both amateur and professional use nowadays to study the Universe.
“My goal is to enable amateur astronomers to do real astronomy”, says Berry, “and to have fun while doing so”.

It was an honour to have our home built telescopes judged by him. Here follows his report:

Telescope Innovations at Scope-X 2007– by Richard Berry

One of the big advantages of judging an amateur telescope making event is that you must look at every one of the telescopes-so you should see everything. But this year there were 66 telescopes entered in the judging, and there was only a short time to examine each telescope. However, I was impressed with the quality of telescopes at Scope-X, and individually, I was impressed with the level of innovation on display.

Not surprisingly, the majority of telescopes had Newtonian optics on Dobsonian mountings. Although many of these telescopes appeared to be the "standard" design, in detail they were

highly individualistic. For example, it is often difficult to get the right amount of friction in

Dobsonian-type bearings. In a simple yet clever innovation, Hugh Scholtz's* beautiful wooden telescope, and the mounts for Jethro Alter's and Marle Graaf's 4.5-inch commercial Newtonians employed spring-loaded Teflon pads to add the necessary drag to an otherwise-too-easy azimuth motion.

The prevalence of Crayford focusers also speaks well for the ScopeX builders. Every Crayford that I tried provided smooth, trouble-free motion, a significant advantage for the observer over traditional rack-and-pinion units. However, Hetta Pretorius displayed a novel moving focuser using a taut wire wrapped around a shaft on the focuser body. The entire community of ATMs benefits from the experiments that telescope makers like those I saw at ScopeX tried with their telescopes.

I was impressed by the workmanship in Julian Shellard's ingenious 6-inch f/7.8 Dobsonian. The telescope itself was handsome, and the illuminated-reticle finder telescope was crafted from PVC pipe and blocks. Overall, the instrument was a fine combination of elegance and practicality.

The binocular mounting by Johan Smit was perhaps the most versatile bino-mount I have ever seen. In addition to the standard “any-angle” and “any-height” trapezoid motion, Smit added additional motions that enabled the binoculars to swivel into nearly any orientation, even allowing an observer to lie flat on his or her back looking straight up. This bino-mount had many ideas worth emulating.

In my experience, the "personality" of amateur telescopes differs in different places. For example, homebuilt telescopes on the cloudy east coast of the United States differ from those on the sunny west coast. Taken as a whole, the amateur telescopes of South Africa impressed me as sturdy, functional instruments with lots of individuality.

Conclusion

Two of ASSA Pretoria’s members were mentioned in the report. Hetta Pretorius and Johan Smit were singled out for technical excellence and innovation in their respective projects, which shows that the quality of our ATM class and students can compete with the best in the world. The Pretoria Centre encourages any-one that considers building a telescope to join the class and become part of a world class team.

*Not our committee member Hein Stoltsz.

News note about HartRAO*

Until recently, the only radio telescope on the site had been the 47-year-old 26-meter dish that has been making first-rate scientific observations since NASA abandoned it in the 1970’s.

On 14 February 2007, a new fully built 7.2 meter dish arrived on the site. It has since been installed. This dish will be used to develop the South African component of the C-BASS project. C-BASS is an acronym for “C-Band All Sky Survey”. The C-band is the 5 gigahertz frequency or 6 cm wavelength band. It will map the polarization of the radio emission from the Milky Way with exquisite accuracy. This will trace the galactic magnetic field. But the prime goal of C-BASS is to apply corrections to current and planned measurements of the polarization of the CMBR*.

Looking towards the future, HartRAO is also the site for the XDM - the prototype facility for the KAT project. (See the February 2007 newsletter for information about the KAT project.) This dish, being built using new generation composite fabrication techniques, will be put up within the next few months.

Read more in MNASSA, vol 66 nos 3 & 4 April 2007 p 53.

***Hart**ebeesthoek **R**adio **A**stronomy **O**bservatory

***C**osmic **M**icrowave **B**ackground **R**adiation

Monster supernova SN 2006gy

The brightest stellar explosion ever recorded may be a long-sought new type of supernova, according to observations by NASA's Chandra X-ray Observatory and ground-based optical telescopes. This discovery indicates that violent explosions of extremely massive stars were relatively common in the early universe, and that a similar explosion may be ready to go off in our own galaxy.

"This was a truly monstrous explosion, a hundred times more energetic than a typical supernova," said Nathan Smith of the University of California at Berkeley. "That means the star that exploded might have been as massive as a star can get, about 150 times the mass of our sun. We've never seen that before."

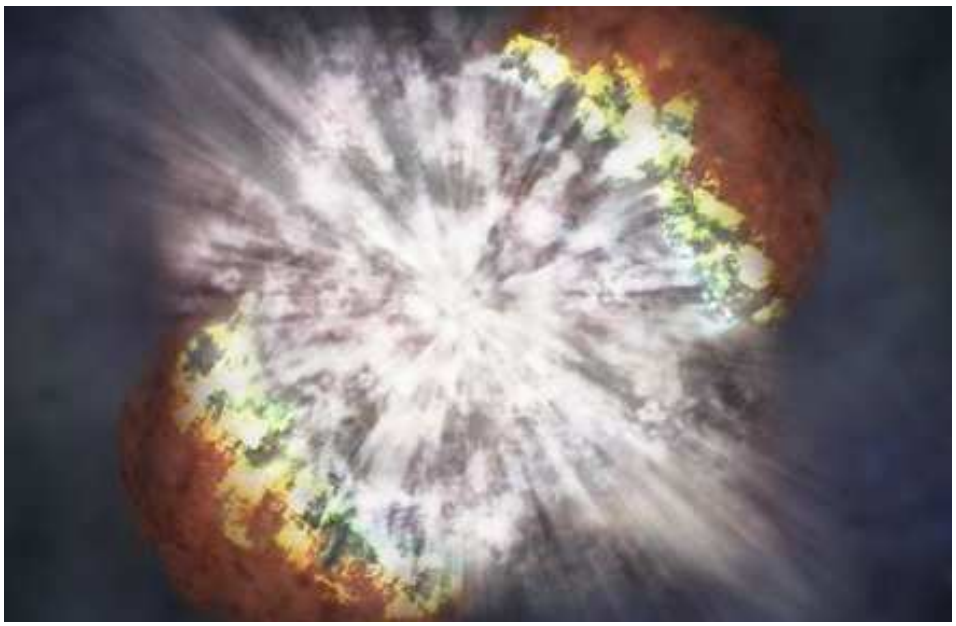
Monster supernova websites:

http://science.nasa.gov/headlines/y2007/07may_bigsupernova.htm?list50005

http://www.universetoday.com/2007/05/07/chandra-sees-the-brightest-supernova/

Immediately below: Eta Carinae: a supernova waiting to happen in our own galaxy?

Below: An artist's illustration of supernova SN 2006gy.



Die twintigste herdenking van SN 1987A

MNASSA April 2007 Vol 66 p 50

Webwerfadresse:

http://apod.nasa.gov/apod/ap060125.html

http://www.universetoday.com/2007/02/22/20th-anniversary-of-the-brightest-supernova-in-recent-history/

Chandra Discovers Light Echo from the Milky Way's Black Hole

Like cold case investigators, astronomers have used NASA's Chandra X-ray Observatory to uncover evidence of a powerful outburst from the giant black hole at the Milky Way's center.

A light echo was produced when X-ray light generated by gas falling into the Milky Way's supermassive black hole, known as Sagittarius A* (pronounced "A-star"), was reflected off gas clouds near the black hole. While the primary X-rays from the outburst would have reached Earth about 50 years ago, the reflected X-rays took a longer path and arrived in time to be recorded by Chandra.

"This dramatic event happened before we had satellites in space that could detect it," said Michael Muno of the California Institute of Technology in Pasadena. "So, it's remarkable that we can use Chandra to dig into the past and see this monster black hole's capacity for destruction."

Previously, scientists have used Chandra to directly detect smaller and more recent outbursts from the black hole. This latest outburst revealed by the X-ray echo was about 1,000 times brighter and lasted well over 1,000 times longer than any of the recent outbursts observed by Chandra.

Theory predicts that an outburst from Sagittarius A* would cause X-ray emission from the clouds to vary in both intensity and shape. Muno and his team found these changes for the first time, thus ruling out other interpretations. The latest results corroborate other independent, but indirect, evidence for light echoes generated by the black hole in the more distant past.

Scientists have long known that Sagittarius A*, with a mass of about 3 million suns, lurked at the center of the Milky Way. However, the black hole is incredibly faint at all wavelengths, especially in X-rays.

"This faintness implies that stars and gas rarely get close enough to the black hole to be in any danger," said co-author Frederick K. Baganoff of the Massachusetts Institute of Technology in Cambridge. "The huge appetite is there, but it's not being satisfied."

During the outburst, the area close to the black hole would have been about 100,000 times brighter than it is currently. If such an outburst had occurred more recently, it likely would have been detected by an X-ray instrument, or would have produced similar features in other nearby clouds.

Website for the event: **http://chandra.harvard.edu/press/07_releases/press_011007.html**

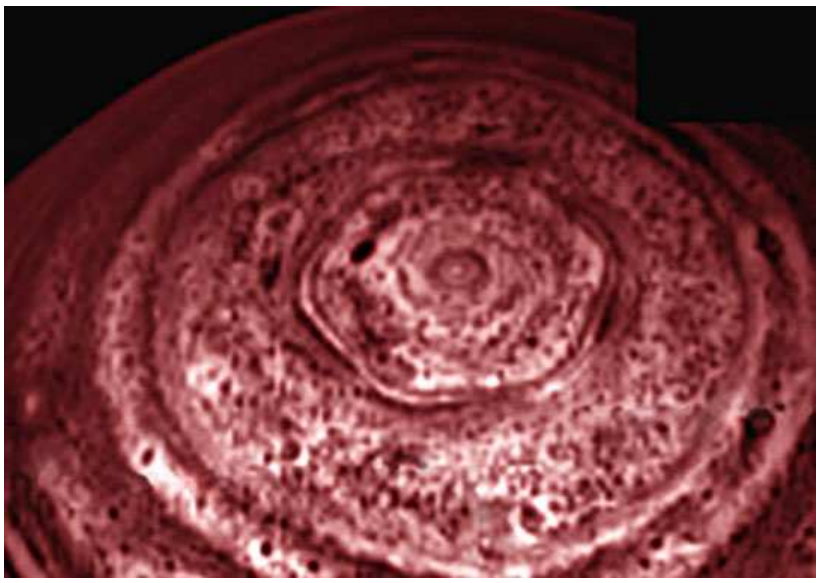
Chandra website: **http://www.nasa.gov/mission_pages/chandra/main/index.html**

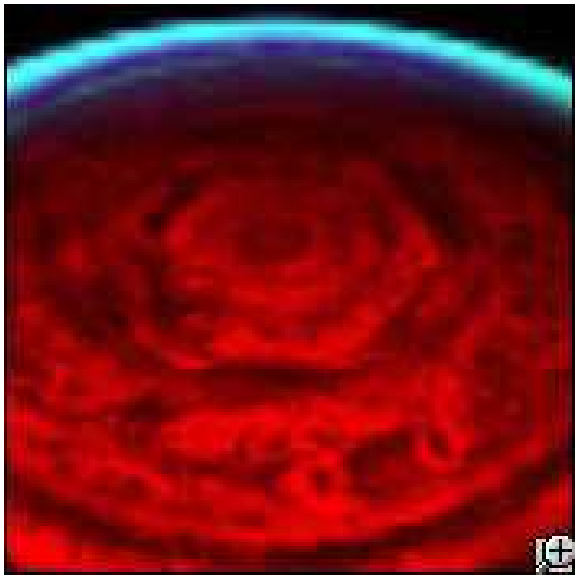
Saturn's north pole

Remember the monster storm at Saturn's south pole, reported on in the January 2007 newsletter? Something downright weird has been sighted twirling over the north pole of Saturn by the Cassini spacecraft: a long-lived double hexagon in the clouds.

Originally discovered and last observed by a spacecraft during NASA's Voyager flybys of the early 1980's, the new views of this polar hexagon taken in late 2006 (see below) prove that this is an unusually long-lived feature on Saturn. See website

http://dsc.discovery.com/news/2007/03/27/hexagon_spa.html?category=space&guid=20070327163030





MNASSA* electronic version

At the ASSA Council meeting on 20 February 2007 it was decided that MNASSA would continue to be printed and distributed as at present. However, it will also be available in electronic form through SABINET and EBSCO. These media are expected to bring in some revenue to ASSA.

Website address: **http://www.saao.ac.za/assa/html/mnassa.html**

***MNASSA = M**onthly **N**otes of the **A**stronomical **S**ociety of **S**outhern **A**frica

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Centre Representative :	Michael Poll 012 331 1615 (h)
Public Relations Officer and Deputy Treasurer :	Lorna Higgs 012 333 9366 (h)
Librarian :	Wayne Mitchell 012 719 9065 (w) 072 465 7739 (c)
Curator of Instruments :	Johan Smit 083 306 1199 (c)
Member :	Dirk Wolmarans 083 303 0348 (c)
Member :	Fred Oosthuizen 072 373 2865 (c)
Member :	Hein Stoltsz 083 302 5096 (c)