



The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER JUNE 2011

Next meeting

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 22 June at 19h15.

Programme:

- **Beginner's Corner:** "The 10 greatest astronomical discoveries of 2010" by Hein Stoltz
- **What's Up:** by Percy Jacobs.
- 10 minute break — library will be open.
- **Main talk:** "Composition of the Earth and the inevitable emergence and evolution of life" by Dr Chris Hatton.
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Percy Jacobs.

Next observing evening: Friday 17 June at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road. Arrive from sunset onwards.

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Last month's observing evening - by Michael Poll and Johan Smit

A cloud free night at last – just as well, we are running out of ways to say that it is cloudy. There were about 9 or 10 telescopes spread around the CBC sports field, so a good turn out. We watched the sky get dark and the stars, and the one planet, come out. At about 6.20 pm we saw the International Space Station passing to the south west.

This evening saw the annual visit of the third year Medunsa medical students. About 20 or 30 were there. Johan gave an introductory talk about the naked eye night sky, including some indigenous star lore – a few of the students knew about Naka (also known as Canopus). Many did not recognise the name “Naka” but many recognized the translation “the Horn”. The latter name reflects the fact that the first person to see Naka rising before sunrise at the end of winter, would blow a sound on an antelope horn (and would also get a reward of cattle). After the talk, the students moved around to look through the telescopes. There was the usual cross section of interest – some were very keen and asked a good few questions (“Can the people in the USA see these stars?” – which led to a discussion about latitude and longitude). A few clusters were shown, including NGC 6231 (the False Comet) and NGC 2547, the cluster with a heart. NGC 3532, the Wishing Well Cluster, was also shown, and, after Saturn, was the sight that was probably the most enjoyed by the students.

Saturn was a prime viewing target, with explanations about the rings, and the orbital period. It was pointed out that Saturn can be located fairly easily amongst the stars for the next few weeks because of its proximity to Porrima (Gamma Virginis) – the two making a very distinctive close pair in June. Later on we were able to show them the gibbous moon, which was rising as they were about to leave – some of them were pulled off the bus to see it!

Before the students came, some double stars were examined – including Castor (Alpha Geminorum) and, Porrima (both now opening up); Alpha Centauri (now closing up), Beta Scorpii, Alpha Librae (very wide, can be split in binoculars), and Gamma Leonis.

There was not much viewing after the students left – we were being plagued by the dew, but that is still preferable to cloud. After everyone else left, Johan helped Dewald Wagener pack his scope and ended up talking until about 23:00. When the dew forces a stop to observing there is always talking to do!

Last month's meeting – by Hein Stoltz

Despite the very cold weather on the night, attendance was only marginally down from the previous meeting. Fortunately, the approach of winter promises some clear crisp observing evenings during the coming months!

In “**Beginner's Corner**” Percy Jacobs reported on the very successful National Karoo Star Party which was held from 29 April – 2 May 2011 at Kambro Farm Stall near Britstown and was attended by about thirty keen observers from as far afield as Durban, Port Elizabeth, Bloemfontein, Pretoria, Johannesburg and the West Rand. Despite some adverse weather predictions, it was not too cold and the night sky was crisp and clear and, remarkably, mostly dew-free. Some highlights included magnificent views of Saturn and the southern Milky Way, especially the rich star-fields and nebulosity's in the Crux-Carina region. Later in the evening observers were treated to spectacular views of the many globular and open star clusters and nebulae in Scorpius and Sagittarius. Other highlights included a list of many (some very elusive) deep-sky objects comprising of several planetary and diffuse nebulae and numerous galaxies. Of the nebulae, the “Rings” – M57 in Lyra and NGC3132 (“Southern ring or Eight burst nebula”) in Vela, Orion's M42/43, and the Dumbbell (M27) in Vulpecula delighted. Amongst the many galaxies observed, those in Virgo and Leo were particularly entertaining, but the Sombrero (M104) in Virgo and the Hamburger (NGC5128 in Centaurus) were considered the most visually pleasing. A full report is available on the Pretoria Centre web page (<http://www.pretoria-astronomy.co.za/events.htm>), including a slideshow of pictures taken during the event.

Johan Smit presented “**What's Up**” in June, pointing out that this month covers a complete lunar cycle with New Moon on the 1st, First Quarter on the 8th, Full Moon on the 15th, Last

Quarter on the 23rd and the Moon's twenty nine and a half day cycle ending on the last day of the month, June 30th. The best dark sky evenings are from 3 days past Full Moon until 8 days before the next Full Moon (i.e. until 6th of June, and from about the 20th until the end of June.)

The Total Lunar Eclipse of 15 June 2011 is quite an exceptional one as it is a long eclipse (totality lasting 100 minutes) passing deeply through the Earth's Umbral Shadow and occurring at a particularly convenient time (early evening from about 19:00 on the day before a public holiday! The next total lunar eclipse, fully visible from our location, will be in September 2015 and then you will have to get up at 02:00 in the morning!) Details of the eclipse and an eclipse map were included in the May 2011 newsletter. Observers were encouraged to estimate the various brightnesses at different times during the eclipse using either the Selivanov method or the Danjon Method.

Selivanov Method = Reverse binocular method where the brightness is compared with objects of known brightness). Total magnitude is calculated as follows:

$$mv = m_{red} - (0.2 + (5 \log M))$$

M = magnification of the binoculars.

Correction is -4.4 for 7x, -4.7 for 8x, -5.2 for 10x and -5.6 for 12x binoculars

Danjon method - Compares the appearance of the eclipsed Moon with a five point scale.

L=0: very dark eclipse, Moon almost invisible, especially in mid totality

L=1: dark eclipse, grey or brownish colouration; details distinguishable only with difficulty

L=2: deep red or rust coloured eclipse, with a very dark central part in the umbra and the outer rim of the umbra relatively bright

L=3: brick red eclipse, usually with a bright or yellow rim to the umbra

L=4: very bright copper red or orange eclipse, with a bluish, very bright umbra rim.

A fractional estimate can also be made:

Total magnitude mv of the eclipsed Moon:

$$mv = 3.99 - 3.13 L + 0.364 L^2$$

Barbara Cunow appealed to those present to assist in a small collaborative project with colleagues in Germany to photograph the Moon's parallax at the eclipse. (An e-mail message in this regard was sent to all members.)

As far as planet observing goes, Jupiter is rising earlier each night, but Saturn is setting earlier (around 02:00 at the beginning of the month and around 00:00 at the end of the month). Watch Saturn move relative to Porrima (= retrograde motion until about the middle of the month). Other observing highlights for June were pointed out, especially those in the ASSA Top 100 Catalogue and a challenge was extended to everyone to join the Observing Section (led by Percy Jacobs). The ASSA 100 Catalogue, an Observing log sheet and other observing tools are available for download from the Centre's website (<http://www.pretoria-astronomy.co.za/observationguidelines.htm>)

The **Main Topic** of the evening "**Science at CERN – 3 Trillion Collisions**" was presented by Claire Lee. Claire obtained her Masters in Nuclear Physics from Wits and is now completing her PhD in Particle Physics at the University of Johannesburg. She is part of the South African team involved with the ATLAS experiment of the Large Hadron Collider (LHC), the gigantic particle accelerator near Geneva, which spans the border between Switzerland and France about 100 m underground. Two beams of subatomic particles called 'hadrons' – either protons or lead ions – travel in opposite directions inside the circular accelerator, gaining energy with every lap. Physicists use the LHC to recreate the conditions just after the Big Bang, by colliding the two beams head-on at very high energy.

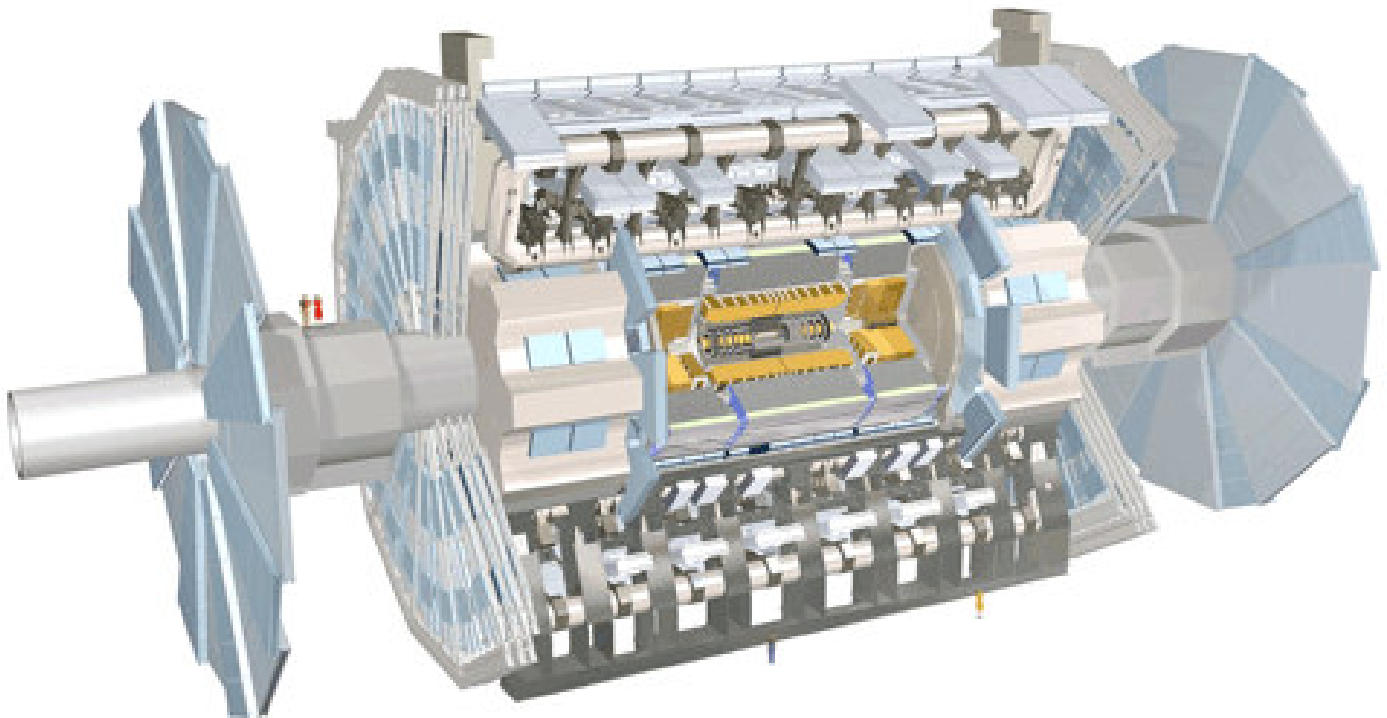
When Claire last visited the Pretoria Centre to present a talk in April 2009 (See May 2009 Newsletter), the LHC had just suffered a catastrophic failure which put all experiments on hold for more than a year. Fortunately, the LHC is now up and running, although only to about 50% of its ultimate capacity. At full power, trillions of protons will race around the LHC accelerator ring (with a circumference of 26 659 m) 11 245 times per second, travelling at 99.9999991% the speed of

light and generating 600 million collisions per second! The two beams each travel at a maximum energy of 7 TeV (tera-electronvolt), corresponding to head-to-head collisions of 14 TeV (which is less energy than that generated by clapping your hands together, but concentrated in such a miniscule space that it generates temperatures 100 000 times hotter than the sun's interior!) To avoid colliding with gas molecules inside the accelerator, the beams of particles travel in an ultra-high vacuum, kept at a super cool temperature of $-271.3\text{ }^{\circ}\text{C}$ (1.9 K), which is colder than outer space.

Claire provided some astonishing statistics of ATLAS and presented some of the early data generated: ATLAS is one of two general-purpose detectors at the LHC which will investigate a wide range of physics, including the search for the Higgs boson, extra dimensions and particles that could make up dark matter. ATLAS will record sets of measurements on the particles created in collisions - their paths, energies, and their identities. This is accomplished through six different detecting subsystems that identify particles and measure their momentum and energy. Another vital element of ATLAS is the huge magnet system that bends the paths of charged particles for momentum measurement. The interactions in the ATLAS detectors will create an enormous data-flow (nearly 1% of the world's information production rate) requiring a very advanced trigger and data acquisition system, and a large computing system.

More than 2900 scientists from 172 institutes in 37 countries work on the ATLAS experiment and Claire will be moving to CERN within the next couple of weeks to complete her data collection and analysis for her PhD.

Her talk generated several questions and lively discussions, which continued during the coffee/tea and biscuits at the end of the evening!



ATLAS detector (figure above).

- Size: 46 m long, 25 m high and 25 m wide. The ATLAS detector is the largest volume particle detector ever constructed.
- Weight: 7000 tons.
- Design: barrel plus end caps.
- Location: Meyrin, Switzerland.

News items

- Bidding farewell to NASA's Spirit Rover on Mars.
http://www.scientificamerican.com/gallery_directory.cfm?photo_id=2918C1BD-A527-5856-E68F3F50BD0E0B2E&WT.mc_id=SA_CAT_SPC_20110526
- Newfound piece of the Milky Way galaxy: a looping spiral arm of gas some 70 000 light-years away seems to preserve the galaxy's spiral symmetry.
http://www.scientificamerican.com/article.cfm?id=new-spiral-arm-milky-way&WT.mc_id=SA_CAT_SPC_20110526
- Kepler spacecraft shows that smaller planets abound. NASA's planet-hunting satellite is making the case that it's a small-world galaxy.
http://www.scientificamerican.com/article.cfm?id=kepler-planet-census&WT.mc_id=SA_CAT_SPC_20110526
- WiggleZ project confirms dark energy's effects. A survey of 150 000 galaxies confirms predictions about dark energy, thought to be what's driving galaxies apart.
http://www.scientificamerican.com/podcast/episode.cfm?id=wigglez-project-confirms-dark-energ-11-05-23&WT.mc_id=SA_CAT_SPC_20110526
- Dispatches from the May 2011 Dark Matter Symposium at the Space Telescope Science Institute. For four days in May, leading physicists and astronomers gathered in Baltimore to talk about the abundant but mysterious stuff that accounts for one quarter of the universe.
http://www.scientificamerican.com/article.cfm?id=dark-matter-may2011-symposium-space-telescope-science-institute&WT.mc_id=SA_CAT_SPC_20110602
- Evidence mounts for liquid water on Saturn's moon Enceladus.
http://www.scientificamerican.com/article.cfm?id=evidence-mounts-for-liquid-wat&WT.mc_id=SA_CAT_SPC_20110526

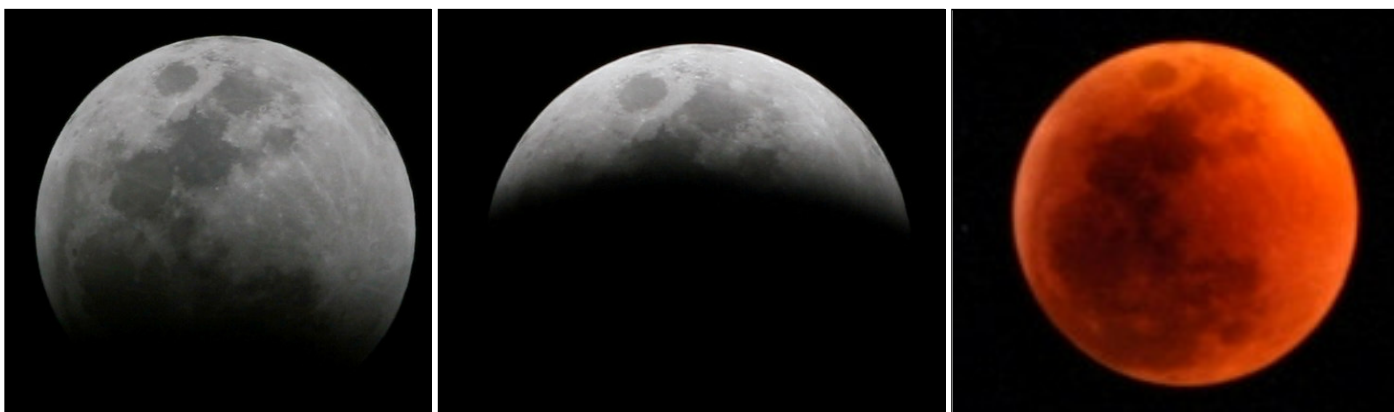
On the BlogSpot of the Bloemfontein Centre of the ASSA

- Averted vision.
- Dark adaptation.
- The atmosphere and observing - A guide to astronomical seeing.
- Beware of the jet stream.
- Images: 3rd Karoo Star Party.
- ScopeX.
- Other topics.

<http://assabfn.blogspot.com/>

Photographs of the lunar eclipse on 15 June 2011

These photographs of the lunar eclipse on 15 June 2011 were taken by Pat Kühn, one of our members. Left to right: **1.** 20h33: The moon just starting to enter the umbra. **2.** 21h03: The moon almost completely in the umbra. **3.** 22h10: The moon close to the center of the umbra.



SKA: Australia or South Africa?

Australia has 6 dishes, with designs on 30 more; South Africa has built 7 of a planned 64. When the two projects, the Australian Square Kilometer Array Pathfinder (ASKAP) and the Karoo Array Telescope (MeerKAT), are finished, each will be among the most powerful radio observatories in the world. But both countries have set their sights on a bigger prize. Australia is building ASKAP, and South Africa is building MeerKAT in the hopes of landing the \$2-billion Square Kilometer Array (SKA), one of the most ambitious telescope projects in history.

In 2012 an international consortium will choose Murchison in Australia or Karoo in South Africa as the home of the SKA, a vast network of 3 000 15-meter steerable radio telescopes that pivot on multiple axes to aim at celestial targets.

http://www.scientificamerican.com/article.cfm?id=ska-radio-astronomy&WT.mc_id=SA_CAT_TECH_20110511

Excitement is mounting as the two countries run neck and neck. If you want to receive the free regular SKA newsletter, send an e-mail message to Marina Joubert and request it. Her e-mail address is marina@southernscience.co.za

Astronomy weekend of the Johannesburg Centre of the ASSA, held from 27 to 29 May 2011 at Suikerbos Nature Reserve - by Antonio de Franca

Suikerbos Nature Reserve is situated in the Vredefort Dome area approximately 22 km south-east of Potchefstroom, near Venterskroon. This splendid area is declared a World Heritage Site and it boasts a number of interesting treasures e.g. wildlife, birdlife, fauna & flora and a rich geological history. This area is mountainous and picturesque with minimal light pollution.

Observing conditions was considered ideal, clear and although bitterly cold on the first night, it proved to be one of the finest night skies seen in a long time. Those attended were mostly from the Johannesburg Centre and needless to say they were a friendly and helpful bunch of amateur astronomers to say the least. Four telescopes were set up including the enormous and impressive Meade LX200 12 inch Schmidt Cassegrain telescope. Alec Jamieson and Melvyn Hannibal did the duty of erecting the magnificent telescope on to its large tripod. Gary Els, Chairman of the Johannesburg Centre, also attended the event. His enthusiasm for astrophotography brought some more interest to the evening's business. Spectacular photos were taken of HGC 5139 or Omega Centauri, M17 or "Swan nebula", NGC 2070 commonly known as the "Tarantula nebula" in the Large Magellanic Cloud (LMC), NGC 4755 or "Jewel box" in Crux, only to mention a few of these gems. Gary and Antonio photographed the night sky without the aid of a telescope of the Milky Way. These images were equally impressive, by using a standard 18-55mm lens, wide aperture, high ISO setting (3200 to 6400) and 5 to 40 second exposures produced stunning results of the "heavens above". Further observations included Saturn, M4 globular cluster in Scorpius, NGC 5822 open cluster in the constellation of Lupus the Wolf, M44 "Beehive open cluster" in Cancer and a few more.

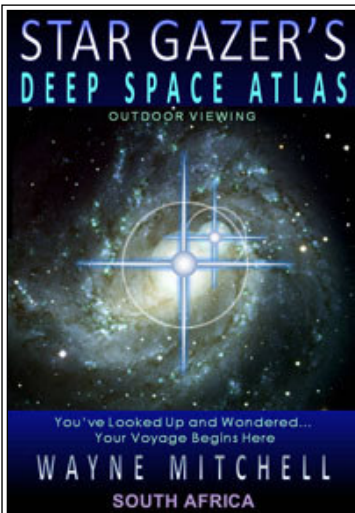
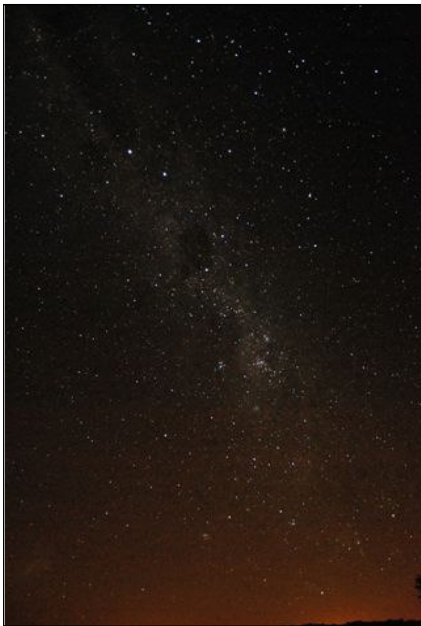
Saturday morning was welcomed by a proposal to visit a geological site in an abandoned granite quarry near Venterskroon. Trevor expertly explained how granite rock was impacted by the meteorite to form a black crystallised molten rock called "pseudotachylite". This rock was caused by high impact pressure on the existing granite and it took millions of years to cool down to its current state. The Vredefort Dome was a result of a meteorite impact. This occurred approximately 2000 million years ago and the damage caused when the meteorite collided in this region was massive. The size of the meteorite was about 10km wide. The speed of this meteorite was so fast that it exploded when it hit the ground. It blasted a mammoth crater. This meteorite made a crater of about 300km in diameter and approximately 5km deep. This is the largest and oldest meteorite impact known according to geologists.

In conclusion the outing was entertaining and fun with plenty jokes and laughter despite the low turnout. A special thanks to the members of the Johannesburg Centre who hosted the event, it was certainly a prelude to the next exciting astronomy event.

Antonio de Franca is a member of the Pretoria Centre of the ASSA. **(Photographs: next page.)**

Photographs taken at the astronomy weekend at Suikerbos Nature Reserve

Clockwise, from top right: **1.** Setting up the Meade LX 200 12-inch telescope. **2.** The Milky Way Galaxy - Nikon D60 camera on tripod, 18-55mm lens, 30 sec exposure. **3.** Coal Sack & Crux - Nikon D60 camera on tripod, 18-55 lens, 30 sec. exposure. **4.** Members of the Johannesburg and Pretoria Centres of the ASSA who attended the astronomy weekend.



Special offer

I (Wayne Mitchell, a member of the Pretoria Centre of the ASSA) will be holding a Father's Day special of R299 for the **Star Gazer's Deep Space Atlas** for the rest of June and for July. Postage will be the usual R45. Father's Day will be on 19 June this year. Interested people would need to contact me directly at my email address so as not to confuse other orders coming from my website. The email address to use is wayne.mitchell@penbogroupe.com. My cell phone number is 072 465 7739.

Look Up and Discover the Cosmic Gems We All Deserve to See!

For more information about the star atlas, visit my website. Its link is <http://www.deepspaceatlas.com/>

Basics: Evidence that Earth orbits around the Sun - by Pierre Lourens

1. The aberration of starlight.

All stars observed from Earth undergo apparent aberration orbits with a period of one year. See the newsletter for January 2011.

2. Annual parallaxes of the stars.

Observed from Earth, the alignments of the nearer stars relative to the more distant ones undergo periodic changes with a period of one year. See the newsletter for February 2011.

3. Periodic Doppler shifts of the absorption lines in the spectra of stars.

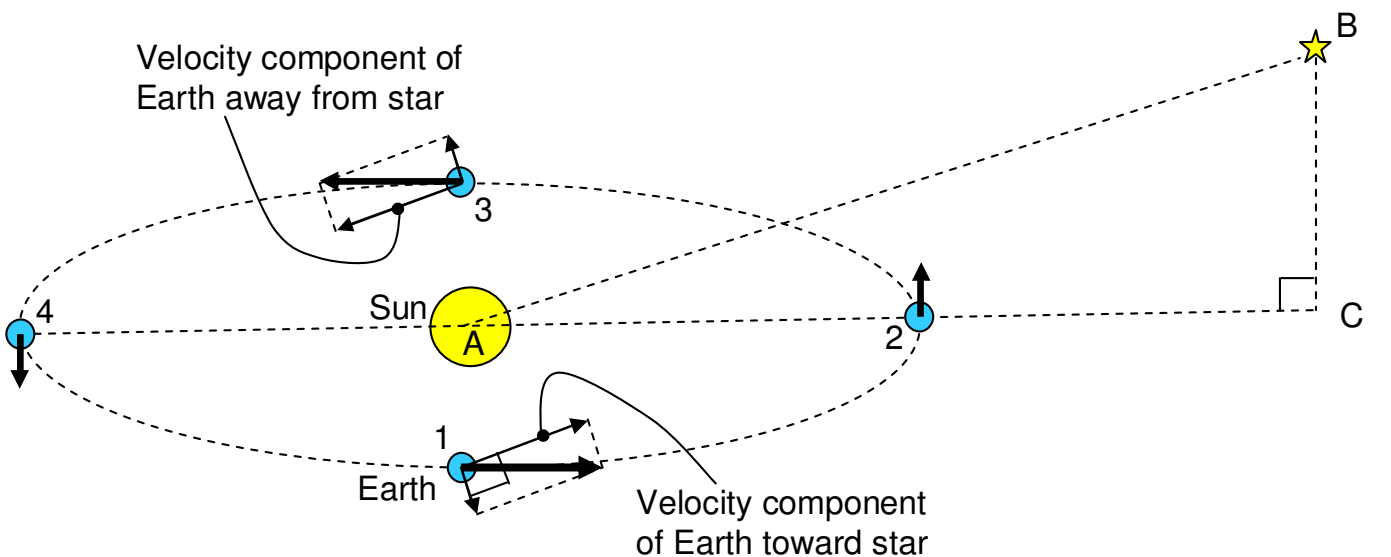
There are periodic shifts (with period one year) of the absorption lines in the spectra of all stars observed from Earth. For example, consider a star that has no shift in its absorption lines at two times of the year, six months apart. The periodic variation of the absorption lines in its spectrum can be explained as follows. (All velocities below are relative to the ecliptic coordinate system.)

When Earth is at position 1 in the figure, its velocity is directed // plane ABC and its velocity component directed along the line of sight **toward** the star has maximum magnitude. Then the absorption lines in the star's spectrum undergo the maximum Doppler shift to shorter wavelengths.

When Earth is at position 2, its velocity is directed \perp plane ABC, the velocity component along the line of sight to the star is zero and there is no Doppler shift of the star's absorption lines.

When Earth is at position 3 in the figure, its velocity is again directed // plane ABC and its velocity component directed along the line of sight **away from** the star has maximum magnitude. The absorption lines in the star's spectrum undergo the maximum Doppler shift to longer wavelengths.

When Earth is at position 4, its velocity is again directed \perp plane ABC, the velocity component along the line of sight to the star is zero and there is no Doppler shift of the star's absorption lines.



***Endeavour's* final launch in pictures [slide show]**

Space shuttle *Endeavour*, the replacement for the doomed *Challenger*, has set off on its final mission. NASA's space shuttle *Endeavour* made a successful and historic launch on May 16 2011, as the agency approached the end of its shuttle program. It was started in the 1960s. The liftoff marked *Endeavour's* final mission and the second-to-last shuttle mission for NASA.

http://www.scientificamerican.com/article.cfm?id=endeavours-final-launch&WT.mc_id=SA_CAT_SPC_20110519

FEATURE OF THE MONTH: Two stars become one

This stellar fusion is the first of its kind ever observed by astronomers. Scientists have directly observed for the first time the merger of two closely orbiting stars named V1309 Scorpii. When the stars' cores merged, the fusion appeared 10 000 times brighter than its original luminosity and more than 30 000 times brighter than the Sun.

The finding could explain other similar bursts observed by astronomers. For stellar astronomers, the Biblical verse "the two shall become one flesh" just took on a

whole new meaning. Experts have suggested for decades that such stars — which whirl so close to each other that their outer layers actually touch — should ultimately fuse. The new research work caught the stars in the act.

The image is an artist's representation of the fusion of the two stars.

<http://news.discovery.com/space/stars-fusion-burst-110322.html>

**Vesta: is it really an asteroid?**

Many astronomers call Vesta an asteroid because it lies in the main asteroid belt between Mars and Jupiter. But Vesta is not a typical member of that orbiting rubble patch. The vast majority of objects in the main belt are lightweights, 100 kilometers wide or smaller, compared with Vesta, which is a 530 kilometer-wide behemoth. Vesta should not be called an asteroid. Not only is it so much larger, but it's an evolved object, unlike most things we call asteroids. The layered structure of Vesta (core, mantle and crust) is the key trait that makes it more like planets such as Earth, Venus and Mars than the other asteroids. Like the planets,

Vesta had sufficient radioactive material inside when it coalesced, releasing heat that melted rock and enabled lighter layers to float to the outside. Scientists call this process differentiation.

The image is a computer-generated image using scientists' best guess to date of what the surface of Vesta might look like. NASA's spacecraft Dawn will arrive at Vesta in July this year.

http://solarsystem.nasa.gov/scitech/display.cfm?ST_ID=2367

Proceedings of MEARIM2

The proceedings of this conference (see the May 2011 newsletter, page 4) will be published in the publication **African Skies** (supported by SAAO) in the next few months, which you should be able to access at <http://www.sao.ac.za/~wgssa/archive.php>

Info sent in by Dr Hubrecht Ribbens.



Foto's van die ISS

Paul Ludick van Ludick Observatory, Krugersdorp-Noord, het hierdie foto's van die International Space Station (ISS) geneem toe dit oor sy huis beweeg het. Plasing is met sy toestemming. Hy het 'n webruimte met skakel picturesforafrica.com

Boodskappe vanaf ou bekendes

Cor Rademeyer was 'n lid van die Pretoria Tak van die ASSA. Hy was 'n professor in chemie by die Universiteit van Pretoria. Ek het die volgende e-pos boodskap van hom ontvang. As enigiemand dalk met hom wil kommunikeer, sy e-pos adres is: corrademeyer@bigpond.com.

Beste Pierre

Dankie vir jou e-pos.

Net om te laat weet, ek het afgetree en ons het Australië toe geëmigreer. Ons woon op die Gold Coast op 'n berg, 600m hoog, net agter Surfer's Paradise. Ons het wonderlike skoon winternagte en omtrent 50 van die somernagte is goed vir sterrekundige waarnemings. Ek stel dikwels my ou 10 duim Newtonian op en verwonder my steeds aan die heelal.

Sterkte vir jou en die vereniging en almal in Suid-Afrika.

Groete

Cor Rademeyer

Johann Swanepoel was 'n lid van die Pretoria tak van die ASSA. Hy was 'n ingenieur. Na sy aftrede het hy verhuis na George in die Suid-Kaap. Hy het die volgende e-pos boodskap op 8 Junie gestuur. As enigiemand dalk met hom wil kommunikeer, sy e-pos adres is:

jqfswanepoel@gmail.com

Hallo Pierre,

Dit was baie gaaf om jou by ScopeX te gesien het. Dankie vir die nuusbrief - ook dat jy die foto van my daarin geplaas het. Ek het die nuusbrief ook deurgestuur na Theo Pistorius in Adelaide, Australië. Hy was mos in die verlede ook deel van die Pretoria sentrum. Die foto wat jy van my by die twee teleskope geneem het is een van die beteres. Sal jy omgee om dit vir my aan te stuur? Lerika het my gevra om iets vir Astronomy Magazine te skryf en ek kan moontlik die foto gebruik.

Die weer hier in George is vanjaar maar baie bewolk en reënerig - so ek kry nie veel kans om te kyk nie. Vandag reën dit katta en honde hier. Dit na al die droogte die afgelope twee jaar. Die reën het verlede November begin - net na ek die AI op die spieëls laat opdamp het! Die begin van Maart het ek die skoop na die sterrefees tussen Bonnievale en McGregor gehad - daar het ons twee pragtige nagte gehad en kon ek lekker kyk.

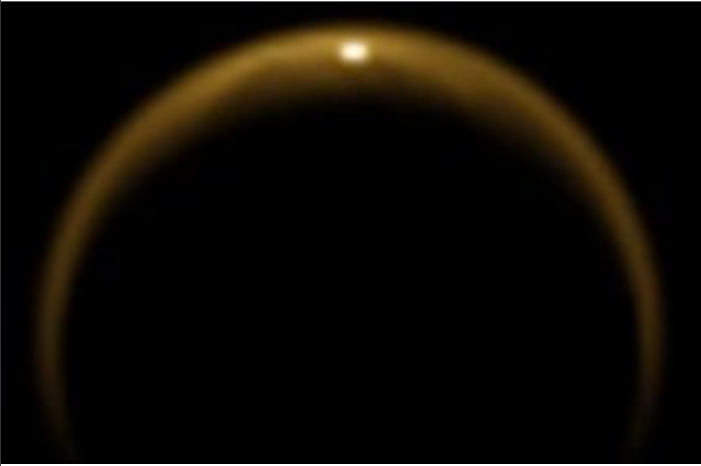
**Groete,
Johann**

Versameling van "Sky & Telescope" gratis - Pierre Lourens

Ek het 'n versameling van die tydskrif "Sky & Telescope". Al die uitgawes vanaf Januarie 1980 tot Julie 2006 is daar, behalwe die uitgawe van Mei 2004. Ek het hulle almal gelees, maar ek wil hulle nou weggee. Die eerste persoon wat my vra, kan hulle kry.

pierre.lourens@telkomsa.net / 012 654 6366 / 072 207 1403.

Titan's winds shape its sandy dunes



Is there life on Titan? We don't know. For life, you need three things — the raw materials, a way to shift them around and a power supply. And they are all present on Titan.

We do know, thanks to the Cassini orbiter and the Huygens Lander, that there are sand dunes on Titan. The sand dunes are located both north and south of the equator of Titan. They run for tens, or hundreds, of kilometers in unbroken stretches.

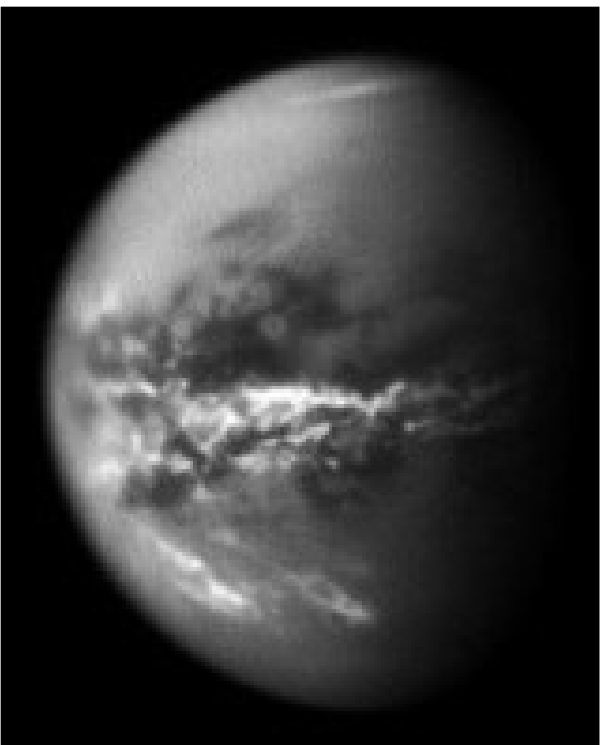
There's one stretch of 1500 kilometers. The individual sand dunes on Titan are up to 100 meters high and a few kilometers apart.

And would you believe it, these are the same dimensions that you find in the sand dunes in the Namib Sand Sea of Africa, and in the Sahara Desert. The sand dunes of Titan seem to be formed by the same mechanisms that gave us sand dunes on Earth.

But while the physics of Titan's sand dunes is the same as here on Earth, the raw materials are different, because of the much lower temperature. So is the 'sand' made of silica, like on Earth? No! It's made of various hydrocarbons. Just think of coffee grounds and you'll be pretty close.

The image shows the first flash of sunlight reflected off a lake on Titan, detected by the visual and infrared mapping spectrometer on NASA's Cassini spacecraft on 8 July 2009.

<http://www.abc.net.au/science/articles/2010/04/13/2871603.htm?topic=space>



Boat on Titan's lakes and oceans?

Among projects under consideration by NASA is one that would send a boat to the hydrocarbon seas on Saturn's moon Titan to check out its composition and chemistry. Titan, Saturn's largest moon, has numerous lakes and seas. But they're not bodies of water - Titan's reservoirs are full of liquid hydrocarbons such as methane. NASA is now considering building a boat to sail the seas of Titan. The space agency recently awarded a team of scientists \$3 million to develop the idea.

http://www.scientificamerican.com/podcast/episode.cfm?id=space-boat-could-see-sea-near-satur-11-05-16&WT.mc_id=SA_CAT_SPC_20110519

Cassini observes seasonal rains on Titan

As spring continues to unfold on Saturn, showers on the planet's largest moon, Titan, have brought methane rain to its equatorial deserts, as revealed in images captured by NASA's Cassini spacecraft. This is the first time scientists have obtained current evidence of rain soaking Titan's surface at low latitudes.

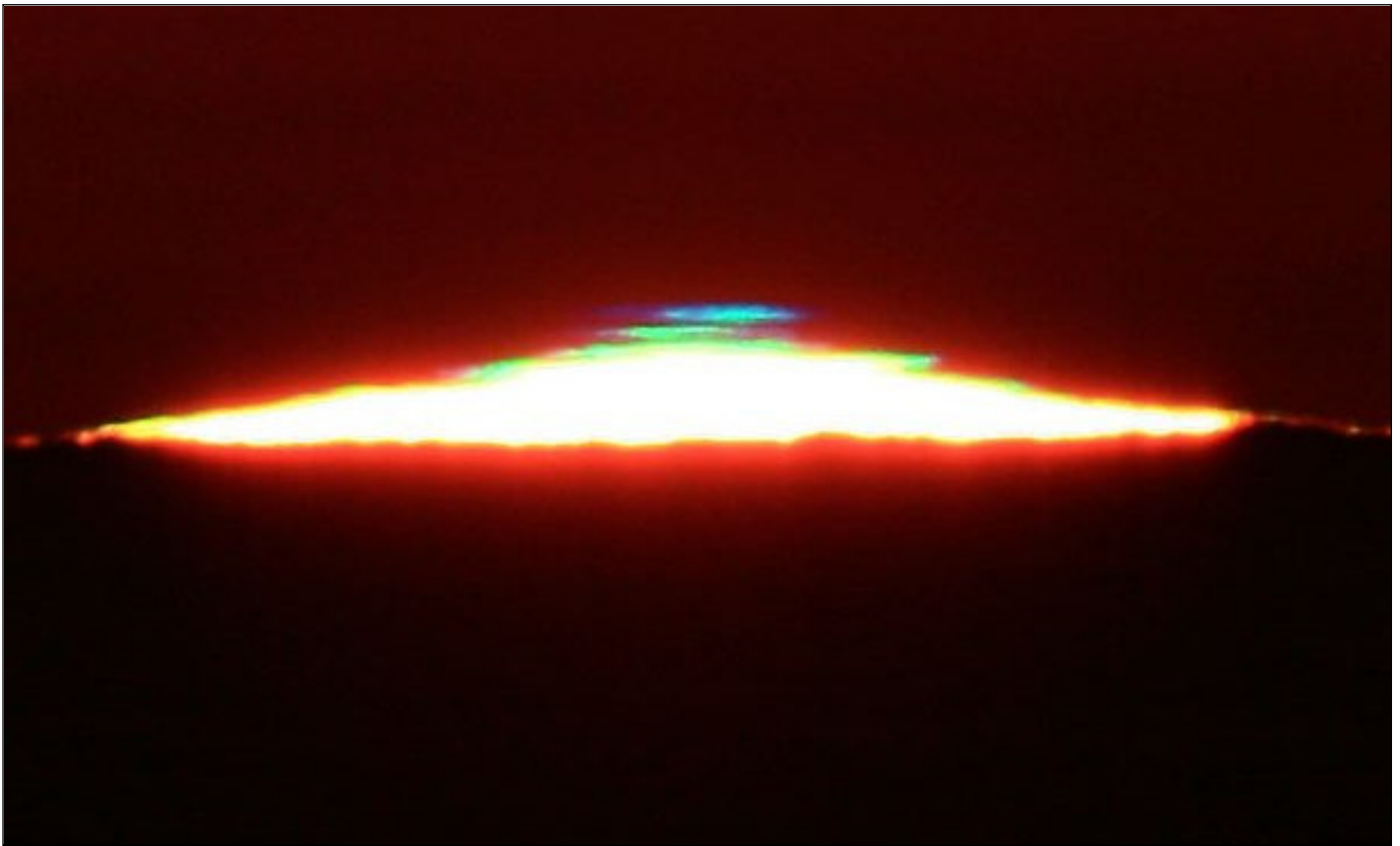
In the image, the Cassini spacecraft chronicles the change of seasons as it captures clouds concentrated near the equator of Titan.

<http://www.sciencecentric.com/news/11031804-cassini-spacecraft-observes-seasonal-rains-on-titan.html>

The green flash and the blue flash

The rare green flash as well as the even rarer blue flash, was caught above the setting Sun in this rare photograph.

<http://apod.nasa.gov/apod/ap110104.html>



**thinking
is real**

*I'll tell you what was before the Big Bang
when you can tell me what lies south of the South Pole*

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