



# The PRETORIA CENTRE

of the

**Astronomical Society of Southern Africa**

[www.pretoria-astronomy.co.za](http://www.pretoria-astronomy.co.za)

## NEWSLETTER MARCH 2012

### Next meeting

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

**Date and time:** Wednesday 28 March at 19h15.

#### Programme:

- **Beginner's Corner:** Presentation to be combined with **What's Up?** by Michael Poll
- **What's Up?** by Michael Poll
- 10 minute break — library will be open
- **Main talk: "The Square Kilometer Array"**  
by **Dr Adrian Tiplady**
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Johan Smit.

Next observing evening: Friday 23 March 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

We were clouded out : ten tenths cloud as they say, and it did not break up either. At least it did not rain – we had that earlier in the afternoon. Nevertheless, about 15 people came, and we had a long evening of friendly talk and discussion, and the also looked at the three or four telescopes that were on view.

Again, there were a number of first time visitors, and, although it was disappointing for us not to be able to show things in the telescope, the discussion topics included a summary of the constellations that are in the night sky at this time of year, stellar life history, and Pat Kühn explained the motivations behind the urge to make a telescope and how to go about building one yourself.

The next observing evening will be on Friday March 23<sup>rd</sup> from sunset onwards. Jupiter, Venus, Mars and Saturn will all be well placed for observing. Our calendars tell us that March 23<sup>rd</sup> is World Meteorological Day, so we will be able to see what effects there will be on the weather!

### Summary of “What’s Up?” and “Beginner’s Corner” for March 28<sup>th</sup> 2012 by Michael Poll

“What’s Up?” and “Beginners Corner” are combined for this month, some items in “Beginner’s Corner” will be an extended discussion following on from some of the subjects mentioned “What’s Up?”

Four bright planets, Jupiter, Venus, Mars and Saturn are in the northern sky in April, and the positions and movements of these planets will be shown, together with the background constellations. There will be a look at the relationship of the orbits of Venus and Mars relative to that of the Earth, and the way that the positions of the orbits, and the orbital periods, determine the frequency and duration of the viewing seasons for these two planets. Included in the discussion are Transits of Venus, and the (unfortunate for us) circumstances of the transit of Venus on June 6<sup>th</sup> 2012 will be detailed. In the case of Mars, circumstances giving rise to favourable oppositions will be explained.

“Beginner’s Corner” will also include a look at the night sky as seen from the location of the Titanic on the night that the ship sank, including a tour of the constellations, and descriptions of the sky from the survivors. Some of the constellations visible from the scene of the sinking are visible in our Pretoria night sky in April.

#### Moon Phases (2012)

First Quarter	March 30 <sup>th</sup>	21h 41
Full Moon	April 6 <sup>th</sup>	21h 19
Last Quarter	April 13 <sup>th</sup>	12h 50
New Moon	April 21 <sup>st</sup>	09h 18

#### Moon Distances (2012)

Apogee	April 22 <sup>nd</sup>	15h 49.	Distance 406 400 km.
Perigee	April 7 <sup>th</sup>	18h 59.	Distance 358 300 km.

Note that in the press in March 2011 there was a lot of hype about how big the full moon of March 19<sup>th</sup> 2011 would look, because it which occurred within an hour of perigee. The moon was 356 575 km away on that date. The full moon of April 6<sup>th</sup> 2012 occurs less than 24 hours before perigee, and the perigee distance of 358 325 km is only 1740 km more than on March 19<sup>th</sup> 2011!

#### Moon’s Declination (2012)

Furthest North	March 29 <sup>th</sup>	: Declination + 21.9°
Furthest South	April 10 <sup>th</sup>	: Declination – 21.8°
Furthest North	April 25 <sup>th</sup>	: Declination + 21.7°

The moon’s movement to its greatest declination north and south of the equator in one month is the equivalent of the sun’s movement north and south to the solstices in the course of one year.

However, because of the tilt of the moon's orbit relative to the ecliptic, and the retrograde shift of the nodes of its orbit, the moon's greatest declination from month to month and year to year varies over a 19 year cycle.

**Moon near bright objects (Selected Events for 2012)**

**Evening sky**

- March 27<sup>th</sup> & 28<sup>th</sup> Moon near Aldebaran, the brightest star in Taurus.
- April 3<sup>rd</sup> Moon near Regulus, brightest star in Leo. (Mars also near).
- Apr 6<sup>th</sup> & 7<sup>th</sup> Moon near Spica, brightest star in Virgo. (Saturn also near)
- April 9<sup>th</sup> at 21h 41 Moon occults Omega 1 Scorpii
- April 10<sup>th</sup> Moon near Antares, brightest star in Scorpius
- April 22<sup>nd</sup> Moon near Jupiter (Moon 34 hours old).
- April 24<sup>th</sup> & 25<sup>th</sup> Moon near Venus

**Morning sky**

- April 18<sup>th</sup> & 19<sup>th</sup> Moon near Mercury.

**(Selected) Constellations visible in April : (Sequence repeats from year to year)**

- April :South** Carina, Vela (False Cross), Crux, Centaurus.
- North** Canis Major, Gemini, Cancer, Leo.

Some sources of information on what there is to observe are:

- <http://www.skyandtelescope.com/observing/ataglance>
- <http://www.heavens-above.com/>
- <http://skymaps.com/>
- <http://spaceweather.com/>
- <http://spaceweather.co.za/>
- <http://www.sao.ac.za/public-info/sun-moon-stars/>
- <http://www2.jpl.nasa.gov/calendar/>
- Sky Guide Africa South 2012.

**Last month's meeting - by Johan Smit**

The meeting was attended by about 40 people, including some first time visitors. Everyone was welcomed and the following notices were read:

- **Our Karoo star party at Kambro, 20 km north of Britstown on the N12 route, on 21 to 25 March 2012. By the time you read this we will probably be on our way there. If you decide to attend at short notice it is best to contact Kambro directly to enquire if there is space available. Details can be found on our web site.**
- And our Northern Star party planned for 13 to 15 July near Warmbaths. More details will follow shortly.
- Scope X to be held on 21 July 2012. Diarise this day and complete those projects.

"Beginner's Corner" was presented by Pierre Lourens in Afrikaans. This was a first for the Centre. He showed everyone the progress he made with a 14½ inch fork mounted Newtonian telescope. Many people have heard about this project, and many more have not.

After the richly illustrated talk everyone knew that Pierre is nearly finished with a telescope of note. Due to its gigantic size and heavy metal construction it was named by Pierre, the eye of Cyclops. Only photos will do it justice. (See them on the next page.)

The best news is that we are busy negotiating with the Voortrekker organisation to house this telescope permanently on their farm, near the Roodeplaat dam. Soon we will have a decent observatory within one hour's drive from Pretoria, under quite good skies. More details will follow as the negotiations progress.

"What's Up?" was presented by Percy Jacobs and was used to motivate the members for Britstown. Apart from the usual objects to look at, Percy also included some observing tips. He also listed the submissions of the observers in the ASSA top 100 challenge. A total of 127 obser-

vations were recorded and George Dehlen leads the pack comfortably with 60 observations. Louis Kloke handed a pack of observations to Percy at the meeting so the amounts have since changed dramatically.

Then a retired member, Jorrie Jordaan, who was in Pretoria for some business gave a fascinating talk on cosmology, concentrating on the  $\Lambda$ CDM (Lambda-cold dark matter) model. Jorrie used an interesting lattice model based on the artist Escher's work to explain concepts like expansion and the particle horizon.

Through Jorrie's excellent explanations and demonstrations of the effects of different variables on the LCDM model formula I understood the following different distance orders that we are faced with.

Observed light travel time = 13.8 GLy (giga-light-year), or the more common 13.8 billion light years of the size of our observable universe.

By using a maximum red shift of 10 (speed of light), the observed proper distance works out to 90 GLy, in other words that is how far the objects we see at 13.8 GLy really are from us.

Using the redshift of the cosmic microwave background (1000), the minimum universe diameter works out to 1200 GLy. This is the smallest that our universe could be if it is closed with a proper distribution of matter.

My descriptions on this topic does not do the presentation justice, and fortunately Jorrie left us with some help. He informed us about his blog on this fascinating topic. <http://cr4.globalspec.com/blog/22/Jorrie-s-Blog>

And his self-published e-book, Relativity 4 engineers: <http://www.einsteins-theory-of-relativity-4engineers.com/index.html>

I strongly advise everyone to spend some quality time on these links to learn more about Jorrie and his passion.

The meeting ended with the usual refreshments and very lively discussions of the main topic.



Photographs of parts of the telescope-to-be, left to right: **1.** The RA shaft with setting circle and 600mm diameter worm gear. **2.** The tube with the declination cage allowing the tube to be rotated. **3.** The precious optics, with the metal ruler on the surface, which nearly induced a heart attack in some members of the audience. I trust that Pierre will be more careful about what he places on top of the mirror in future.

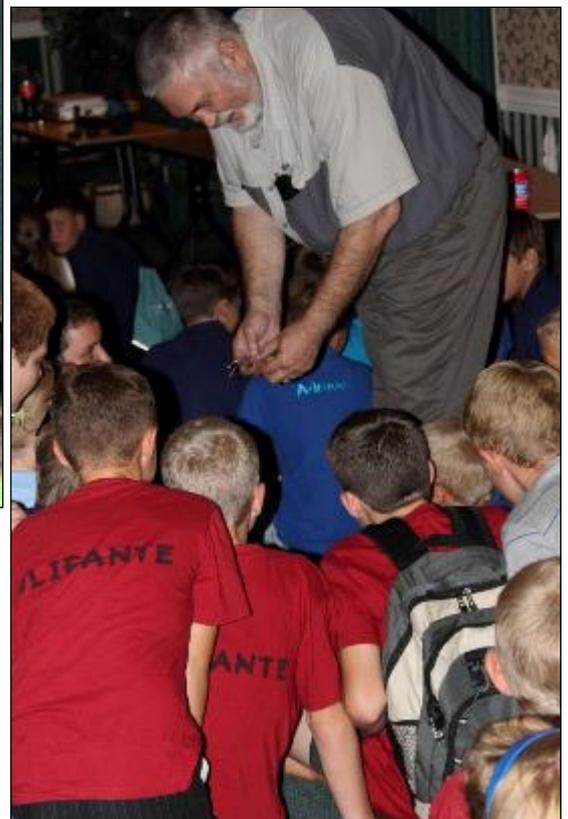
### Outreach to Voortrekkers, 17 February 2012 - by Johan Smit

Johan Smit did a presentation to some 65 young Voortrekkers about telescope optics and light pollution. It took place at the Johannesburg observatory and we also used the historic 26 inch Innes refractor. Unlike Pretoria, the sky opened in two places and we could show the children the Orion nebula (M42) in the 26 inch and Mars in the portable telescopes outside. This group of children gave me hope for the future. When I asked them how many of them like mathematics, about 90% of them put up their hands. And they asked many questions and it was a pleasure to teach such eager youngsters something new.

I was assisted by Bosman Olivier from Pretoria, and Chris Curry, Alec Jamieson, Michael Robbins, Rodney Hyman and Keith Lou from Johannesburg. Lerika Cross from ASSA assisted with the arrangements and supplied some much needed refreshments. Many thanks to all in-

volved.

An informal invitation to join them on their next camping trip outside the city was mentioned. Not much convincing will be needed to accept this invitation.



# Basics: Determination of stellar diameters - by Pierre Lourens

## 1. By means of the Michelson stellar interferometer.

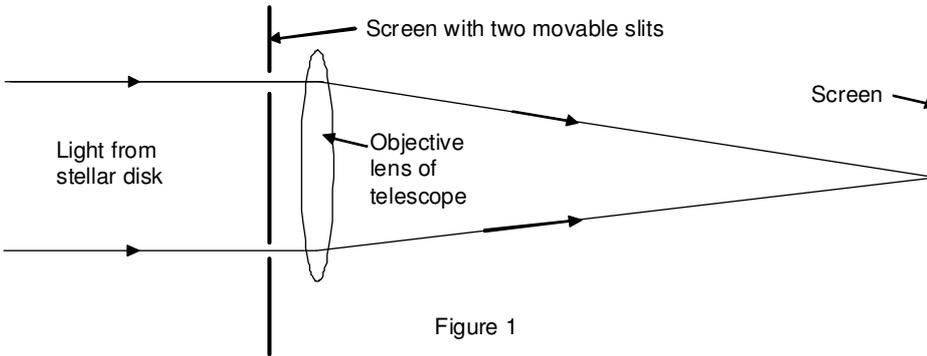


Figure 1

The Michelson stellar interferometer consists of a screen with two movable slits, placed in front of the objective lens of a telescope, as shown in figure 1. The light from the stellar disk passes through the top slit, and because of the wave nature of light, undergoes diffraction (bending of waves around edges of obstacles) as it passes through the slit. The same thing happens at the

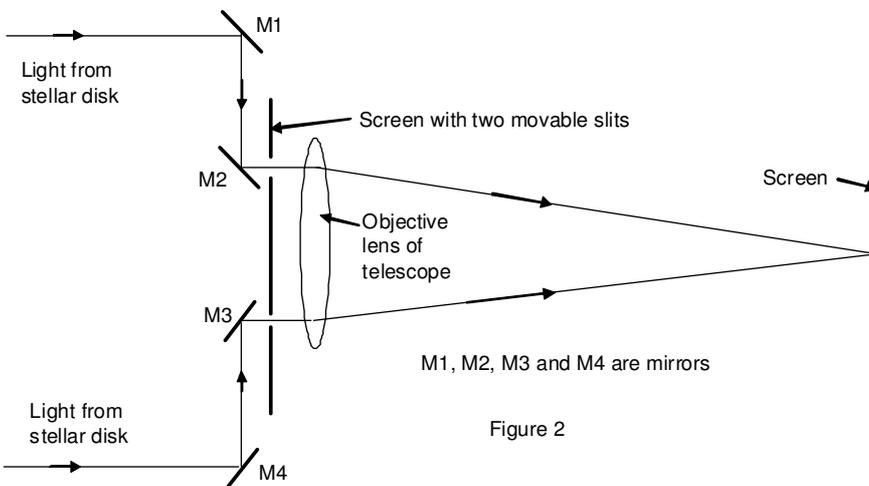


Figure 2

bottom slit. The resulting waves from the two slits undergo interference (interaction) with one another behind the screen. Where they impinge on the screen, there is an interference pattern. It has maxima and minima (i.e. it has interference fringes) which change in intensity and can even attain uniform intensity as the distance between the slits is varied. According to the theoretical analysis of the interferometer, the smallest separation of the slits for

which the interference pattern has uniform intensity (i.e. for which the fringes disappear), is given by the simple formula

$$d = 1.22 \lambda / \theta \quad (1)$$

where

**d** is the distance between the slits.

**λ** is the average wavelength of the starlight.

**θ** is the angular diameter of the stellar disk.

**d** and **λ** are determined by measurement, and **θ** calculated from this formula.

The distance **D** to the star is determined by one of several methods, and the diameter **D<sub>star</sub>** of the star then calculated from the formula

$$\theta = D_{\text{star}} / D \quad (2)$$

where **θ** is in radians.

Attempts to measure **d** initially failed. As a result of the very small angular diameters of stars, the fringes did not disappear with the largest aperture separation permitted by available telescopes. Michelson ingeniously improved this method of determining **θ** by using the experimental setup shown in figure 2. It effectively increased the available aperture separation.

It is difficult in practice to make the measurement of **d**, and as a result the diameters of only a few giant stars have been determined by this method.

## 2. By consideration of effective temperature and luminosity.

A black body is an idealized body that absorbs all the electromagnetic radiation (emr) that falls on it. The amount of emr radiated by such a body per unit area per unit time is  $\sigma T^4$ , where **σ** is the

Stefan-Boltzmann constant and  $T$  is the temperature of the body in Kelvins. A star's photosphere has a very high absorption coefficient for emr, which makes it a close approximation to an ideal black body. The emr it emits is therefore very close to that of an ideal black body. The effective temperature  $T_{\text{eff}}$  of a star is defined as the temperature of an ideal black body that emits the same amount of emr, per unit area per unit time, as the star, i.e.

$$\sigma T_{\text{eff}}^4 = L / (4 \pi R^2) \quad (3)$$

where

$L$  is the luminosity of the star.

$R$  is the (unknown) radius of the star.

The luminosity  $L$  is found as follows. Measure the apparent magnitude  $m$  of the star and find the distance  $D$  to the star by using one of the methods to do this. Find the intensity  $I$  of the starlight received here on Earth from the formula

$$m = m_0 - (5 / 2) \log_{10} (I / I_0) \quad (4)$$

(in which  $m_0$  and  $I_0$  have known values) and then calculate the luminosity  $L$  from the formula

$$I = L / (4 \pi D^2) \quad (5)$$

The wavelength at which the radiation from an ideal black body has the highest intensity, is given by (it is called "Wien's law"):

$$\lambda_{\text{max}} = 2.898 \times 10^{-3} / T \quad (6)$$

where

$\lambda_{\text{max}}$  is the wavelength in meters.

$T$  is the temperature in Kelvins.

The spectrum of the star is inspected to find  $\lambda_{\text{max}}$ .  $T$  is then calculated from formula (6). This is taken to be  $T_{\text{eff}}$ .

In formula (3),  $\sigma$  is a known constant and  $L$  and  $T_{\text{eff}}$  are now known, so that the radius  $R$  of the star can be calculated.

This method is the one most commonly used.

### 3. From the study of eclipsing binaries.

Consider an eclipsing binary star consisting of a small star and a large one. From the light curve, it is possible to tell how long it took for the small star to pass in front of the large star. Multiplying this time interval by the orbital speed (relative to the large star) of the small star gives the diameter of the large star. From the light curve, it is also possible to tell how long it took for the small star from the moment it started disappearing behind the large star until it disappeared completely. Multiplying this time interval by the orbital speed (relative to the large star) of the small star gives the diameter of the small star.

Of course, there are complications. Although many binary star systems have circular orbits, some have elliptical orbits. And these affect the shape of the light curves. In some cases, the plane of the orbits is tipped slightly, so the stars do not cross directly in front of each other, and neither star is completely eclipsed. In some cases, the stars are so close together that they distort each other from perfect spheres, and the rotation of these non-spherical stars causes confusing variations in the light curve of the system. It is even possible for the stars to be so close that the hotter star heats up one side of the cooler star and thus further confuses the light curve. Some of these complications can be accounted for, and some can make a system so complex that it cannot be analyzed. Those that can be analyzed yield not only stellar diameters, but also stellar masses.

### 4. By means of lunar occultations.

The basic idea is simple. Find a star which will be covered by the Moon as it moves through the sky. Using a high-speed device, measure the light from the star as a function of time. Draw the light curve, and from it, determine the time  $t$  it took from the moment the star just touched the Moon's limb to the moment when it disappeared completely. The angular diameter  $\theta$  of the star is

calculated from the formula

$$\theta = \omega t \quad (7)$$

where  $\omega$  is the (known) angular speed of the Moon through the sky.

The distance  $D$  to the star is determined by one of several methods, and the diameter  $D_{\text{star}}$  of the star then calculated from formula (2) above.

But there are difficulties of measurement. Any lunar occultation will be a very quick event. One will need a high-speed photometer or camera, capable of hundreds of measurements per second and a big enough telescope to gather enough photons within each frame to make a decent measurement. This requirement of collecting lots of photons in a very short time is a killer. The lunar occultation method is therefore restricted to relatively bright stars. It's also restricted to stars which happen to lie near the ecliptic, because the Moon's position in the sky is always near the ecliptic. But it's even worse! It turns out that diffraction makes life difficult for astronomers again. As the Moon's limb begins to pass in front of the star's disk, and when it has almost emerged completely, it diffracts the light from the star. This makes it difficult to determine the start and finishing times of the occultation precisely from the light curve.

**Table of approximate stellar radii**

Star	Radius of star / Radius of Sun	Radius of star / Radius of Earth's orbit
Sun	1.0	0.0047
Alpha Centauri A and B	1.23 and 0.87	0.0057 and 0.0039
Sirius A and B	1.6 and 0.022	0.0074 and 0.00014
Spica	5.1	0.024
Capella ( $\alpha$ Aurigae)	12.2	0.057
Betelgeuse*	1180	5.5
Mu Cephei	1225	5.7
VY Canis Majoris	2600	12.1
Antares	883	4.1
VV Cephei	1891	8.8
Deneb	206	0.96
Arcturus	23	0.11

\* Betelgeuse is a pulsating red supergiant star. Its radius changes periodically.

### Southern Star Party – 20 to 22 April

<http://www.southernstarparty.org>

### Why is the Universe the way it is and not something else?

<http://www.oneminuteastronomer.com/5146/anthropic-principle/>

### A news tidbit about Barbara Cunow

She left South Africa on 3 February to visit her parents in Germany and returned on 12 March after 5½ weeks. She managed to photograph M67 during this time, so that she has now photographed all 110 objects in the Messier catalogue. Sometime in the near future, she will give us a presentation on this topic.



Nigel Rotherham (left) lives in Benoni and is very enthusiastic about astronomy. He has been a visitor at several of our meetings. He says there was an astronomy club in Benoni, but it has faded away.

### Notice about MNASSA

The February 2012 issue of MNASSA can now be downloaded from the MNASSA Download Page at <http://www.mnassa.org.za/>

### Now on the shelves of bookstores: special editions of magazines

- **Sky & Telescope:** "Beautiful Universe - a collection of the world's most beautiful astronomy photographs."
- **Astronomy:** "The future of space exploration."
- **Scientific American:** "A matter of time. It begins, it ends, it's real, it's an illusion. It's the ultimate paradox".

### STAR GAZERS DEEP SPACE ATLAS, OUTDOOR VIEWING

The Atlas is probably the most valuable and versatile tool for star gazers in South Africa. Beginners may now, with ease, gaze up at the starry heavens and find the constellations and experienced observers may use their telescopes to its full potential. Never before has star gazing been easier!

Star atlases are generally complicated and awkward to use and, at times, an enthusiastic beginner would be left feeling somewhat despondent. But, the carefully designed and revolutionary features included in the new Deep Space Atlas, have been implemented with both the beginner and experienced star gazer in mind.

As a beginner, you may be interested in knowing more about the stars, but are not sure how and where to start. The "Where do I Start" section and the "Sky Tour" exercise, will guide you step by step, from the time you step outside, to locating and observing a remarkable celestial object such as a star cluster, gaseous nebula or double star. The Atlas is also an invaluable tool for more experienced observers in possession of a pair of binoculars, or a small or large telescope, who wish to look for visually challenging objects such as galaxies.

Added information such as distances, and velocities at which these celestial objects travel through space, as well as the Author's Notes, are included to make your observations more inspiring. Viewing the hundreds of objects included in the Atlas would take several years, ensuring you many hours of observing pleasure. Explanations of the Milky Way and meteors (shooting stars) are also included.

Dew resistant and wire bound pages, white stars on a black background, finder circles, southern hemisphere star maps, direction pointers, horizon lines and an abundance of celestial objects to observe, are just some of the features which places the Atlas in a class of its own, one that has revolutionized recreational astronomy!

Wayne Mitchell offers on-line support to users of the Atlas which is accessible via a website, [www.deepspaceatlas.com](http://www.deepspaceatlas.com).

***Your Voyage to the Stars is About to Begin... Image of cover on next page.***

Author: Wayne Mitchell.

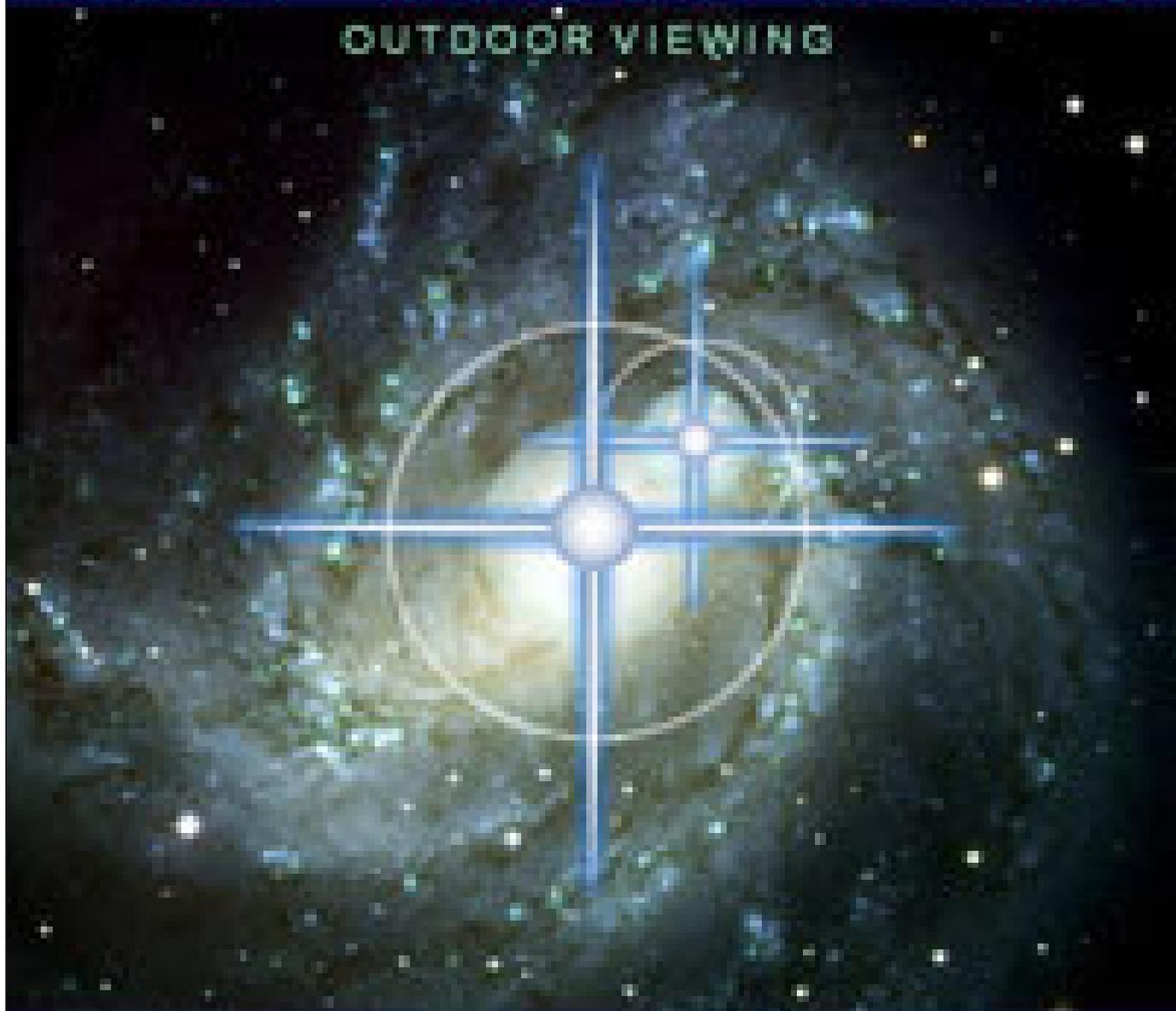
Size: A5 (210x150 mm). 270 gloss varnished pages.

**Cost: R329 for March.** Registered postage: R45.

**Orders:** Contact Wayne at Email: [wayne.mitchell@penbrogroupe.com](mailto:wayne.mitchell@penbrogroupe.com). Cell: 072 465 7739.

# STARGAZER'S DEEP SPACE ATLAS

OUTDOOR VIEWING



You've Looked Up and Wondered...  
Your Voyage Begins Here

## WAYNE MITCHELL

SOUTH AFRICA

## Noteworthy items

- **Explore the Saturnian system with the Cassini spacecraft.** <http://news.discovery.com/space/big-pic-hazy-titan-atmosphere-120204.html#mkcpqn=emnws1>
- **Saturn's rings and crescent moon Enceladus.** Read about this and related articles. [http://www.esa.int/esaSC/SEMZ46WX7YG\\_index\\_0.html](http://www.esa.int/esaSC/SEMZ46WX7YG_index_0.html)
- **Titan's great dune seas.** [http://www.esa.int/esaCP/SEM5NH8RXG\\_index\\_0.html](http://www.esa.int/esaCP/SEM5NH8RXG_index_0.html)  
<http://news.discovery.com/space/titans-great-dune-seas-rival-science-fiction-worlds-120220.html#mkcpqn=emnws1>
- **Undersea radar image of a "saucer shaped" object on the seabed in the Baltic Sea.** A murky unknown circular object is still unexplained. But: "*Seek ye first the natural explanation, and all other things shall be added unto ye.*" <http://news.discovery.com/space/is-an-alien-spaceship-lying-on-the-ocean-floor-120202.html#mkcpqn=emnws1>
- **Mission to land on a comet.** Europe's Rosetta spacecraft is en route to intercept a comet. [http://science.nasa.gov/science-news/science-at-nasa/2012/02feb\\_rosetta/](http://science.nasa.gov/science-news/science-at-nasa/2012/02feb_rosetta/)
- **"Thar she blows!" NASA designing a comet harpoon.** <http://news.discovery.com/space/nasa-designing-a-comet-harpoon-120117.html#mkcpqn=emnws1>
- **Comets seen in a brand new light.** Comets falling into the Sun are studied. <http://www.abc.net.au/science/articles/2012/01/20/3410657.htm>
- **What's taking ET so long to find us?** Alien civilizations starting from the oldest stars in the galaxy would have had more than enough time to reach Earth. Calculations show either we are alone in the galaxy, or ET is ignoring us. <http://news.discovery.com/space/aliens-et-find-120130.html#mkcpqn=emnws1>
- **Hubble pinpoints farthest protocluster of galaxies ever seen.** Astronomers have uncovered a cluster of galaxies in the initial stages of development. The protocluster is seen as it looked 13 billion years ago, just 700 million years after the Big Bang. [http://www.nasa.gov/home/hqnews/2012/jan/HQ\\_12-007\\_Hubble\\_Distant\\_Protocluster.html](http://www.nasa.gov/home/hqnews/2012/jan/HQ_12-007_Hubble_Distant_Protocluster.html)
- **Hubble zooms in on double nucleus in Andromeda galaxy.** <http://hubblesite.org/newscenter/archive/releases/2012/04/>
- **Young star rebels against its parent cloud.** The end stages of the star formation process can be very violent, with the young star shaking up its stellar nursery. [http://www.esa.int/esaSC/SEM7E8XZVG\\_index\\_0.html](http://www.esa.int/esaSC/SEM7E8XZVG_index_0.html)
- **Our galaxy's black hole opens its mouth.** For the first time ever, astronomers have spotted a black hole's lunch before it gets eaten. A gas cloud with a mass three times that of Earth, has been picking up speed and will reach the black hole by 2013. <http://news.discovery.com/space/our-galaxys-black-hole-has-the-munchies-111215.html#mkcpqn=emnws1>
- **NASA's RXTE detect 'heartbeat' of smallest black hole candidate.** [http://www.nasa.gov/home/hqnews/2011/dec/HQ\\_11-419\\_RXTE\\_Black\\_Hole.html](http://www.nasa.gov/home/hqnews/2011/dec/HQ_11-419_RXTE_Black_Hole.html)
- **Water ice on Mercury?** Mercury doesn't tilt very far on its axis, raising the prospect that the bottoms of some polar craters might be in permanent shadow and act as cold traps. <http://news.nationalgeographic.com/news/2011/12/111214-water-ice-mercury-mars-moon-bright-poles-space-science/>
- **New thinking about habitable zones around stars.** Life on Earth is based on carbon based chemistry taking place in liquid water as a solvent. Alternative solvents considered by astrobiologists include dihydrogen (H<sub>2</sub>), sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), dinitrogen (N<sub>2</sub>), formamide (CH<sub>3</sub>NO) and methane (CH<sub>4</sub>). <http://news.discovery.com/space/planetary-habitable-zones-defined-by-alien-biochemistry-111118.html>
- **Largest solar radiation storm since October 2003.** <http://news.discovery.com/space/solar->

[radiation-storm-largest-since-2003-120125.html#mkcpgn=emnws1](http://radiation-storm-largest-since-2003-120125.html#mkcpgn=emnws1)

- **11 new alien solar systems crowded with exoplanets.** The number of known multi-planetary star systems has just tripled. The Kepler orbiting observatory is opening a window into a galaxy that seems to be crammed with small worlds. <http://news.discovery.com/space/11-new-alien-solar-systems-crammed-with-exoplanets-120126.html>
- **Galactic cluster clash spotted in early Universe.** Two clusters of galaxies are colliding 7 billion light-years away. <http://news.discovery.com/space/galactic-cluster-clash-spotted-in-early-universe-120110.html#kcpgn=emnws1>
- **A new view of an icon.** The Eagle Nebula as never seen before. [http://www.esa.int/esaCP/SEM4NMXDXG\\_index\\_0.html](http://www.esa.int/esaCP/SEM4NMXDXG_index_0.html)
- **Planck's High Frequency Instrument completes its survey of early Universe.** [http://www.esa.int/esaSC/SEM4WNMXXDXG\\_index\\_0.html](http://www.esa.int/esaSC/SEM4WNMXXDXG_index_0.html)

### REMINDER TO ORDER YOUR FLEECE JACKET NOW

Orders for these jackets are progressing well. These are quality garments at a really good price, so order one now to warm your winter observing evenings (they look great for general wear as well). They are non-pill polar fleece jacket with a full length zip, complete with embroidered club emblem, which can be worn equally well by gents and ladies. We are offering a colour choice of Navy, Black, or Stone (beige). Sizes are S/M/L/and XL up to 4XL. The cut is generous, so you don't need to add an extra safety factor to the size.

Prices are R200 each for sizes S/M/L/XL; and R220 each for sizes XXL and up.

#### HOW TO ORDER:

Payment must first be made into the following account:

Astronomical Society of SA – Pretoria Centre, ABSA Bank, Rosebank branch.

Branch code: 630-805. Account number: 405 833 5681

NB!! Please be sure to use your name followed by "Fleece" as the beneficiary reference

To order, send an email to [pat@kuehn.co.za](mailto:pat@kuehn.co.za) with:

Proof of payment (deposit or internet slip)

Your name and contact number

Quantity of jackets ordered with size(s) and colour choice(s)

#### DELIVERY:

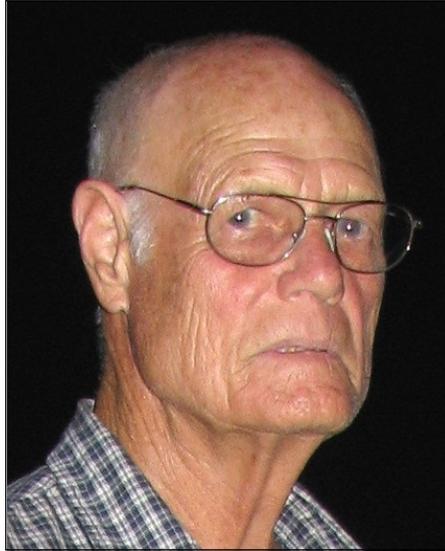
We plan to distribute the jackets at the April monthly meeting. If you can't make it your jacket(s) will be kept for the next meeting, or you can arrange to collect from me (Constantia Park, Pretoria).

If for any reason your choice is not available I will contact you to make alternative arrangements.

Pat Kühn - 082 895 5686; [pat@kuehn.co.za](mailto:pat@kuehn.co.za)

ASSA Pretoria Centre

## Meet some fellow members of the Pretoria Centre of the ASSA



**Above, left to right:** Anton Grobler, Fred Oosthuizen (a committee member), Rudolf Strydom.

**Below, left:** Johan Smit, our chairman. I have given him the nickname "Die Voortrekker" because of his beard, his bulky figure, the curved stem pipe that he smokes, and the fact that he has been involved for a long time with teaching astronomy to the children in the Voortrekker movement.



### Feature of the month: "Sweet spots" for formation of complex organic molecules discovered in our galaxy

Scientists within the New York Center for Astrobiology at Rensselaer Polytechnic Institute have compiled years of research to help locate areas in outer space that have extreme potential for complex organic molecule formation. The scientists searched for methanol, a key ingredient in the synthesis of organic molecules that could lead to life. "Methanol formation is the major chemical pathway to complex organic molecules in interstellar space," said the lead researcher of the study.

Astrobiologists have discovered regions in our galaxy which might have the greatest potential for producing very complex organic molecules, the starting point for the development of life. We've heard before about "follow the water" in the search for life; in this case it may be "follow the methanol".

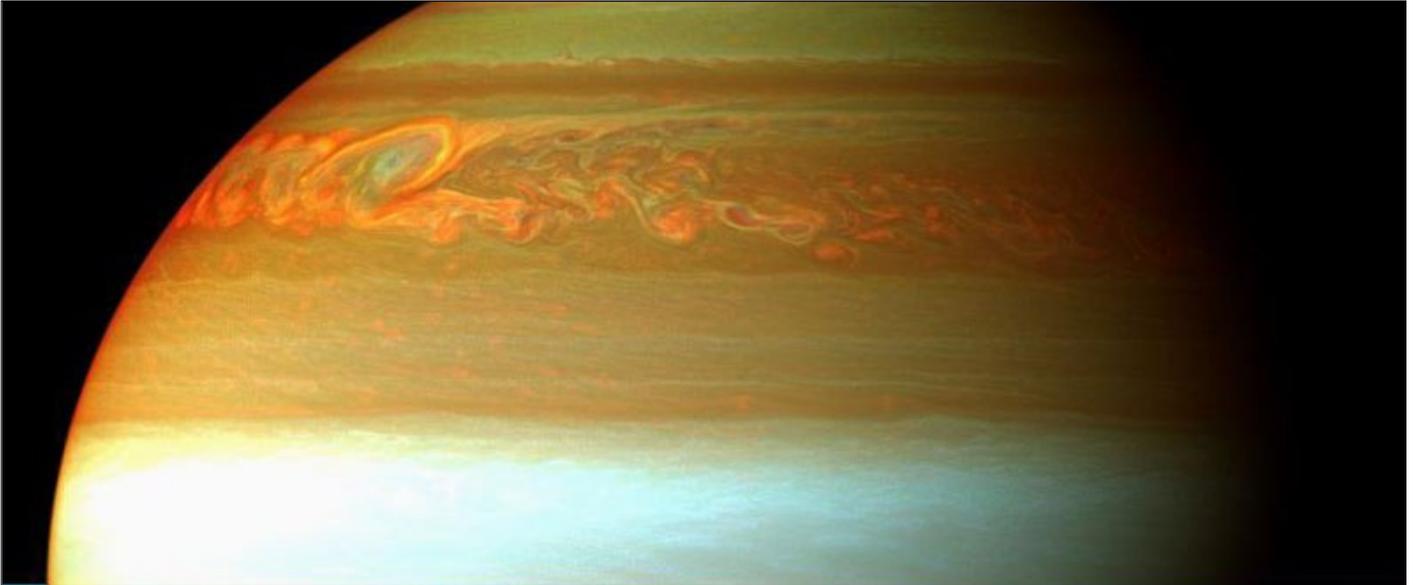
Methanol concentrations at the birth of our solar system were actually closer to the average of what they saw elsewhere in interstellar space. Methanol concentrations in our solar system were fairly low, at only a few percent, compared to some of the other methanol-dense areas observed in the galaxy. This means that our solar system wasn't particularly lucky and didn't have the large amounts of methanol that we see around some other stars in the galaxy. But, in spite of that, it was obviously enough for us to be here.....

<http://www.universetoday.com/90771/sweet-spots-for-formation-of-complex-organic-molecules-discovered-in-our-galaxy/#more-90771>



### A raging storm system on Saturn

The cloud formation in the northern hemisphere of Saturn was first seen late in 2010. It started larger than the Earth and soon spread completely around the planet. The storm has been tracked not only from Earth but from close up by the robotic Cassini spacecraft currently orbiting Saturn. It is pictured here in false coloured infrared. The storm may relate to seasonal changes as spring slowly emerges in the northern hemisphere of Saturn. <http://apod.nasa.gov/apod/ap111226.html>



### Pretoria Centre committee

Chairman	Johan Smit	072 806 2939 [ Mobile ]	
Vice Chairman	Danie Barnardo	084 588 6668 [ Mobile ]	
Secretary	Tony Viljoen	072 247 6648 [ Mobile ]	012 654 5783 [ H ]
Newsletter Editor	Pierre Lourens	072 207 1403 [ Mobile ]	012 654 6366 [ H ]
Treasurer and Membership Secretary	Rynhardt van Rooyen	082 325 8745 [ Mobile ]	
Member	Michael Poll	074 473 4785 [ Mobile ]	
Librarian	Danie Barnardo	084 588 6668 [ Mobile ]	
Curator of Instruments	Johan Smit	072 806 2939 [ Mobile ]	
Public Relations Officer	Fred Oosthuizen	072 373 2865 [ Mobile ]	
Observing Director	Percy Jacobs	082 498 4680 [ Mobile ]	
Member	Bosman Olivier	082 883 1869 [ Mobile ]	
Member	Pat Kühn	082 895 5686 [ Mobile ]	
Member	Johan Hartmann	083 276 1323 [ Mobile ]	
Member	Hubrecht Ribbens	082 448 0633 [ Mobile ]	

