



# The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

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

## NEWSLETTER APRIL 2005

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

Date and time            Wednesday 27 April at 19h15  
Chairperson            Lorna Higgs  
Beginner's Corner    *Making Observing a Pleasure* by Wayne Mitchell  
What's Up                by Neville Young

+++++++ LEG BREAK - Library open +++++++  
MAIN TALK

**Brian Fraser from the Jo'burg Centre presents**  
***Variable Stars How and Why***  
***Some Favourites and some you could observe***

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

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## Last month's meeting - by Michael Poll

The meeting was attended by 53 members and visitors. The evening's programme was opened by Lorna Higgs, who corrected some fancies, and outlined some facts, about the moon. She explained that it is not made of green cheese, but is made of rock and rock dust. She gave us information on distance and size, explained its phases and the phenomenon of eclipses, where, in solar eclipses, the moon is the eclipsing body and in lunar eclipses the moon is the eclipsed body. It is well worth being reminded about these apparently simple things!

Johan Smit presents "What's Up?" in his inimitable style. Johan showed where planets and stars will be in April: Saturn is in the evening sky, Jupiter was at opposition on April 3<sup>rd</sup> and so is effectively in the sky all night during the month. The Pleiades and Orion are disappearing into the evening sunset. After the disappointment of a number of occultations of bright objects by the moon that were not visible here, including one of Jupiter in January, the surprise is that we will at last see one - an occultation of Jupiter on April 22<sup>nd</sup>. This coincides with our observing

evening, but be reminded that the disappearance is quite early at 5.43 pm. The reappearance is at 6.27 pm.

The main topic of the evening was presented by Neville Young and Mike Haslam "The Titan Landing". Neville explained the mechanics of the operation – the insert of Cassini into Saturn orbit, and the separation of the Huygens lander and its descent on to the surface of Titan. Neville also explained how some gaps in communication were solved when some of the signals from Huygens were picked up directly by radio telescopes here on Earth. However, mostly the data was relayed by Cassini, with a journey time of 1 hour 14 minutes. Mike showed and interpreted pictures transmitted during the descent, and from the surface of Titan. There were dark and light areas, and clouds around the south pole. There were incised channels possibly caused by rivers of liquid methane. There were also ice blocks near the lander. This was fascinating stuff, and the promise of more in the future was welcomed by those present.

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

Another clear evening, with a bit of haze and the cloud stayed away until most people had left. About 30 – 40 people came, and had an interesting time, although with so many people we did not look at so many objects.

There was a half moon, also known as first quarter, which was duly observed, and then a long look at Saturn, which was nicely placed in the north, above and to the left of Pollux. The other "twin", Castor, is now a beautiful pair, two white stars of equal brightness. This must surely become a showpiece double over the next few years. Also in the northern part of the sky, the Orion Nebula (M42), and M43 next to it, were still well placed. In the south we looked at Theta Carinae (IC2602) and NGC 2516, an open cluster just to the west of the False Cross. Eta Carinae was somewhat washed out by the moon and other light.

The Centre 12" telescope was aimed at M42 in Orion. The views were excellent as usual. Jupiter was next, trying for the Red Spot, predicted by Neville's lap-top, to be coming into view, and which was eagerly awaited. Also anticipated was a re-appearance of Europa from behind the planet, but then terrestrial clouds covered Jupiter. Wayne came with his 10" Dobsonian which gave lovely views of lunar mountains – as if one were sailing over

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them in a balloon.

With the advent of the cloud cover most people left, except for Johan S and Wayne who were still chatting when the clouds opened up around Jupiter. They quickly set up the 10" Dobsonian and managed to see the Red Spot and, at about 22:34, the re-appearance of Europa. Lesson: Everything comes to those who are prepared to wait..

### Mauritz Geyser's Website

Mauritz, one of the committee members of our Centre, has created his own astronomical website! You are invited to visit it. Its address is: [www.etacarina.co.za](http://www.etacarina.co.za). The images below, as well as the one on page 8 of this newsletter, come from his website.

Right: Mauritz busy doing astrophotography on the farm.



Above: This image of the Milky Way is a mosaic made up of photos taken using a Minolta X-300 camera equipped with a 50 mm lens at f4 mounted on a SkyWatcher 8" f5 Newtonian telescope with a 20 min exposure time using Fujichrome Sensia 400 slide film.

Photo taken from Goudrivier farm in the Limpopo Province, about 50 km east of the town Ellisras in South Africa. Coordinates: 23°45'10.5" South, 28°12'02.7" East. Altitude: 1000m above sea level.

## Hans Bethe 1906 – 2005 by Michael Poll

*Died : Hans Bethe, 98, the last of the scientific titans who helped devise the atom bomb for the U.S Government's top secret Manhattan Project. [He died] in Ithaca, New York State. Before heading the Theoretical Physics Division at Los Alamos, the brilliant unpretentious refugee from Nazi Germany solved, in six weeks, the age old question of how the stars keep burning. A vocal proponent of disarmament, in the 1980s he criticised Ronald Reagan's Star Wars plan, saying "We need to try and understand the other fellow". Time Magazine: March 21<sup>st</sup> 2005.*

Hans Albrecht Bethe was born in Strasbourg, Alsace-Lorraine, on July 2 1906. He obtained a Ph.D in theoretical physics at Munich in July 1928, and remained there until 1933. He later held a position as Acting Assistant Professor at the University of Tübingen, which he lost due to the advent of the Nazi regime. Bethe emigrated to England in October 1933 where he held positions at the Universities of Manchester and Bristol. In 1935 he was appointed Assistant Professor at Cornell University, Ithaca, New York State, and became Professor in the summer of 1937. Except for the times he was away in World War II, first to the Radiation Laboratory at the Massachusetts Institute of Technology, working on microwave radar, and then to the Los Alamos Scientific Laboratory where he was part of the Manhattan Project, he stayed at Cornell for the rest of his working life.

An atomic nucleus is composed of protons, which have a positive charge,

and neutrons, which have no charge. The nucleus is surrounded by negatively charged electrons. The number of protons defines the element, for example a nucleus with 8 protons is oxygen and one with 16 is sulphur. A hydrogen nucleus is a single proton. If protons can be added or removed from the nucleus, the element changes into another element. It was this that the alchemists needed to do to transmute lead into gold, but (unknown to them) they were only manipulating the electrons in simple chemical reactions. Transmutation of the elements required the re-structuring of the nucleus, a process that required far more energy than was available at the time! In their time, and until the detonation of the Hydrogen bomb, the only place that transmutation occurred was in the stars, but the process by which this took place was not elucidated until the 1930s. We now know that the energy that drives the stars comes from nuclear fusion, whereby a series of reactions changes one element another, with the conversion of some of the mass into energy.

A problem with fusion theory was that, according to the laws of physics, the positively charged protons should repel each other, so that no more could be added to a nucleus. It was thought at the time that temperatures would have to reach tens of billions of degrees for the repulsion to be overcome. In 1928 George Gamow, a Russian emigrant in Germany, proposed that, considering that

particles could escape from nuclei, as did alpha particles (an alpha particle is a helium nucleus) from radium, then the opposite could occur, and particles could join the nucleus. In 1929 it was shown that, because particles (including protons) behaved as waves, they *could* overcome the repulsive forces in the nucleus - there was a very small, but non-zero, probability of it happening. It was also shown that it could occur at the temperature that had been calculated was at the centre of the sun.

Most of the people working on these theories were in Germany, but in the 1930s many moved to the United States, including Bethe. In 1938, Gamow organised a conference in New York to discuss the problem of energy generation inside the stars.

Many models had been proposed, but the energy output was either too fast or too slow. For example, if lithium nuclei were available, hydrogen would easily combine with them to form beryllium, which would rapidly split into two helium nuclei. The conversion of hydrogen into helium in this manner would release so much energy in such a short time that it would blow the star apart. On the other hand, if oxygen nuclei were abundant, the reaction of protons with these nuclei would not release enough energy. The problem was not solved at the conference. An anecdotal story suggests that Bethe solved the problem on the back of an envelope on the train journey home, but in the event it still only took a few weeks. The process he discovered,

and which was independently discovered by Carl Freidrich von Weizsaker, is now known as the carbon cycle, or the carbon-oxygen-nitrogen cycle (CNO) cycle. However, this cycle required higher temperatures than that in the centre of the sun, and is the one that keeps more massive stars shining. Bethe joined forces with another physicist, Charles Critchfield, to determine what keeps lower mass stars such as the sun shining, and they described the proto-proton reaction, whereby four protons (ie four hydrogen nuclei) are converted into one helium nucleus, with loss of part of the mass (1 part in 143) of the original hydrogen nuclei – mass that is turned into energy. Bethe won a \$500 prize for this work, and used the money to move his mother and her furniture out of Germany. In 1967 he won the Nobel Prize in Physics.

#### References

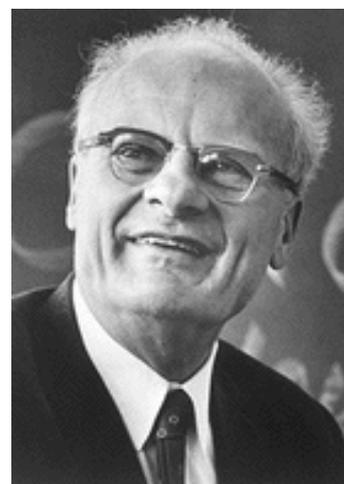
- “Stars”, one of a series of Time Life books in the “Voyage through the Universe” series.
- Stardust by John Gribbin, Penguin Books, 2000

#### Website addresses

- [www.timesonline.co.uk](http://www.timesonline.co.uk)
- [Nobel Prize.org](http://NobelPrize.org)

Right:

The late Hans Bethe



## Letter to the Editor from Prof Brian Buch

*"I came across something interesting a while ago:*

*I was at the observing evening last month and got into conversation with one of the members who mentioned that his physics lecturer many years ago had told him of a reference to the two moons of Mars in "Gulliver's Travels" by Jonathan Swift.*

*I duly researched this and came upon the following:*

*Gulliver in one of his many travels visited the "flying island of Laputo". This was an island which was able to fly many leagues above the clouds. On the island was an observatory housing telescopes more powerful than any found on earth, thereby allowing for astronomical discoveries more advanced than any thus far made.*

*He goes on to describe two satellites orbiting Mars, the inner one being at a distance three times the diameter of Mars, the outer being at a distance five times Mars's diameter. The inner orbited Mars in 10 hours while the outer took 21.5 hours.*

*This seems uncanny as "Gulliver's Travels" was published in 1726 and the two moons of Mars were only officially discovered in 1877. Furthermore the accuracy of these statements by Gulliver (ie Swift) was pretty close. In fact Phobos is at a distance of about 1.5 Mars's diameter and orbits Mars in about 7.7 hours while Deimos is at a distance of about 3.5 Mars diameters and orbits in about 28 hours.*

*Was the flying island of Laputo a prediction of the Hubble Space Telescope three and a half centuries before its time?        Regards - Brian"*

Neville Young researched the question and found the following answer:

*"Hi Brian        I found this comment on the www (www.daviddarling.info/encyclopedia/S/Swift.html) - it does throw some light on the situation although there is some measure of amazing coincidence in it. In my book, there remains place for 'coincidence' so I am happy with this explanation.    Cheers - Neville"*

*Some cult literature has sprung up specifically to address how Swift could have "known" about the Martian moons and has arrived at some spectacular solutions, including the remarkable one that Swift himself was a Martian! In fact, the idea that Mars might have two satellites goes back to Johannes Kepler and a memoir he published in 1610 in which he misconstrued an anagram devised by Galileo in order to announce secretly a new discovery to his correspondents (who also included the Jesuit Fathers at the Collegio Romano). What Galileo had actually found were features connected with the planet Saturn which we now know to be its rings. His anagram was:*

***s m a i s m r m i l m e p o e t a l e u m i b u n e n u g t t a u i r a s***

*the correct solution of which was:*

***Altissimum planetam tergeminum observavi.***

***I have observed the most distant planet [Saturn] to have a triple form.***

*However, Kepler misconstrued the scrambled message to mean:*

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***Salve umbistineum geminatum Martia proles.***

***Hail, twin companionship, children of Mars.***

*and assumed, therefore, that Galileo had discovered two Martian moons. Although the true meaning of the anagram became known half a century later, Kepler's mistranslation endured and, it seems, came down to Swift who may (although this is purely conjecture) have added some reasoning of his own. Since no Martian moons had been found by the early eighteenth century, then it would have been reasonable to assume that they must be very small, very close to the planet, or both. Whatever the case, Swift's fictional moons turned out to be surprisingly like their real counterparts. A more recent example of satellite prescience is Arthur C. Clarke's description of a solitary moon of Pluto in *Rendezvous With Rama*, made in advance of the discovery of Charon.*

### **Eyepiece special offer**

Andrie van der Linde - Pretoria Centre Member - introduced himself to the attendees at the February meeting by way of a brief talk on digital imaging.

Andrie has the following offer for you. Contact him at: 083 632 4894 (cell) or at email address: eridanusoptics@yahoo.com He will attend both the practical (22 April) as well as the meeting (27 April), where you will have the opportunity to talk to him personally. **Orders close on 30 April.**

Eridanus Optics negotiated a special eyepiece deal with a supplier. A significant saving is realised by supplying the eyepieces in kit form.

To order your eyepieces, the following will apply:

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>· 60% Deposit when ordering</li> <li>· 40% Payment upon delivery</li> <li>· Subject to exchange rate variation<br/>(Price Based on \$1 = R6.00)</li> <li>· Expected delivery: June 2005</li> <li>· Inspection sets of 1¼" sets available</li> <li>· Set 1 (1¼"): R600</li> <li>* 15mm Plössl eyepiece</li> <li>* 2x Barlow</li> <li>* Moon filter (neutral density)</li> <li>* Carry case</li> <li>· Set 2 (1¼"): R1060</li> <li>* 32mm, 15mm and 9mm</li> </ul> | <ul style="list-style-type: none"> <li>Plössl eyepieces</li> <li>* 2x Barlow</li> <li>* 3x Color filters</li> <li>* Moon filter (neutral density)</li> <li>* Carry case</li> <li>· 2" Set: R1800</li> <li>* 52mm and 32mm Plössl eyepieces</li> <li>* 1¼" 15mm (65° FOV)<br/>eyepiece</li> <li>* Carry case</li> <li>* One of the following:               <ul style="list-style-type: none"> <li>· 2" diagonal for SCT</li> <li>· 2" diagonal for non SCT's</li> <li>· 2" 42mm Plössl eyepiece</li> </ul> </li> </ul> |
|---|--|

### Nylsvley Star-gazing Weekend 6th—8th May

If you are still considering joining us at Nylsvley it is very important that you please phone me before you deposit your payment, to confirm if a room is available for you. By doing so, I will be able to monitor the room space available before the resort is fully booked. Failing to phone me before your payment, may result in your booking being turned down, due to the resort already being fully booked.

Looking forward to seeing you all there!

Wayne Mitchell 012 719 9065 (w) 072 465 7739

### The Kyalami Castle

April 1st is traditionally the day to play a joke on a fool, but Christo Barnard, Wayne Mitchell, Johan Smit, Casper and Andrie vd Linde and Neville Young took their chances and accepted an invitation to show stars to guests that day at the annual awards dinner of Telkom Directory Services (ie Yellow Pages) at the Kyalami Castle. During cocktails, guests peeked through the scopes and asked questions. Once the awards started, R1000 was donated to our astronomy centre and the guys were invited to a free 3-course meal in the castle!!! Astronomy can pay—no joke!

### Earthlike planets around other stars

The December 2004 issue of National Geographic magazine contains a popular article about the search for such planets.

### PRETORIA CENTRE COMMITTEE

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