"The Southern Cross"

HERMANUS ASTRONOMY CENTRE

NEWSLETTER

JUNE 2010

We hope you find this month's newsletter and the two New Scientist articles on 'asteroids freezing Antarctica', and 'forensic astronomy' interesting and informative.

We welcome the following new members: Ed Blignaut, Hannelie and Pittius Coetzee, Margaret and Bill Cunningham, and Toekie Oberholze.

The next **Beginner's Astronomy** meeting will take place on Monday **14 June** at 7 pm at the Magnetic Observatory. Led by chairman, John Saunders, it will include a PowerPoint presentation in the first hour, followed by stargazing for the second hour, both with the naked eye and using the Centre's telescopes, weather permitting. Please contact John either by telephone on 028 314 0543 or via e-mail at shearwater@hermanus.co.za to reserve a place.

The Centre's website is a year old this month. It continues to be a valuable resource, and we thank Maxitec for their continued sponsorship for a further year. The website can be found at www.hermanusastronomy.co.za

Four features near the easily identified eponymous constellation of Scorpius are visible in the night sky during the winter months. The two brightest stars in Libra (The Scales) can be found as apparent extensions from the 'head' of Scorpius. In ancient Greece, these stars were considered to be the

claws of the scorpion, their names, meaning 'northern claw' and 'southern claw', reflecting this. At the other end of the scorpion, two attractive open clusters can be seen (ideally with binoculars) below the tail, between it and Sagittarius. They are designated M6 and M7.

LAST MONTH'S CENTRE MEETING

Pierre de Villiers gave an interesting and informative presentation on the ways in which astronomers determine the characteristics of stars, including their apparent and actual brightness, distance, temperature, and the elements which they contain. He used a number of useful graphics to help understand the science underlying the details one can find on individual stars in books and on the Internet.

Centre member Oelof Heckroodt also gave a brief presentation on the history or orreries and planetariums, focusing on a fascinating historic example he saw in Holland.

MONTHLY CENTRE EVENINGS 2010

These take place at 7 pm at the **Hermanus Magnetic Observatory**.

17 June	'19th Century astronomy at the Cape' by Johan Retief (committee member)
15 July	'Deep space and deep time: related or not?' by Ed Foster, biochemist and amateur astronomer
12 August	Presenter and topic to be confirmed
9 September	Presenter: Case Rijsdijk, scientist and amateur astronomer Topic to be confirmed
7 October	'Comets: the trailblazers' by John Saunders (chairman)
11 November	Presenter: Amanda Gulbis, Astronomer, SAAO, Cape Town Topic to be confirmed
9 December	Christmas party

ACTIVITIES

Cosmology interest group On 17 May, 6 members attended an interesting and wide-ranging a discussion on electromagnetic and black body radiation. Ten members attended the 'alternative models' meeting on 7 June. The Wave Structure of Matter theory provoked lively discussion and debate.

OBSERVATORY NEWS

Efforts to secure funding for completion of the Environmental Impact Assessment (EIA) continue. In the meantime, as part of the EIA, exploration of possible alternative sites continues. The light-meter survey in differing weather and light conditions is underway, as is discussion with land owners of other potential sites.

While awaiting the outcome of our funding application to the National Lottery, work is continuing on exploring other potential funding for building of the observatory itself. The 'Friends of the Observatory' project continues for those wishing to make a donation towards the development. Please contact John Saunders to find out more about this.

ASTRONOMY NEWS FROM STEVE KLEYN

1 Mars Rover update In May, Mars Exploration Project manager John Callas updated a NASA audience at the Marshall Space Flight Center about future prospects for the Mars rovers. Spirit, he said, is in peril from the advancing Martian winter, and Opportunity could soon run into trouble as the rover attempts a daring trek across dangerous terrain. Nevertheless, both rovers are still in the hunt for new discoveries. In other words, it's business as usual on Mars.

Opportunity set the surface longevity record for Mars landers on 20 May, breaking Viking 1's old record of 6 years and 116 days. Opportunity is now inching her way across rough terrain toward the tremendous Endeavour crater – a destination the team is eager to reach because it may contain the habitats of possible ancient Martian life.

Meanwhile, Spirit is motionless – hunkered down for the winter. To survive, she must weather the coldest temperatures either rover has yet faced and collect enough solar energy to awaken. "We've lost contact," says Arvidson. "The sun has been too low for the rover to collect enough power to stay in touch with Earth. She's merely surviving now."

The fourteenth of May was winter solstice in Mars' southern hemisphere, where Spirit is waiting for the sun to provide a much-needed dose of solar power. "In September or October the sun will be high enough for Spirit to

wake up, hear us, and 'talk' to us. I won't be greatly surprised if she wakes up and says 'I'm here. What do I do next?'" The scientists have an answer ready for her, "Oh, just uncover the secrets of the Martian core." (For more information, read the Science@NASA story "Spirit's Journey to the Center of Mars"). At present, however, no one knows if Spirit will ever get to hear her next assignment--or whether Opportunity will complete the marathon trek to Endeavour.

2 Lost: *A giant belt of brown clouds big enough to swallow Earth twenty times over. If found, please return to Jupiter.*

One of Jupiter's two main cloud belts has completely disappeared. "This is a big event," says planetary scientist Glenn Orton of NASA's Jet Propulsion Laboratory. "We're monitoring the situation closely and do not yet fully understand what's going on." The belt of cloud may not actually be gone, but may be just hiding underneath some higher clouds. Jupiter's Great Red Spot is still there, surrounded by almost uninterrupted white.

This isn't the first time the SEB has faded out. It did so in 1973-75, 1989-90, 1993, 2007, 2010," says John Rogers, director of the British Astronomical Association's Jupiter Section. "The 2007 fading was terminated rather early, but in the other years the SEB was almost absent, as at present."

3 Airborne telescope makes its first observations SOFIA is a 2.5 metre telescope, "Stratospheric Observatory for Infrared Astronomy", which has been built into a Boeing 747. The observatory is designed to fly at an altitude of about 12 kilometres, a level above more than 99 per cent of the atmosphere's water vapour. That means SOFIA will receive roughly 80 per cent of the infrared light available to space telescopes, so it can be used to study phenomena such as star and planet formation in the Milky Way.

The telescope's first in-flight night observations taken during the six-hour flight are sharp enough for the telescope to perform "front-line astronomical research". It cost more than $1 billion to develop and NASA aims to fly SOFIA several times a week for about 20 years.

4 Ice Cube An excess of high-energy particles hitting Earth may be shrapnel from a stellar explosion 800 light years away. In the 1930s, it was suggested that supernovae can accelerate galactic cosmic rays. The shock waves from

such stellar explosions, or the magnetic fields of the superdense neutron stars left behind, were thought to be able to boost particles from the explosion and surrounding region to very high energies. "But there's been absolutely no evidence for it whatsoever," says Francis Halzen of the University of Wisconsin in Madison, lead scientist for the IceCube detector at the South Pole.

IceCube detects showers of muon particles that cascade towards the Earth when high-energy cosmic rays hit our atmosphere. After analysing the distribution of around 4.3 billion muons detected between June 2007 and March 2008, the IceCube team has found a small but clear excess of cosmic rays coming from the direction of the constellation Vela, hinting that the relatively close Vela supernova remnant may be responsible "This may be the first strong indication we have in support of this theory", says Halzen.

DID YOU KNOW?

This month, we learn about Achernar, the ninth brightest star, and also about the effects of rapid rotation speeds on the characteristics of stars.

Ache(r)nar (Alpha Eridanus,(the river))
The name means 'end of the river' (Arabic), reflecting its position at the southern tip of the long, thin constellation. Located deep in the southern skies, it never rises north of 33 deg N, and is circumpolar below 33 Deg S.

It is a very young star, a bright, blue-white colour, and the hottest of the 10 brightest stars.

Vital statistics

- 8x mass and 2,900 – 5,400x brighter than the Sun
- m = 0.45
- M = -2.77
- 144 ly away

It is the least spherical star identified, so far, in the Milky Way due to its **rapid spin (rotation)** of 250 km per second. This characteristic makes its equatorial diameter 50% greater than polar one. This oblate shape means the poles are hotter than the equator.

This rate of spin means the star has a belt of emitting gas causing it to lose mass at a rate 1000s of times faster than that of the Sun.

Although large is size and mass, it is likely to become a massive white dwarf, rather than go supernova.

Speed of rotation and shape of stars
Gravity tends to contract celestial bodies into perfect spheres. However, rotation causes a change in shape - an equatorial bulge due to centrifugal force. At the poles, gravity causes contraction, but at the equator, the effect of gravity is reduced by centrifugal force, weakening contraction in that region and producing a bulge. The faster the rotation, the larger the bulge. Also, because they are not solid bodies, the equator can rotate at difference speeds than the higher latitudes.

These differences in the rate of rotation within a star may be important in the generation of a stellar magnetic field. The magnetic field interacts with the star's stellar wind, the net effect being that the stellar wind slows the star's rate of rotation over time. The rate of rotation can be measured by the spectrum of the star or by timing movements of active surface features eg. sun spots

Examples of rapidly rotating stars: Achernar (Eridanus), Vega (Lyra), Regulus (Leo)

Sources: http://en.wikipedia.org, www.space.com/scienceastronomy
Oxford dictionary of astronomy, Astronomy (Dorling Kindersley – Eyewitness companions

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