

"The Southern Cross"



HERMANUS ASTRONOMY CENTRE NEWSLETTER

AUGUST 2009

Welcome to the latest newsletter, and also to new members Peter Harvey, Shirley Koster, Kobus Nel and Ruth Walluschnig. Two New Scientist articles are attached with the newsletter - one on the influence of dark energy on the shape of the universe, and the other on the top ten moments in astronomy. The third attachment is the pledge form for joining the 'Friends of the observatory' (details can be found in the 'Observatory news' section). The final attachment is a schedule for the Absolute beginners astronomy interest group evenings for the remainder of 2009.

Visits to Cape Town and Sutherland

There are still about 10 places available for the trip to the Cape Town Planetarium and observatory on 19 September. Please contact John Saunders if you would like to join the group. People will travel to Cape Town in private cars and transport arrangements will be made closer to the time.

A maximum of 30 people can attend the Sutherland trip on 13-14 November. There are, currently, a few places still available for people who don't mind going on the night tour on the Saturday rather than the Friday. This means they will miss the stargazing from Kambrokind. Members going to Sutherland will have to make their own accommodation and travel arrangements. Please contact John Saunders if you would like to join the trip to Sutherland. Once all thirty places have been taken, he will accept a waiting list of up to 10 in

case of any cancellations. Nearer the time, arrangements will be made to meet up on 13 November in Sutherland.

More astronomical wildlife is visible in the night skies at this time of year. The constellation Aquila (the Eagle) can be located high in the sky to the north in the late evening. It has a bird-like shape, with a long neck and outspread wings. The brightest star in Aquila is Altair (alpha Aquilae), the central part of a distinctive trio. It is the twelfth brightest star visible to the naked eye and is noted for its very rapid speed of rotation (9 hours). Along with Deneb (Cygnus) and Vega (Lyra), Altair forms the Northern hemisphere's 'summer triangle'. To the right and further north-east of Aquila is the small constellation of Delphinus, another eponymous constellation, resembling a dolphin. From the Southern hemisphere, the tail appears to be up and the head down.

CENTRE MEETING - 23 JULY

'The star of Bethlehem' proved to be a very popular topic. Case Rijdsdijk gave a fascinating and detailed summary of possible dates of Christ's birth, based on biblical and other records, and known astronomical events. His talk identified the opportunities and challenges faced when trying to 'pin down' precise historic dates when sources of evidence are varied and often imprecise. He also showed how the original descriptions and depictions of the 'wise men from the East' have been influenced, over time, by events and trends in European history eg. paintings of them as kings with crowns in front of European style buildings.

FUTURE CENTRE EVENINGS 2009

The monthly Thursday meetings will be held at 19.00 on the following days:

- 20 August 'The Milky Way' Presenter: Johan Retief (member)
- 24 September 'Three early scientists: Tycho, Kepler and Galilae'
Presenter Auke Slotegraaf, an SAAO astronomer based at SALT in Sutherland.
- Plus** 25 and 26 September (see details below)
- 22 October 'All about Sundials' Presenter: Steve Kleyn (member)
- 19 November "Moons and Asteroids of the Solar System" Presenter:
John Suanders (Centre chairman)
- 17 December Christmas Party

Auke is staying over after the Thursday meeting on 24 September.

On Friday 25 September he will be showing us how to make planispheres.-
'Learning the constellations with the southern star wheel - at Fernkloof at 19.00.

On Saturday 26 September there will be a daytime workshop entitled 'Deep sky observing' which will be held at the Hermanus Magnetic Observatory. from 10.00 - 16.00.

Both extra sessions will be free to centre members.

ACTIVITIES

Cosmology interest group On 27 July, nine members participated in a lively discussion on cosmic inflation, a topic which often appears to encourage heated debate. Black holes will be the focus of the next meeting on 31 August. Please contact committee member Pierre Hugo if you would like to join the group.

Overstrand Local Economic Development Agency (OLEDA) The centre continues to be one of the major interested parties in OLEDA's new science, sport and cultural centre, a development proposed to be located in the old ambulance station building.

Twinning with Adelaide, Australia Club member Adele Matthee is moving to Adelaide Australia, but wants to continue her involvement in astronomy. John Saunders found that the Astronomical Society of South Australia is based in Adelaide (their very good website can be found at www.assa.org.au) He has contacted them and they are very keen to become 'linked' to us - our very first twin town for Astronomy. Maybe one day we can pay them a visit....

OBSERVATORY NEWS

The planning application for the observatory is due to be heard at Full Council meeting on 26 August.. Leon Theron of the Whale Festival Media and Marketing Company, John Saunders and Pierre de Villiers have met staff at the Hermanus Times and we can expect a nice article on the observatory in the issue after 26 August.

In the meantime, work continues on finding the necessary funding for the development. We appreciate the pledges which have already been made, an existing pledges which members have made as 'Friends of the Observatory' will be called in after 26 August. However, more pledges are needed to pay for the costs of the planning process - anything from R50 upwards or whatever members can afford. To this end, a copy of the pledge form is attached with the newsletter. Completed forms can be posted confidentially into the pledges box which can be found at the back of the hall at meetings.

ASTRONOMY NEWS (this month) FROM JOHN SAUNDERS

1. Saturn's shadow On 11 August, Saturn will be at its equinox with the Sun and it will remain like this for up to a year. Because of the enormous shadows of the planet falling across the ring system, particularly as they will fall on Saturn's moons, the Cassini spacecraft will spend an entire year studying several of Saturn's moons, such as Enceladus, Titan (Saturn's largest moon), Rhea, Helene and Dione. We can expect some spectacular photos, and fascinating information that will improve understanding of the structure of the ring system. It is being called 'The biggest show on Saturn ever seen'.

2. Betelgeuse shrinking The ultra-massive red supergiant Betelgeuse (Alpha Orionis) is getting smaller. Its diameter is now 15% per cent smaller than when it was last measured in 1993., which is still about 5.5 times the distance between Earth and the Sun. It is not known why it is getting smaller but it is a known 'variable' star, whose size increases and decreases at different times. Studies into this phenomenon continue. Despite this variations, Betelgeuse produces an average 135,000 times more energy than the Sun.

It is 640 light years away from Earth. This means that the light we see from the star left Betelgeuse when the Plantagenet King Edward III was on the English throne in the year 1340! This light sped away at 300,000 km's per second, on through the Stuart times and King Henry the VIII and his 6 wives. On and on, the light sped through the times of Christopher Columbus's discovery of the New World, on through the Napoleonic Wars, the Boer War, and the First and Second World Wars. Still, on and on, and still at light speed, we see Betelgeuse now as it was all those centuries ago. It is possible that, during that time, it could have exploded as a supernova which we have not yet seen. If it has gone supernova, it will shine as brightly as our Sun for a few weeks. This could, of course, occur any time in the next 640 years.

DID YOU KNOW?

We move from exploring the planets and other 'cold' structures in our solar system to the stars, starting, this month, with our Sun.

Vital statistics

- A yellow dwarf accounting for 98.6% of the solar system mass. It is about 109 times larger than Earth, with a volume 1.3 million times that of Earth. It is a near-perfect sphere.

- Mean distance from Earth: 150,000,000 km, with its light travelling to Earth in 8 min 19 sec.
- Surface temperature: approximately 5,500 °C. It is white in colour, but appears yellow from Earth due to atmospheric scattering.
- Brighter than 85% of stars in the galaxy, which are paler red dwarfs.
- Orbits the galactic centre of the Milky Way in an almost circular orbit at a distance of 24,000 - 26,000 light yrs. One revolution of the Milky Way takes 225 - 250 m yrs (1 galactic year), at a speed of 251 km/sec.
- Rotates on its own axis, on average, every 25.38 days. As a gaseous structure, rotation is faster at different latitudes (25.05 days at the equator and 34.3 days at the poles).

Life cycle

The Sun was formed about 4.57 billion yrs ago following the rapid collapse of a hydrogen molecular cloud. High comparative levels of heavy elements in the solar system eg. gold, uranium suggest that the Sun was the consequence of one or more nearby supernovae.

It is currently a main sequence star, generating energy via fusion of hydrogen into helium. More than 4 million tonnes of matter are converted into neutrinos and solar energy every second. The Sun will survive for a total of 10 billion yrs. It has insufficient mass to explode as a supernova. It will become an enlarged red giant as it runs out of hydrogen. The outer gases will then be lost, forming a planetary nebula, leaving a small hot stellar core - a white dwarf - which will cool and fade over billions of years.

Chemical composition

It is made of gas and plasma and consists of

- hydrogen - 74% of mass, 92% of volume
- helium - 24% of mass, 7% of volume
- trace elements - incl. iron, nickel, oxygen, silicon, sulphur, magnesium, carbon, neon, calcium

Structure

- inner core - 150 times the density of water and extremely hot, it is the site of nuclear fusion
- radiative zone - heat is transferred slowly outwards by radiation
- convective zone - a cooler region and heat transfer is by convection in thermal columns
- photosphere - outer visible layer of the sun

- solar atmosphere, which includes
 - chromosphere - visible as a coloured flash at the start and end of solar eclipses
 - corona - extended outer part of the atmosphere, larger in volume than the sun itself
 - both hotter than the photosphere

Overall, radiation produced at the core takes from 10,000 - 170,000 yrs to reach the surface.

The Sun is a magnetically active star, with a continuously varying field which reverses every 11 yrs. This variability is a result of the different rates of rotation at different latitudes which twist the magnetic field. The effects of the magnetic field include sunspots, solar flares and variations in the solar wind.

Sunspots - dark regions of lower temperature, the sites of intense magnetic activity which inhibit convection, lowering temperatures. The magnetic activity strongly heats the corona, forming active sources of intense solar flares and coronal mass ejections (CMEs). Sunspots can be tens of thousands of kilometres across. The number of sunspots varies in the 11 year solar cycle, having strong influences on space, and Earth's weather. Low levels of sunspot activity, ie. small numbers of sunspots, reduces Earth temperatures, and vice versa.

Satellite observation of the Sun began in 1959 and continues. Observation has mostly been of the equatorial regions.

Reference <http://en..wikipedia.org>

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