

"The Southern Cross"



HERMANUS ASTRONOMY CENTRE NEWSLETTER

DECEMBER 2009

Welcome to the last newsletter for 2009. We also welcome new members Roy and Avril Whitaker, and Gavin Turner.

'Dark power' and interstellar travel is the topic of the attached New Scientist article.

The southern 'summer constellations' are becoming increasingly visible, with the easily recognisable shape of the hunter Orion probably the easiest to identify. Found to the north-east, the distinctive human shape appears upside-down from the southern hemisphere. The 26th largest of the 88 named constellations contains a number of features visible to the naked eye, including the red supergiant Betelgeuse (marking the right shoulder) and the blue-white supergiant Rigel (marking the left knee). The spear or dagger attached to the belt contains the huge Orion nebula (M42) in which both stars and gas clouds can easily be seen.

CENTRE MEETING - 24 SEPTEMBER

There are 171 moons and other named small objects in the solar system. Centre chairman, John Saunders, presented a breathtaking overview of a number of these, supported by fascinating details and many amazing photographs, some only days old. John focused particularly to the 6 or so moons which are of particular interest to astronomers because of their possible presence of water and other earthlike characteristics.

MONTHLY CENTRE EVENINGS 2009

11 December Christmas Party 42 members and partners will be attending the traditional Christmas meal at Baleens Auberge in Voelklip. The time is 7.00 for 7.30 pm.

SCHEDULE FOR MONTHLY MEETINGS FOR EARLY 2010

Centre meetings will take place at 7 pm at **Hermanus Magnetic Observatory**.

21 January	AGM
18 February	'Looking down, not up - planet Earth' by Izak Rust
18 March	'Galaxies: cosmic collisions' by Petri Vaisanen, SAAO, Cape Town

ACTIVITIES

Trip to Sutherland The 28 members and partners who visited Sutherland and the nearby South African Astronomical Observatory (SAAO) from 13 - 15 November had a full and memorable time. The group had an exclusive 3 hour tour of the South African Large Telescope (SALT) and was also able to visit the Radcliffe telescope and tour the display in the visitor's centre.

There were two opportunities to view the stars through telescopes, one at SAAO and the second at Sterland in Sutherland. Although there was some cloud on both nights, everyone who braved the chilly weather was rewarded by wonderful sights of planets, moons, stars, open and globular clusters, nebulae and galaxies, visible either to the naked eye and/or through telescopes in skies free of light pollution. The observations at both sites were assisted by knowledgeable guides, including Auke Slotegraaf who led three presentations to the Centre in Hermanus in September. Interesting lectures on astronomy were also given at both sites.

The weekend also gave members the opportunity to socialise at two excellent evening meals, as well as at other times.

'Whale talk' magazine article An article by John Sanders on The Star of Bethlehem will be published in the December issue of Whale Talk magazine.

It follows the presentation given to the HAC by Case Rijdsijk earlier in the year.

Cosmology interest group Eight people attended the second meeting on the homeostatic model. The author of the model, Pierre Hugo, presented a very useful overview of the model, aspects of which will be discussed in greater detail in future meetings. The scheduled monthly meeting of the general cosmology group was postponed until early December.

OBSERVATORY NEWS

Pierre de Villiers and John Saunders met Paul Slabbert, the Environment Impact Study (EIS) consultant, at the end of November.

The conclusion of the EIS has been reached and the report will be studied by the Observatory Committee shortly.

Paul Slabbert received several really strong and well constructed letters from HAC members expressing their support for the project.

Although the report does reflect some strong concerns, the vast majority are actually in favour of the project, albeit with reservations. Committee members are certain that these can be addressed and that a considered decision acceptable to all can be reached, allowing the project to continue to move forward. Further work on the project will continue after the Christmas holiday.

ASTRONOMY NEWS FROM STEVE KLEYN

1 Wise camera NASA's Wide-field Infrared Survey Explorer, (WISE), is set to survey the entire sky in infra-red light. It should launch early in December on its mission to cover the entire night sky

1½ times in nine months. The infra-red sensors are hundreds to thousands of times more sensitive than all its predecessors at four infrared wavelengths which will pick up millions of previously hidden objects like dark (non-reflective) asteroids and cool (dead) stars. The data will enable the Hubble and Spitzer and upcoming Herschel, Sofia and James Webb space telescopes to follow up.

2 The LHC fires up After a year's delay due to a gas leak having to be repaired, the Large Hadron Collider has successfully smashed two beams of protons into each other at nearly the speed of light. This is the start of a

new era in unravelling the deep secrets of the universe. The data collected by the Atlas, CMS and LHCb detectors is being studied by a team of scientists who will, hopefully, soon release some news of what they find.

3 Dark galaxies? A galaxy the size of our Milky Way should have about 1000 dwarf galaxies hovering around it. However, so far, only a few have been found. Now, it seems that many may be "dark" and, thus, have escaped detection.

In 2008, a cloud of hydrogen known as Smith's cloud was found to be colliding with our galaxy. It should have disintegrated and its mass of about 1 million suns become absorbed. However, it avoided this breakup and passed right through. It now seems that it has been here before, about 70 million years ago, and that its mass is probably about 100 times more than originally thought. This leads to the conclusion that our neighbourhood may be teeming with "invisible" galaxies.

DID YOU KNOW?

Information about the fourth brightest star, Arcturus, enables us also to find out about orange-red giants and supergiants.

Arcturus (Alpha Bootes)

It is actually the third brightest star, but because it is fainter than combined Alpha Centauri A + B, which are often regarded as one star, Arcturus is, thus, listed as 4th brightest. It is the brightest star in the Northern hemisphere, and second brightest star visible in northern latitudes.

The name means 'Bear watcher / guard' / guardian of the bear (Greek) as it appears to follow Ursa Major (Big Bear). It is believed to be one of the first stars named by ancient observers.

Characteristics

- An **orange/red giant**, with a visible orange hue.
- 1.5 - 2x mass and 113x brighter than the Sun. However, its lower temp means much of its energy is infrared. When this is taken into account, it is actually about twice as bright as the Sun, but releasing 215x more radiation
- 25x diameter of the Sun
- $m = -0.04$

- $M = - 0.31$
- 37 ly away
- A dying star, which has already converted most of its hydrogen to helium
- Theorised to be part of a binary system, but not yet proven

Its light was used to open the 1933 world fair in Chicago, the light having left the star at around the time of the previous Chicago fair in 1893.

Orange-red giants and supergiant stars

Cooler than the Sun (indicated by their colour at the red end of the visible spectrum)

Red giants

- Giant stars of low or intermediate mass (0.5-10x solar masses)
- Radii 10 - 100x that of the Sun
- Their outer atmospheres are inflated and tenuous, giving a huge radius and cool surface temperature ($< 5,000$ K)
- Although cooler, they are very luminous because of their great size
- Appear yellow-orange to red. Most are red, but some well-known ones are other colours in the red part of the spectrum - Arcturus (orange), Capella (yellow)
- In the later phases of their lives - the Sun will become a red giant in its old age
- Have exhausted hydrogen in their core and stopped fusing hydrogen to helium in their cores, but their shells are still fusing hydrogen into helium, while the core is inactive helium
- Dying red giants form planetary nebulae, then become white dwarfs
- Examples: Arcturus (Bootes), Aldebaran (Taurus), Gamma Cruc

Red supergiants (RSGs)

- Largest type of star in terms of volume - if in place of the Sun, some would reach Saturn
- Solar masses $>10x$ that of the Sun (range 10-70).
- Not the most massive (low density) objects, but have huge radii - 30-1,500x the Sun,
- Luminosity many 1000x's of time more than the Sun
- Cooler (surface temp $< 6,500$ K, 3,5000 - 4,5000 K) and dimmer than white or blue supergiants

- Relatively old stars, having finished burning hydrogen. They become red supergiants during their helium-burning phase with diameters about 100x larger than their original sizes
- Have several layers - outer, a red glowing area of inactive hydrogen and helium, next, active region of hydrogen fusion to helium, next helium fuses to carbon , and so on until the iron core is reached
- Have relatively short lives - 100,000s to a few million years
- Will end as supernovae and become either neutron stars or black holes
- Examples: Betelgeuse (Orion), Antares (Scorpius)

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

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