



The **PRETORIA CENTRE**

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER MARCH 2008

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

Date and time Wednesday 26 March at 19h15

Chairperson Tony Viljoen

Beginner's Corner **"Surprise"** by Percy Jacobs

What's Up in the Sky Hein Stoltsz

+++++ **LEG BREAK - Library open** +++++

MAIN TALK

"Reflecting on history: the development and use of the telescope"

by

Johan Smit

The meeting will be followed by tea/coffee and biscuits as usual.

The next observing evening will be held on Friday 21 March at the Pretoria Centre Observatory, which is also situated at CBC. Arrive anytime from 18h30 onwards.

INSIDE THIS NEWSLETTER

LAST MONTH'S MEETING	2
MOON-WATCHING CHARTS FOR INTERMEDIATE PHASES.....	2
THE DATE OF EASTER	3
LAST MONTH'S OBSERVING EVENING.....	4
PROPERTY WITH BRONBERG OBSERVATORY ON IT FOR SALE	4
ECLIPSE TRIP TO CHINA JULY 2009	5
FROM THE ARCHIVES	5
TELESCOPES FOR SALE	7
GIGANTIC GAS BALL FOUND	8
CHANDRA DISCOVERS A COSMIC CANNONBALL	8
DIE HESS-TELESKOPE	8
DEATH STAR GALAXY FOUND BLASTING SMALLER NEIGHBOUR	9
FIRST HABITABLE EARTHLIKE PLANET FOUND	9
LL ORIONIS: WHEN COSMIC WINDS COLLIDE	10
PRETORIA CENTRE COMMITTEE	10

Last month's meeting — Lorna Higgs

Lorna welcomed the 34 present, including a number of visitors. She remarked on how disappointing the last total lunar eclipse until 2010 had been. Totality was totally eclipsed by cloud! It seems to have been a bright eclipse.

Pierre Lourens presented Beginner's Corner as the first of the very interesting talks of the evening. He showed us how a shuttle is prepared for launch. It is a technical and logistical nightmare – the external fuel tank that is moved by barge, because it is so huge; parts hang from cranes and in slings before everything is joined together; the previously constructed payload container slides into the correct position; the completed shuttle moves for 8 hours over 3 ½ miles to the launch-pad by crawler. The video of a successful launch showed that it is possible to get it all right, however.

Danie Barnardo presented What's Up and after listing the phases of the moon and telling us when and where to look for the planets in March, he recommended that we look at all the fascinating objects (some of them naked-eye) in Carina which is so well placed for observing at present. His travelogue of the area was enough to tempt many to observe.

The fascinating Main Topic was well-presented by Michael Poll, who discussed Life on Earth – and in the Universe? He first listed the requirements for life as we know it:

- A single star of sufficient mass – of which there are 10 to 20 billion in the Milky Way.
- A planet – life could not exist in a star.
- Water.
- Carbon.
- Complex organic molecules enabling reproduction – RNA or DNA.

Evaluation of the requirements showed us just how difficult it is to get everything right for life.

- Water is liquid at a convenient temperature, whereas liquid ammonia and methane (other possible solvents) are freezing cold.
- Carbon forms very strong bonds in long and complex molecules, but silicon (a possible framework candidate) only gets to 8 weaker bonds.
- RNA and DNA can both replicate and adapt to changing environments.

Hydrogen and oxygen are the first and third most abundant elements in the universe. This means that there is plenty raw material to make water. Carbon is abundant in molecular clouds and is concentrated in pre-planetary discs. However, the inner solar system is low in both carbon and water. The source of these on earth has to be found. Life has definitely concentrated carbon on earth, but water and the initial carbon had to come from somewhere. Some water could have come from hydrated minerals in the earth rocks, but most of it probably comes from impacts by icy comets, meteorites and space dust. There have been enough of them over the last 4 billion years to fill our oceans. Most, at least, of the carbon will have come from impacts by the carbon-rich bodies.

Energy is needed to create the complex molecules of life, including RNA, DNA and cell walls. These molecules, formed by an energy source in space, could have been delivered by comet; and/or chlorophyll could have produced oxygen that is our present energy source; and/or energy could have come from glucose from fermentation; and/or energy could have come from lightning, and/or radioactivity, and/or freezing of raw materials – ammonia and cyanide, and/or ?

Once the complex molecules exist, evolution is required to eventually develop intelligent life with manual dexterity – to build electronic equipment that can transmit signals to other possible equally intelligent and manually dextrous life on special planets in outer space. These would need to have a moon, continental drift, a source of sufficient impacts with the correct raw materials, life, e.g. with chlorophyll, to modify the environment, etc. HELLO?

Moon-watching charts for intermediate phases

Moon-watching observation charts are available at website www.planetarium.co.za
* for March [use from 10th to 21st March] and
* for April [use from 8th to 20th April]

You can view space videos at website
<http://www.space-video.info/>

The date of Easter — by Michael Poll

The word Easter comes from the name of the Teutonic goddess of spring, Eostre, whose festival was celebrated at the March equinox. Other European languages use words for Easter that stem from the Hebrew word "Pesach" after the name of the Jewish Passover feast, which was observed by Jesus the night before the crucifixion. Easter was first celebrated in about AD 68.

To commemorate the Biblical account, Easter Sunday should fall on a Sunday during the Jewish Passover week. Celebration of Passover started on the 14th or 15th day of the Jewish spring month of Nisan. Because Jewish months start when the moon is new, the 14th or 15th day of the month must have been immediately after a Full Moon.

Prior to AD325, churches in different regions celebrated Easter on different dates, and not always on Sundays. This matter was addressed at the Council of Nicaea in 325 AD. (The Nicene Creed was also instituted at this Council. Nicaea is in Turkey, and is now known as Iznik).

The Council of Nicaea decided that Easter would be celebrated on Sundays, and to fix the date, Easter was defined as the first Sunday after the Full Moon that occurs on or after the March Equinox. If this Full Moon falls on a Sunday then Easter is the next Sunday.

Easter was defined with respect to an imaginary moon □ known as "**Paschal**" Full Moon, and a **fixed equinox** that was to be always on March 21. The reason for using the imaginary Moon (it can vary slightly from the real one) and the fixed equinox is that the method allows the date of Easter to be calculated in advance, without further astronomical knowledge. It also makes the date of Easter independent of longitude on the Earth, and is thus independent of Time Zone.

The calendar in use at the time of the Council of Nicaea was the one introduced by Julius Caesar in 46 BC. Because the year in this calendar was too long, (by 11 minutes and 16 seconds) the sun returned to the equinox (i.e. in one tropical year), before one calendar year had passed. The real equinox was occurring earlier and earlier in the year, compared with the fixed Equinox. By the 1500s Caesar's calendar had been in use for 1 600 years, and the error amounted to 10 days, and the real Equinox was occurring on March 11th. The Jewish Passover was still related to the real Equinox and Easter was being celebrated 10 days after the Passover, and was drifting away from its springtime position towards summer.

The Julian calendar needed reforming, but the reason for the reform was not the fact that the seasons were out, but that Easter was being celebrated too late, and so was losing its relationship with the Jewish Passover. A new Calendar, devised by Aloisius Lilius (1510 -1576) was introduced by Pope Gregory XIII in 1582, and so the calendar in use today is called the Gregorian calendar. Lilius also devised **the tables** that would be used to determine the date of Easter, as based on the Gregorian calendar. It took Lilius 10 years to devise these tables.

The tables are based on a cycle of 19 years in which the phases of the Moon repeat themselves on the same dates. The tables use two quantities called the **Golden Number**, where each of the years in the 19 year cycle is given a number between 1 and 19 and the **Dominical Letter**, which indicates how many days into the new year the first Sunday will fall: When the Golden Number and Dominical letter for each year have been found from the tables, a third table combining the two gives the date of Easter for that year.

In the Gregorian calendar the calculation is complicated by the definition of which century years are leap years. These leap years alter the number of days in different periods of 19 years, so the tabular method for the Gregorian calendar uses the Epact instead of the Golden Number. The Epact is a number derived from the Golden Number, by calculation, and is a number ranging from 0 to 29. The **Table of Epacts** indicates the age of the Moon (ie the lunar phase) expressed in whole days, on January 1st of a given year. The Dominical letter for the Gregorian calendar is found from the table and the date of Easter is again found from a third table combining the Epact and the Dominical letter.

The entire tabular system for the Gregorian calendar comprises a period of 5 700 000 years.

Only after this period, does the pattern of Gregorian Easter dates repeat itself.

The earliest possible date for Easter is when the full moon occurs on March 21st, (i.e at the Equinox) and that day is a Saturday. Easter will fall on the next day, which is Sunday March 22nd. This only happens once every 210 years on average, last time was 1818, the next occurrence will be in 2285. This year Easter is only one day off the earliest possible.

The latest possible date is April 25th. This happens when a full moon occurs on March 20th, the day **before** the equinox. The first full moon to occur on or after the equinox will occur 29 days later on April 18th, and if that day is a Sunday, then Easter will be the following Sunday April 25th. Easter falls on April 25th once every 130 years on average. The last time was in 1943 and the next will be 2038.

The commonest date for Easter over the whole cycle is April 19th. It is not possible to have Easter in March for two years in a row i.e if Easter does fall in March, it will be in April the following year.

Last month's observing evening - by Michael Poll, Johan Smit & Percy Jacobs

Seven star starved stalwarts came to yet another cloudy observing evening. Well, cloudy – no telescope viewing but we did get passing glimpse of the Diamond Cross, the False Cross, Sirius, Canopus and parts of Orion. Percy's plan to try for the Horsehead Nebula was stillborn, but we did check on the map to see where it was in relation to Sigma Orionis, and we did look at a picture of it. Johan reminded us of how small an object we would be looking for, and how much aperture is required to see it. (Given good conditions, Percy's 10 inch may just see it). We **talked** about a lot of things astronomical – Eta Carinae, supernovae, including the 1987 one, central stars of planetary nebulae, - how bright (or rather, faint, they are,) and what the chances of seeing one were, and a discussion about variable stars, and how to go about observing them.

The next observing evening will be on March 21st, which happens to be Good Friday, but observing *will* take place. The moon will be full, but do not let that put you off!

Property with Bronberg Observatory on it for sale

Do you remember our visit to Bronberg Observatory belonging to Berto Monard? If not, see the newsletters for August 2007, page 10 and September 2007, page 8. (Old newsletters from August 2003 to January 2008 are on our website.)

The following e-mail has been received by the Centre:

“Just in case that some of the Gauteng astronomers might be interested, I like them to know about this in time. The fact is that I will go on pension at the end of March and Brigitte and me would like to settle somewhere in the Karoo preferably in 2008 still. This means that we have put our property, housing the Bronberg Observatory and which is part of a nature and game conservancy, on the market.

I hope you will not mind to announce or forward the content of this posting to your centre members. Interested parties can contact Brigitte at 083 283 5560 or Berto at 012 841 3003.”

Onder: Okkultasie van Venus deur die sekelmaan. Gefotografeer deur Philip van Heerden. (Foto's uit “Fokus”, nuusbrief van die Orion Observasie Groep, Januarie 2007.)



Eclipse trip to China July 2009

The solar eclipse in July 2009 will be the longest duration of totality you will ever see in your lifetime. Maximum totality occurs out in the Pacific ocean and lasts for 6 minutes and 40 seconds. In Shanghai in China totality will be around 6 minutes.

We have put together a wonderful trip to China to observe the eclipse and see some of the country. The basic package will be a 7-day 6-night trip and there is an optional extension of 5 nights for those who would like to see more of the country. The basic package includes:

- Return flights from Johannesburg to Shanghai, via Dubai on Emirates airline.
- Six nights accommodation in 3-star hotels
- 2 internal flights in China
- Breakfast and Lunch on most days, other days Breakfast.
- Entrance fee to all places of interest.
- Transport in a private bus on all days.
- English speaking guide for all excursions

Sights on the program :

- Shanghai/ and the waterfront.
- Terracotta soldiers in Xian
- Big Wild goose Pagoda
- Beijing : Tiananmen square , Forbidden City, Great Wall of China, Temple of Heaven, Ming Tombs.
- And of course the eclipse which we will observe from a site about 1 ½ hours outside of Shanghai.

At current exchange rates this package works out at about R11,900 per person sharing. Single supplement would be about R900 per person.

However exchange rates will change so allow for about a 10% increase. The aim is to arrange a price that is under R15,000.

The 5-day 4-night extension will be about R3,000 per person.

Please note – July is the rainy season in China and there is no guarantee that we will have clear weather for the eclipse.

Will anyone interested please let me know, BEFORE THE END OF APRIL 2008, as we need to get an idea of numbers for the hotel bookings. We are not asking for a commitment at this stage but need to know if anybody is interested.

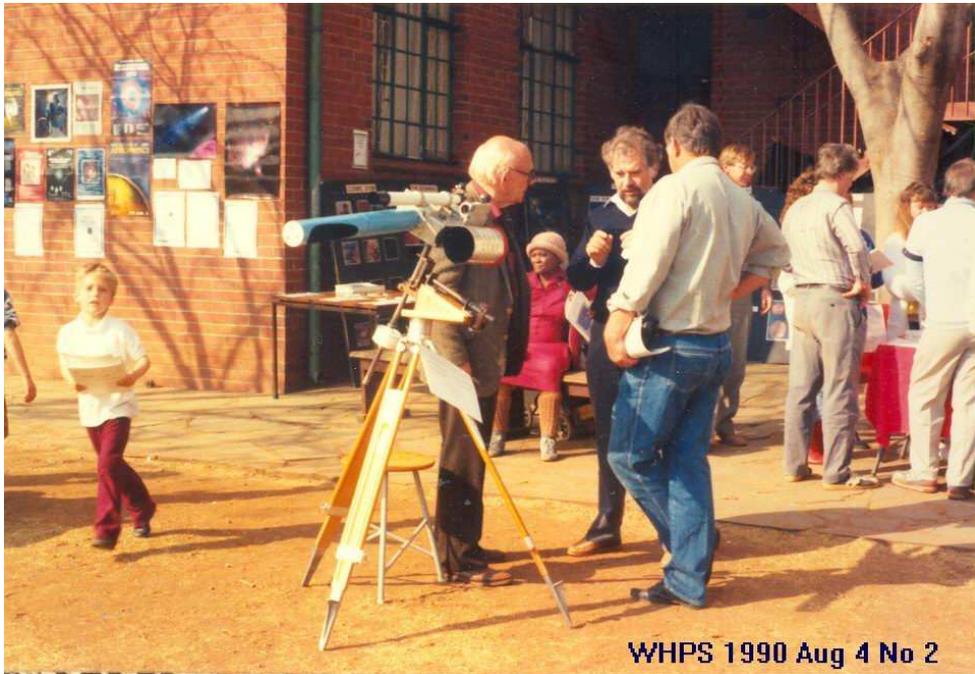
Please email Brian Fraser on fraserb@intekom.co.za

From The Archives — by Michael Poll

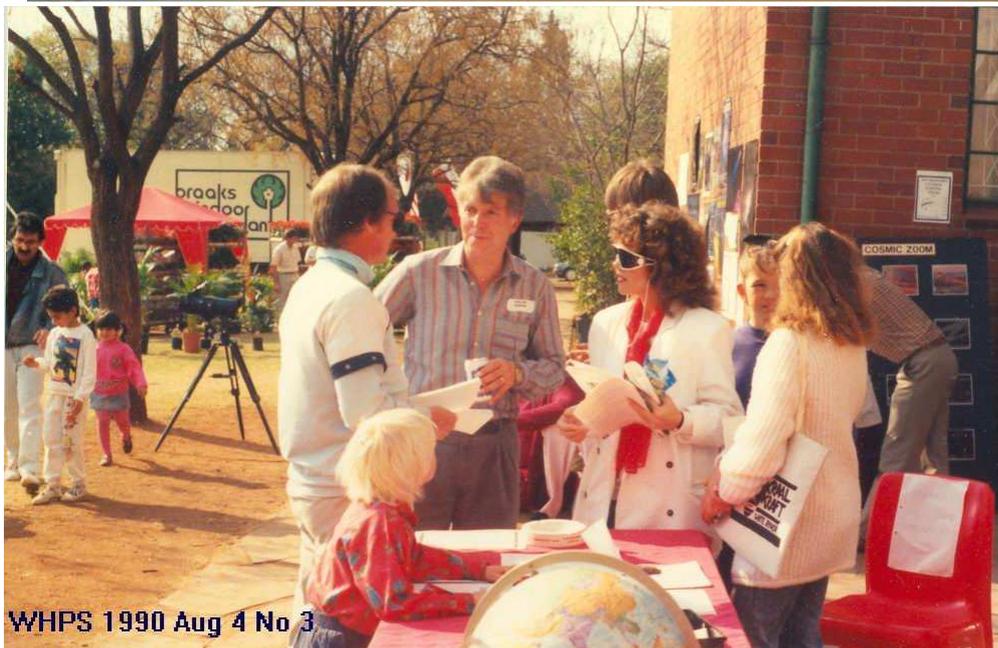
The attached photographs were taken on August 4th 1990, when the Pretoria Centre put on a display at an open day at Waterkloof House Preparatory School (WHPS). The pictures are on the next page. Picture No 1 shows Michael Poll with his 3 inch refractor and an attentive audience. In Picture No 2, the person in the centre is the late Dr Voogt, (with glasses) with his home made Schiefspeigler telescope. Dr Voogt was always known as such, (we seemed not to know his first name!) and his telescope was very well known to members at the time. Like the latter day telescope builders, he was also a master at improvisation, for example, note the coffee tin. This telescope was part of the motivation for Dr Voogt to win the Jack Bennett Award in 1993. Picture No 3 shows the late Walter Wargau (centre). Walter was a professor of Astronomy at UNISA and was sometime Chairman of our Centre.



WHPS 1990 Aug 4 No 1



WHPS 1990 Aug 4 No 2



WHPS 1990 Aug 4 No 3

Telescopes for sale

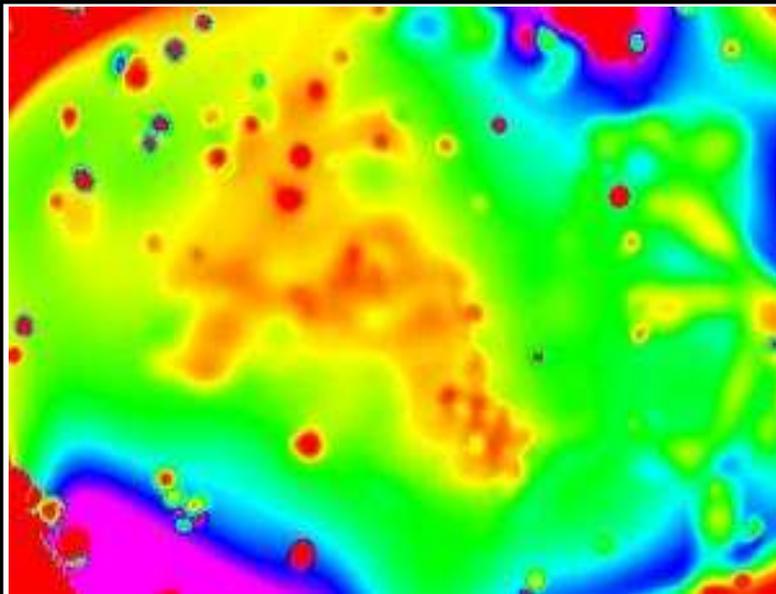
Here are some images of the Rosenberg telescopes offered for sale by Wayne Mitchell. Mirror sizes are from 6" to 40". His contact details are:

072 465 7739 (c)

012 719 9065 (w)

E-mail address: waynemit@webmail.co.za





Gigantic gas ball found

Thanks to data from ESA's XMM-Newton X-ray satellite, a team of international scientists found a comet-like ball of gas over a thousand million times the mass of the sun hurtling through a distant galaxy cluster over 750 kilometers per second.

This colossal 'ball of fire' is by far the largest object of this kind ever identified. The gas ball is about three million light years across, or about five thousand million times the size of our solar system. It appears from our perspective as a circular X-ray glow with a comet-like tail nearly half the size of the moon.

The gas ball is in a galaxy cluster called Abell 3266, millions of light years from Earth, thus posing absolutely no danger to our solar system. Abell 3266 contains hundreds of galaxies and great amounts of hot gas that is at nearly a hundred million degrees.

The X-ray image shows a comet-like blob of gas about 5 million light-years long hurtling through the galaxy cluster. The blob is confined to the orange regions in the central part of the image.

See website <http://www.sciencedaily.com/releases/2006/06/060613082035.htm>

Chandra Discovers A Cosmic Cannonball

Astronomers using NASA's Chandra X-ray Observatory have discovered one of the fastest stars ever seen. It's a "cosmic cannonball" that is challenging theories to explain its blistering speed. The name of the star is RX J0822-4300. It's a neutron star created by the Puppis A supernova explosion about 3700 years ago. Three Chandra observations clearly show the neutron star moving away from the center of the blast. Speed: 1400 kilometers per second! At this rate, RX J0822-4300 is destined to escape the Milky Way just millions of years from now. It's a high-speed mystery -courtesy of Chandra.

See website

http://www.spacedaily.com/reports/Chandra_Discovers_A_Cosmic_Cannonball_999.html

Onder: Die H.E.S.S- teleskope, Khomashoogland, Suid van Windhoek, Namibië.

(H.E.S.S. = High Energy Stereoscopic System)



The Science and Space website of National Geographic magazine is to be found at website address <http://science.nationalgeographic.com/science/space>

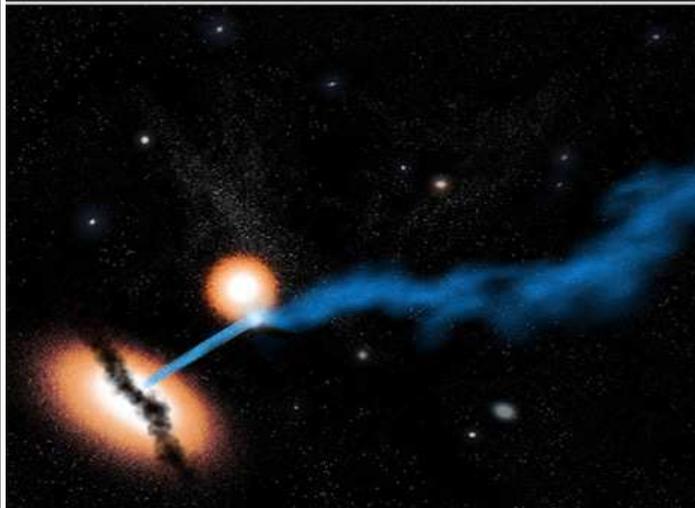


"Death Star" Galaxy Found Blasting Smaller Neighbour

The super massive black hole at the center of a distant galaxy is blasting a smaller neighbour with a violent energy jet, earning it the moniker the "Death Star" galaxy - scientists announced recently. The jet has probably fried the atmospheres of any planets in the way.

But the never-before-seen display may also one day lead to a new burst of star and planet formation. And it may help unravel the many mysteries about how such jets form, how they work, and how they evolve, experts said.

A composite image (top, left) shows a never-before-seen spectacle: a "Death Star" galaxy blasting a nearby neighbour with a powerful jet from a super massive black hole. The image combines X-ray data from the Chandra X-Ray Observatory (purple), optical and ultraviolet data from the Hubble Space Telescope (red and orange), and radio emission data from the Very Large Array and MERLIN array (blue).



An artist's illustration (bottom, left) shows another view of the spectacle.

See website

<http://news.nationalgeographic.com/news/2007/12/071217-black-holes.html>



First Habitable Earthlike Planet Found

The first known planet beyond the solar system that could harbor life as we know it has been discovered, scientists report. The most Earthlike planet yet found, it orbits a red dwarf star and likely contains liquid water, said the European astronomers who made the discovery. The planet is estimated to be only 50 percent larger than Earth, making it the smallest planet yet found outside the solar system. Known as Gliese 581c, the new-found world is located in the constellation Libra, some 20.5 light-years away. The planet is named after the red dwarf star it orbits, Gliese 581, which is among the hundred closest stars to Earth. A year on the

planet lasts just 13 days. Gliese 581c lies within the relatively cool habitable zone of its solar system. The scientists estimated the planet's surface temperature at between 0 and 40 °C.

The image is an artist's illustration of the planet and the red dwarf star it orbits.

See websites

<http://news.nationalgeographic.com/news/2007/04/070424-new-planet.html>

<http://planetquest.jpl.nasa.gov/news/superEarth.cfm>

LL Orionis: When Cosmic Winds Collide



This arcing, graceful structure is actually a bow shock about half a light-year across, created as the wind from young star LL Orionis collides with the Orion Nebula flow. Adrift in Orion's stellar nursery and still in its formative years, variable star LL Orionis produces a wind more energetic than the wind from our own middle-aged sun. As the fast stellar wind runs into slow moving gas a shock front is formed, analogous to the bow wave of a boat moving through water or a plane traveling at supersonic speed. The slower gas is flowing

away from the Orion Nebula's hot central star cluster, the Trapezium, located off the lower right hand edge of the picture. In three dimensions, LL Orionis' wrap-around shock front is shaped like a bowl that appears brightest when viewed along the "bottom" edge. The complex stellar nursery in Orion shows a myriad of similar fluid shapes associated with star formation, including the bow shock surrounding a faint star at the upper right. Part of a mosaic covering the great Nebula in Orion, this composite color image was recorded in 1995 by the Hubble Space Telescope.

See website <http://apod.nasa.gov/apod/ap031115.html> for web links to this topic.

PRETORIA CENTRE COMMITTEE

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