



# The PRETORIA CENTRE

of the

## Astronomical Society of Southern Africa

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

### NEWSLETTER AUGUST 2010

#### Next meeting

**Venue:** The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

**Date and time:** Wednesday 25 August at 19h15.

#### Programme:

- **Beginner's Corner:** "Amateur spectroscopy" by Percy Jacobs
- **What's Up in the Sky:** by Danie Barnardo
- 10 minute break — library will be open
- ◆ **Main talk:** "The sextillion challenge"  
by Hubrecht Ribbens
- Socializing over tea/coffee and biscuits.

Next observing evening: Friday 20 August at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road. Arrive from sunset onwards.

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## Last month's Observing Evening

by Michael Poll, Johan Smit, Percy Jacobs, Danie Barnardo, Neville Young

We had a great turnout of members, visitors and telescopes for the July observing evening. About 50 people and at least ten telescopes. Parking spaces were at a premium! The sky was clear of cloud, and it was quite warm for the time of year, but a slight negative was that the moon was very bright – three days from full.

The first viewing attraction was the line up of planets in the north western twilight –from the horizon upwards there was Mercury, Venus, Mars and Saturn. In between Mercury and Venus was the star Regulus, which is the brightest star in Leo. Other stars of Leo were getting washed out in the twilight, but we could see Gamma (Algieba), level with Regulus, (i.e at the same altitude) and Beta (Denebola) level with Venus. Mars and Saturn had moved off into Virgo. These planets are starting a dance that will extend until at least the second week in August.

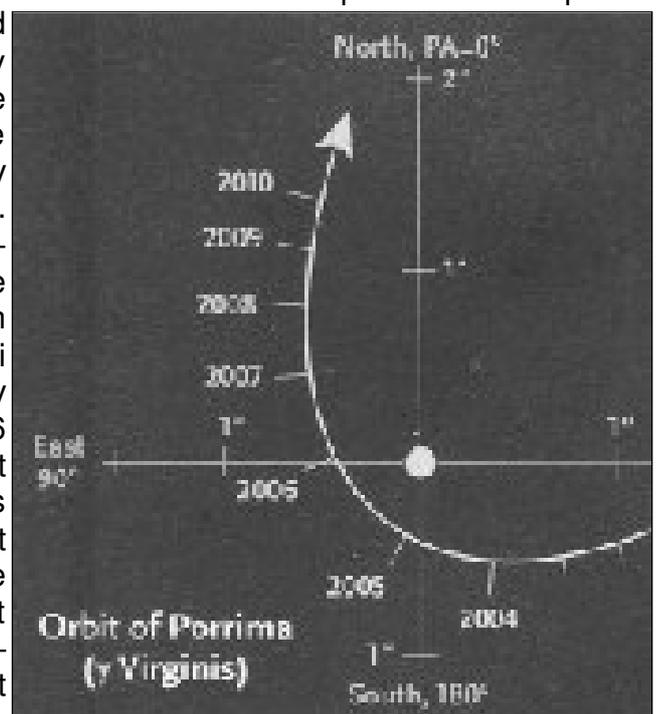
Telescopically, Mercury was a bit low to make much out, but Venus is showing just over half phase – it will be at greatest elongation on August 20<sup>th</sup>, after which the phase will become an increasingly thin crescent. The colours of Mars (reddish) and Saturn (yellowish) contrasted well to the naked eye. In the telescope, Mars showed a small reddish disc. Saturn rings were still not far from edge on. By the next evening viewing season for Saturn (next year) the rings will have opened up some more. An interesting thing to note telescopically is that the globe of Saturn is bigger than the globe of Mars, in spite of Saturn being 5 times further away than Mars (10.0 Astronomical Units versus 1.9 AU).

We had a look at the moon (filter required!). Not a lot of terminator detail to be seen, because of the phase, but the bright crater Tycho, with its rays, were noted, and also Copernicus (terracing of the inner crater wall just visible); Aristarchus (the brightest spot on the moon) and Plato (dark oval crater with smooth floor, the second darkest area on the moon after the crater Grimaldi which becomes visible at, and remains visible after, full moon).

There were quite a lot of other things to see, in spite of the bright moon. Even the cluster M7 in Scorpius looked quite good, as did the “False Comet” NGC 6231, also in Scorpius – these were well seen even with the moon placed in nearby Sagittarius. Clusters in the south we looked at included Theta Carinae (IC2602 – the Southern Pleiades), and Casper noted a cluster and nebulosity below the Southern Cross, which was tentatively thought to be IC 2948 – the Running Chicken Nebula.

There are still double stars to look at, which can still be seen whatever the moon is doing. In the south we looked at Alpha Centauri, and Alpha and Gamma Crucis. Alpha Crucis comprises

a tight double, with a third star quite widely spaced from the pair. While the first pair are gravitationally bound, it is not firmly established as to whether the third component is a part of the system, or a more distant line-of-sight star. Gamma Crucis is the only red star of the four brightest Southern Cross stars. In the telescope the star is seen to be a wide double, but this *is* a line-of-sight (“optical”) double, the fainter companion is much further away. In the north we looked at the famous colourful pair, Beta Cygni – Albireo. And, at last for some of us, – we finally were able to split Porrima (Gamma Virginis) with a 6 inch telescope after some years of it being too tight to separate. The period is 169 years. The stars were at their closest in 2005, (see figure) - they last closed up in 1836. When at their closest they are too tight to split with all but the largest telescopes. It required magnification to split them on this night – 166x on Michael's 6 inch telescope and Angelo split



it with 200 times on his 4 ½ inch.

As well the telescopes there, Neville had brought along his portable model of the solar system, which mimics the real sky and shows where each planet currently is in its orbit. A large attentive audience was listening to his explanations and descriptions. The lovely alignment of Saturn, Mars, Venus and Mercury was ideally suited to explaining exactly why we are seeing them where they are currently in the sky. The relative motions of these planets in the next month and in the next month are going to be fascinating to watch, as Saturn, Mars and Venus reverse the order in which they lie. Those who watched Neville's demonstration should have no problem understanding why this happens and will be able to imagine where and how these planets are moving along their celestial highways.

All in all, a very successful evening, and while we were packing up, Percy explained the joys (and a bit of the pain) of telescope making to some of the late leavers.

**Meanwhile**..... on the same evening, Johan, together with Centre member Gerhard Prinsloo, was doing some outreach at a viewing evening for the Hartebeespoort Animal Welfare Society (HAWS). This was very enjoyable and they met very nice people and showed them as much as could be seen. Johan feels that this could become a regular event, and anyone else from ASSA would be welcome to join in. Some of the feedback included the following from Nat-liegh Aspey Strydom :

*Morning Gerhard.*

*... it was a success, not only in terms of the R2700.00 we made for the animals but also because the people were very, very impressed with you and Johan. We had very good feedback and everyone was very delighted by what they saw and learnt.*

*I would love for us to do this again, perhaps in the summer when it is warmer again. I know it is difficult because of rain and clouds but I would like us to try.*

*Thank you so much to you and Johan- you are HAWS stars! Kind regards, Nat*

### **Observing Evening for CBC Delegates in July 2010 - by Michael Poll**

The observing evening for the persons at CBC, who were delegates for a weekend conference on the subject "Science and Religion" was very successful. Johan, Danie, Casper, Pat, Percy, Fred and Michael were there. There were about 20 delegates and they were very appreciative. A number of the delegates were teachers at CBC and were pleased and interested to have made contact with the Centre members, and to see what goes on at "Observing Evenings". There was naked eye viewing of the planets in the north west, and viewing through the telescopes as well. The objects shown in the telescopes were mostly those described in the July 23<sup>rd</sup> Observing Evening report, but just to add that Saturn and Omega Centauri were superb in the Centre 12 inch reflector.

### **Celestron teleskope teen afslagprys**

Die volgende e-pos boodskap is van Lionel Redelinghuys ontvang:

*"Ek het onlangs weer my liefde vir die sterre ontdek en in my soektog na die regte teleskoop vir my het ek op die invoerders van Celestron afgekom. Ek het my fotografie besigheid by hulle geregistreer en kan nou teleskope teen uitmuntende pryse kry. Byvoorbeeld. Ek het vir my n Celestron 130EQ gekoop met t-adaptor en t-ring teen R3000. Dit is omtrent R1000 goedkoper as wat ek in die winkels daarvoor sou betaal het. Ek sal graag ander aspirant astronome ook hierdie voordeel wou gee."*

e-pos adres: [lionel@dpstorage.co.za](mailto:lionel@dpstorage.co.za) selfoonnommer: 074 179 1483

Foto's van die sterpartytjie wat gehou is naby Britstown van 6 tot 9 Augustus 2010 kan gesien word op die blog van die ASSA Bloemfontein by [assabfn.blogspot.com](http://assabfn.blogspot.com)

### Last month's meeting - by Johan Smit

The meeting was well attended and the audience included visitors who attended our observing evening on the previous Friday.

The main announcements were our Karoo star party that will be taking place over the weekend 7 to 9 August, and the 2010 ASSA symposium that will be hosted by the Pretoria centre on 7 to 9 October.

We have an exciting mix of speakers and activities lined up and urge our members to book for the symposium sooner rather than later.

Then Johan Smit took the audience on a tour through the activities of the centre over the last year. This was part of our annual general meeting. No new members were nominated for the committee and no current serving members resigned. The current committee was proposed and accepted by the meeting.

I trust that this blind trust in the current committee is a sign that we are doing what is expected of us, and not apathy. **Members are encouraged to contact the committee with suggestions and criticism. This can only help to make the Pretoria centre even better.**

A full annual report will be published on the website, our newsletter and in MNASSA over the next month or two.

Then Percy Jacobs showed us what to look out for during August 2010. It will be an excellent month for planetary viewing with all the naked eye planets visible at decent times of the night. A few deep sky objects were pointed out in anticipation of the Karoo star party. A full report back on the Karoo star party will follow soon.

Then Danie Barnardo, our librarian talked about the Tswaing impact crater. The talk did not just cover Tswaing, but gave the audience a background on meteorites and where they come from.

He talked about different types of impact craters, their characteristics and how many are found on Earth. This brought us to Tswaing, which is one of the best preserved craters in the world. We are very fortunate to have such a site so close to us. Members are encouraged to visit Tswaing.

Then he discussed the effect of impacts and everyone's favourite topic—what are the chances of something like this happening again.

Some interesting statistics were highlighted:

Similar meteorites enter the atmosphere about once a week. Most break up in the atmosphere (as a result of friction with the atmosphere) and never reach the Earth's surface. Of those that reach the surface, about three quarters fall in the oceans. So, worry about the other quarter!!!

About 7 reasonably large (about 100 meter in diameter) craters were created during the last 10 000 years. Expect something bad to happen once every 1500 years.

He ended the talk with pictures of "modern" freshly created impact craters, proving that it can and probably will happen again. Fortunately we live close to Tswaing. Lightning does not strike twice in the same place, or am I mistaken????? Makes one think. Thanks to Danie who made us think.

The meeting ended just after 21:00 and was concluded with more lively than usual discussions over tea and coffee.

## Hypergiant star prepares to blow

This is a monster star that lobbed 10 000 times the Earth's mass into space when it erupted two years ago and it is ready to blow again. The star is 10 000 light-years away in the northern constellation Cassiopeia and any explosion there would have no effect on Earth.

Rho Cassiopeiae (Rho Cas) is a yellow-white hypergiant star. If it replaced our Sun, its girth would consume Earth and Mars. It also has a huge atmosphere. Only about a dozen such hypergiants are known in the Milky Way Galaxy. It is probably about to undergo a new episode of eruption, fading, and mass ejection.

Rho Cas is a naked-eye star. It is far away compared to most stars visible at night. It is visible because it is among the most massive stars known, with mass between 20 and 40 solar masses, and shines nearly a million times as bright as the Sun. The constellation Cassiopeia is at declination +60°, which is unfortunately a bit too far north for us to observe from Pretoria, which is located at latitude 25° south.

An artist's impression shows an eruption of Rho Cas as it might appear from a hypothetical planet orbiting the hypergiant star.

- ♦ <http://www.skyandtelescope.com/news/3307131.html?page=1&c=y>
- ♦ [http://www.space.com/scienceastronomy/exploding\\_star\\_030107.html](http://www.space.com/scienceastronomy/exploding_star_030107.html)



## Buckyballs found in space

Now scientists using the Spitzer Space Telescope have discovered real spaceballs, aka buckyballs, the mysterious form of pure carbon they've sought in space for some 40 years. Sporting a soccer ball-like pattern, a buckyball is a molecule whose 60 carbon atoms form a stable, hollow sphere. Even at just  $10^{-9}$  (one billionth) of a meter wide, it's the largest type of molecule yet seen in space.

Buckyballs are the spherical versions of so-called fullerene carbon molecules, which were first theorized in 1970. The molecules were first spotted in a laboratory in 1985 during experiments that simulated the atmospheric conditions of carbon-rich, aging stars.

<http://news.nationalgeographic.com/news/2010/10/100723-buckyballs-largest-molecules-space-science/>

## Star with record mass discovered

A newfound star has shattered the record as the most massive stellar monster ever seen. Weighing in at a whopping **265 solar masses**, the behemoth may have actually slimmed down since birth, when it likely tipped the scales at 320 solar masses.

The discovery could rewrite the laws of stellar physics, since it's long been thought that stars beyond a certain mass would be too unstable to survive. "We are really taken aback, because up until now the astronomical community at large has assumed that the upper size limit for stars would be around 150 times the mass of the Sun", said an astronomer. "This giant could really revolutionize the way we think about how stars form and die in clusters and galaxies." The star was dubbed R136a1. The image shows relative sizes of different types of stars.

<http://news.nationalgeographic.com/news/2010/07/100721-science-space-most-massive-star-ever-discovered-record/>



## **ASSA Symposium 2010**

### **First announcement and invitation to submit papers**

The Society will hold its 2010 Symposium on 7, 8 and 9 October 2010 at the Council for Geoscience, Pretoria Road 280, Silverton, Pretoria. The Symposium will be hosted by the Pretoria Centre of ASSA.

The symposium will be focusing on light/spectrum pollution, but will not be limited to these topics. All other aspects of astronomy will be allowed during the Symposium.

We wish to invite both professional and amateur astronomers to present papers at the symposium.

The organizing committee is calling for abstracts (non-technical overviews of the papers that will eventually be presented. No mathematical or diagrammatic content required. Primary references, or a short list of related publications by the presenter, must be included. Verbal papers may be submitted in two categories:

- Short papers, for delivery in 20 minutes, with 10 minutes for discussion and questions.
- Long papers, for delivery in 40 minutes, with 20 minutes for discussion and questions.

A third available category is:

- Presentations in the form of displays. These may use one standard folding table (about 1 800 X 600 mm in size) and a poster board behind it to display any subject pertaining to astronomy.

Authors should indicate in the abstract in which category the paper is being submitted. Please make submissions in doc (MS Word) or Adobe PDF format. Only e-mailed submissions, with the file attached, will be accepted. Full contact details (including e-mail address) and the full title of the paper MUST be submitted with the abstract. The latest date for submission is 31 July 2010. Please indicate a preferred date and time to present your paper.

The Symposium committee reserves the right to accept or reject papers and to decide in which session of the Symposium it will be placed, although all efforts will be made to accommodate presenters.

Persons interested in attending the Symposium, delivering a paper or presenting a display should contact the Symposium committee at:

[symposium2010@pretoria-astronomy.co.za](mailto:symposium2010@pretoria-astronomy.co.za)

More details and a subscription form can also be downloaded from:

<http://www.pretoria-astronomy.co.za>

Alternatively, the phone contact is: Andrie van der Linde at: 083 632 4894

### **Invitation to members - by Pierre Lourens**

Members of the Pretoria Centre of the ASSA are invited to send articles for placement in the newsletter to me by e-mail. This is the way you can share your astronomical knowledge with other members.

Any of the following items sent, will also be considered for placement: astronomical website addresses, information about astronomical computer packages, relevant news, views, experiences, book reviews, references to interesting articles, notices of astronomy lectures, details about astronomy courses. Astrophotographs taken by members will be especially welcome.

Just check your contribution for accuracy before sending it.

### Solar Dynamics Observatory

The Solar Dynamics Observatory - "SDO" for short - was launched on February 11, 2010, from the Kennedy Space Center in Florida, USA.

SDO is designed to probe solar variability unlike any other mission in NASA history. It will observe the Sun faster, deeper, and in greater detail than previous observatories, breaking barriers of time-scale and clarity that have long blocked progress in solar physics.

Lika Guhathakurta of NASA believes that "SDO is going to revolutionize our view of the Sun." The revolution begins with high-speed photography. SDO will record IMAX-quality images of the Sun every 10 seconds using a bank of multi-wavelength telescopes called the Atmospheric Imaging Assembly (AIA). For comparison, previous observatories have taken pictures at best every few minutes with resolutions akin to what you see on the web, not at a movie theatre.

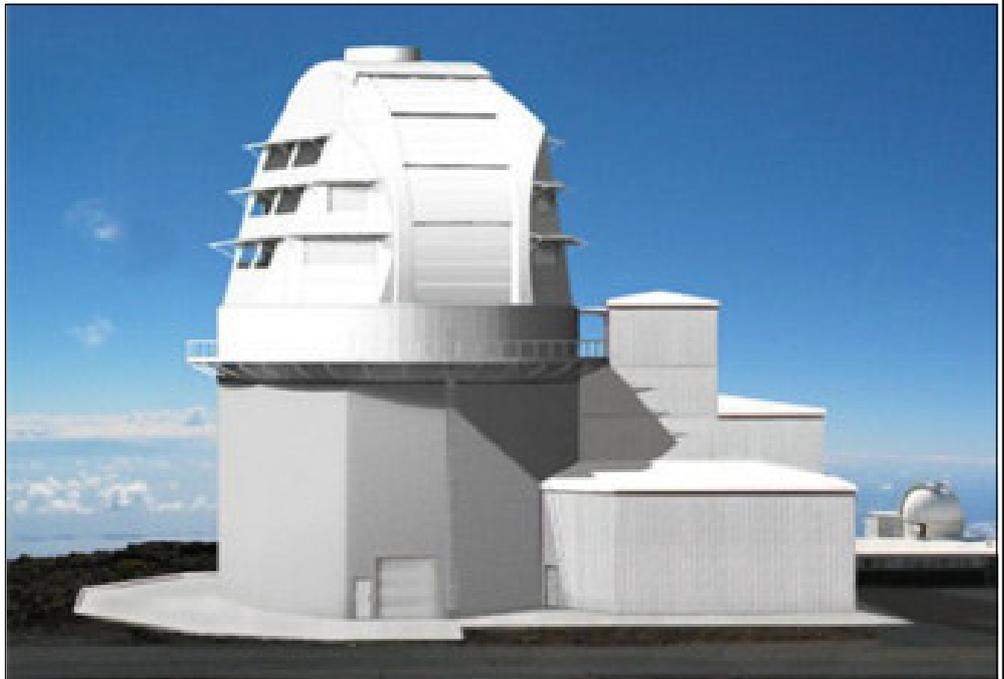
Researchers believe that SDO's rapid-fire cadence could have the same transformative effect on solar physics that the invention of high-speed photography had on many sciences in the 19th century.

SDO doesn't stop at the stellar surface. SDO's Helioseismic Magnetic Imager (HMI) can actually look inside the Sun at the solar dynamo itself.

[http://www.spacedaily.com/reports/Solar\\_Dynamics\\_Observatory\\_The\\_Variable\\_Sun\\_Mission\\_999.html](http://www.spacedaily.com/reports/Solar_Dynamics_Observatory_The_Variable_Sun_Mission_999.html)

### World's largest solar telescope to be built

Towering over the island of Maui is Haleakalā, a 3055 meters high dormant volcano with a dramatic summit caldera. In Hawaiian culture, Haleakalā is revered as the sacred "House of the Sun." So it's seemingly fitting that sometime this year astronomers hope to start construction of the world's largest and most powerful observatory dedicated to the study of our star, the Sun: the ATST (**A**dvanced **T**echnology **S**olar **T**elescope). It is expected to be in full operation by 2017.



Boasting a primary mirror 4 meters across and state-of-the-art adaptive optics, ATST will view the Sun with a resolution of 0.1 arc second, while spanning the spectrum from 350 nm in the ultraviolet to 28 mm in the far infrared.

The image is an artist's rendering of the ATST when finished. At far right in the image is the Mees Solar Observatory, built in 1964.

<http://www.skyandtelescope.com/news/83273092.html>

## The Carina Nebula

The **Carina Nebula** (also known as the **Great Nebula in Carina**, the **Eta Carinae Nebula**, or **NGC 3372**) is a large bright nebula that surrounds several open clusters of stars. The nebula lies at an estimated distance between 6500 and 10000 light years from Earth. It is located in the southern constellation of Carina in the Sagittarius Arm of the Galaxy.

The nebula is one of the largest diffuse nebulae in our skies. Although it is some four times as large and even brighter than the famous Orion Nebula, the Carina Nebula is much less well known, due to its location far in the southern sky. It was discovered by Nicolas Louis de Lacaille in 1751–52 from the Cape of Good Hope.

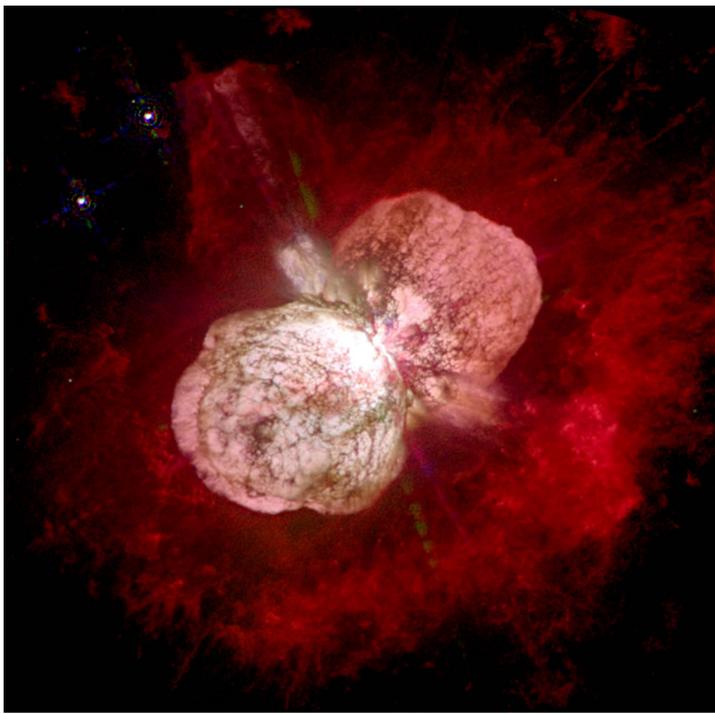
Within the large bright nebula, surrounding the highly luminous hyper giant star

Eta Carinae, is a much smaller feature. It is a small nebula known as the Homunculus\* Nebula, and is believed to have been ejected by Eta Carinae in an enormous outburst in 1841 which briefly made the star the second brightest in the sky.

The accompanying image of the Homunculus Nebula was made by the Hubble Space Telescope.

\* Homunculus is Latin for "Little Man".

- [http://en.wikipedia.org/wiki/Carina\\_Nebula#Objects\\_within\\_the\\_Carina\\_Nebula](http://en.wikipedia.org/wiki/Carina_Nebula#Objects_within_the_Carina_Nebula)
- <http://etacar.umn.edu/>



## The star Eta Carinae: an enigma

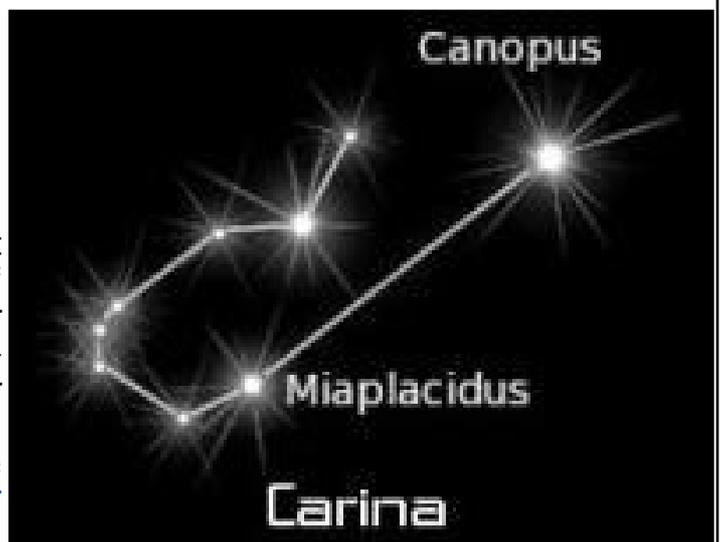
Estimates of its mass range from 100–150 times the mass of the Sun, and its luminosity is about four million times that of the Sun. Stars that have masses of more than 120 solar masses exceed the theoretical Eddington limit, and their gravity is barely strong enough to hold them together.

Eta Carinae is currently the most massive star that can be studied in great detail. Several other known stars may be more luminous and more massive, but data on them is far less robust. Eta Carinae may become a supernova or hypernova in the near future. There are still big questions about Eta Carinae, such as:

- ♦ What caused the Great Eruption of 1841?
- ♦ Is Eta Carinae a binary or a single star?
- ♦ Why has Eta Carinae lately been brightening at all wavelengths?

Even amateur astronomers with modest equipment can help untangle the mysteries of Eta Carinae. Anyone with a telescope, CCD or spectrograph is therefore encouraged to observe this most intriguing object on a regular basis.

- <http://www.aavso.org/vstar/vsots/0400.pdf>
- [http://en.wikipedia.org/wiki/Eta\\_Carinae](http://en.wikipedia.org/wiki/Eta_Carinae)

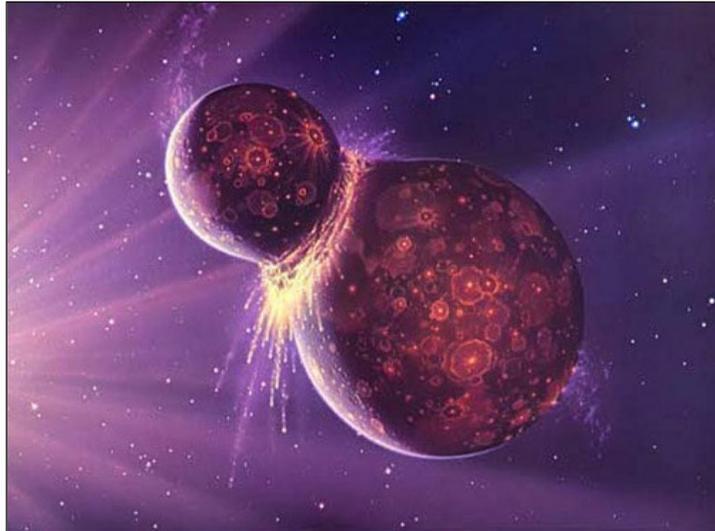


### New images of Saturn's moon Dione

New images of the fractured terrain of Saturn's little-visited moon Dione have been snapped by NASA's Cassini spacecraft as the probe performed a double flyby of Dione as well as Titan.

<http://www.space.com/scienceastronomy/cassini-saturn-moon-flyby-100413.html>

### Hit parade: The biggest bangs in history



Our planet has taken its share of hard knocks over the years – at this web site is a rundown of chart-topping blasts from the past.

The biggest was the impact of a large body with the young Earth. According to this giant impact theory, the most catastrophic blow ever dealt to the Earth came when it was very young, some 4.5 billion years ago. At that time, the solar system was newly formed and the Earth's surface still cooling from its initial molten state. Just as things were settling down, a second planet, about one-tenth as massive as the Earth, made a glancing collision with it. Comparison of lunar and terrestrial rocks supports the theory.

The image is an artist's depiction of this most colossal event.

<http://www.newscientist.com/gallery/biggest-bangs>

### Mysterious radio waves emitted from nearby galaxy



There is something strange in the cosmic neighbourhood. An unknown object in the nearby galaxy M82 has started sending out radio waves, and the emission does not look like anything seen anywhere in the Universe before. "We don't know what it is," says co-discoverer Tom Muxlow of Jodrell Bank Centre for Astrophysics near Macclesfield, UK.

The thing appeared in May last year, while Muxlow and his colleagues were monitoring an unrelated stellar explosion in M82 using the MERLIN network of radio telescopes in the UK. A bright spot of radio emission emerged over only a few days, quite rapidly in astronomical terms. Since then it has done

very little except baffle astrophysicists. **Something in there is producing an unusually regular radio signal. It has hardly changed in brightness over the course of a year, and its spectrum is steady.**

M82 (also known as Messier 82, NGC 3034 or the Cigar Galaxy) is the prototype nearby starburst galaxy only 12 million light-years away in the northern constellation Ursa Major (The Great Bear). M82 is five times as bright as the Milky Way.

The image shows M82.

<http://www.newscientist.com/article/dn18775-mysterious-radio-waves-emitted-from-nearby-galaxy.html>

### A few thoughts - by Pierre Lourens

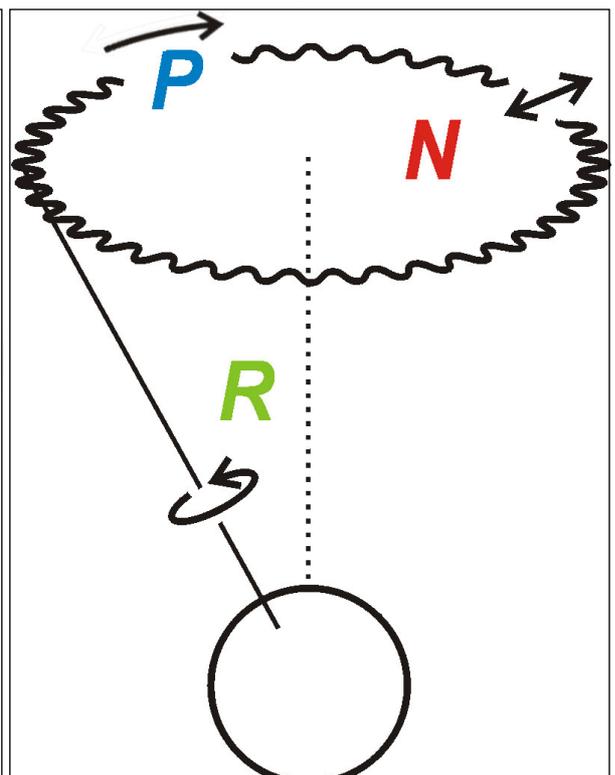
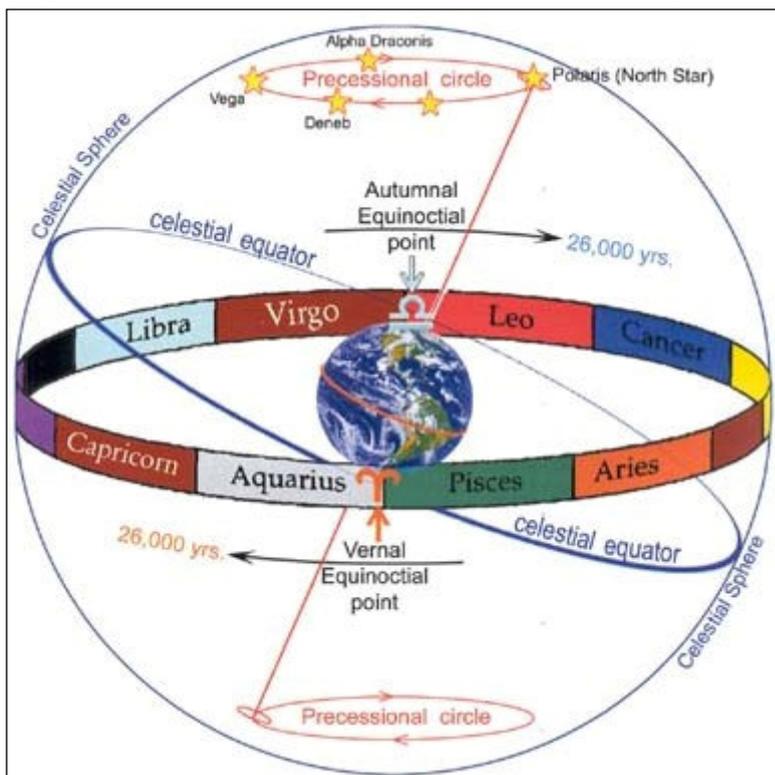
- ♦ Just like the new discovery of unusually regular radio emissions from M82 (see the previous page), similar unusually regular radio emissions were discovered serendipitously in 1968. I still remember an article that appeared sometime afterward in the Afrikaans newspaper “**Die Transvaler**”. Its caption was: “**Gevind: pteringbasis in die diepruim**”. According to this article, the radio emissions were produced by intelligent aliens at a flying saucer base in deep space. Subsequently, however, a perfectly natural explanation has been found: the emissions are due to a pulsar, which is a rapidly rotating neutron star with a powerful magnetic field.
- ♦ I think the commandment to be obeyed when receiving radio signals which are unusual in some respect or other is this: “**Seek ye first the natural explanation, and all other things shall be added unto ye**”. This is especially applicable to work in connection with SETI (Search for Extraterrestrial Intelligence).
- ♦ We can expect similar serendipitous discoveries with the SKA (Square Kilometer Array) and LOFAR (LOW Frequency Array) once they are in operation. We can look forward to it.

### Basics: Precession and nutation of Earth's axis - by Pierre Lourens

Precession of Earth's polar axis is caused by the gravitational pull of the Sun and the Moon on the equatorial bulge of Earth. It makes the polar axis precess around the ecliptic pole, with a period of 25725 years (the so-called *Platonic year*). The precession is clockwise as viewed from above the north pole of Earth. (Figure below left.)

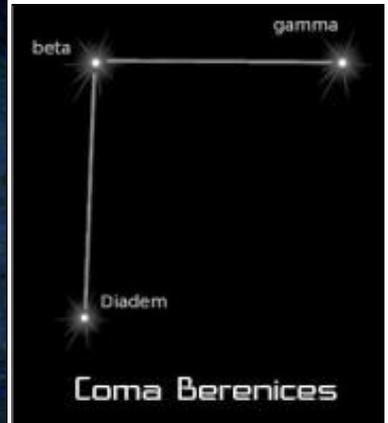
As Earth's axis precesses, this motion is superimposed by small periodic fluctuations called nutation, with a period of 18.60 years. (Figure below right: R = Rotation, P = Precession, N = Nutation. The precession is not shown in the figure below left.) This nutation is caused by variable gravitational pull by the Moon due to its motions around the Earth.

The celestial equator (which is in the same plane as Earth's equator), the solstices and the equinoxes undergo motions corresponding with those of the Earth's axis. The coordinates of astronomical bodies in the celestial and ecliptic coordinate systems change with time because of the motion of the vernal equinox, and should always be given in the celestial or ecliptic coordinate system as it was at a certain epoch (= point in time), e.g. epoch 1950.0 or 2000.0. (See pages 6 and 7 in last month's newsletter for explanation of celestial and ecliptic coordinates.)



**M100**

M100 (aka Messier 100 and NGC 4321) is a spiral galaxy about 52.5 million light-years away in the northern constellation Coma Berenices (Berenice's Hair). It was discovered by Pierre Méchain in 1781. It is one of the brightest galaxies in the Virgo cluster. Five supernovae have been identified in M100.



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★ Centre Representative	Michael Poll	012 331 1615 [ H ]	
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★ Curator of Instruments	Johan Smit	072 806 2939 [ Mobile ]	
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★ Member	Johan Hartmann	083 276 1323 [ Mobile ]	
★ Member	Gareth Gregory	073 220 6824 [ Mobile ]	



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