



# The **PRETORIA CENTRE**

of the

## **Astronomical Society of Southern Africa**

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

## **NEWSLETTER MARCH 2006**

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

Date and time            Wednesday 22 March at 19h15  
Chairperson            To be announced  
Beginner's Corner    To be announced  
What's Up                by Fred Oosthuizen

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

### **MAIN TALK**

**Vredefort Report**  
**by Michael Poll and Erich Nockler**

The meeting will be followed by tea/coffee and biscuits as usual.  
The next social/practical evening will be held on Friday 17 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
LAST MONTH'S OBSERVING EVENING .....	2
NYLSVLEY STAR WEEKEND.....	3
THE CHICXULUB CRATER .....	4
TELESCOPE UNCOVERS HINTS OF MEGA SOLAR SYSTEMS.....	6
.....AND OF MINI SOLAR SYSTEMS .....	7
JUPITER AND MOONS .....	8
MESSAGE FROM NEVILLE .....	8
PRETORIA CENTRE COMMITTEE.....	8

### Last Month's Meeting — by Michael Poll

Michael Poll took the chair, and read a letter from the Chairman, Neville Young, stating that, for personal reasons, Neville was resigning as Chairman and from the Committee. Michael's letter of reply thanked Neville for the input that he has given to the Center.

Johan Smit opened the evening with "What's Up?", mentioning the penumbral lunar eclipse on the night of March 14/15, which we will see, and the total solar eclipse on March 29<sup>th</sup>, which we will not see. Johan showed star charts for the forthcoming month. He also listed a number of "close" asteroid passes for March. Anniversaries in March included Robert Goddard's first rocket launch, and Einstein's Birthday on March 14<sup>th</sup>.

For Beginner's Corner, Michael spoke about astronomy as depicted in cartoons. The moon

often features, and it was noted that it is frequently drawn the wrong way around. Cartoons showing comets, the demise of the dinosaurs, space travel and alien visitors were also covered.

The main topic of the evening was a video about asteroids, featuring Eugene Shoemaker, and his wife Caroline, and Shoemaker's struggle to get his theories about large impacts accepted, especially considering the evidence of Meteor Crater in Arizona. He was a strong advocate of sending a geologist to the moon, at a time when apparently NASA had not thought about actually doing any science when they got there. His theories about impacts were vindicated with the discovery of Comet Shoemaker-Levy 9 and its subsequent crash into Jupiter.

### Last Month's Observing Evening — by Michael Poll & Johan Smit

A cloud free evening at last, although rather hazy. More than 20 people and 5 or six telescopes, including the Centre 12" made for an enjoyable evening. Most of the viewing was in the north, with two planets each near a star cluster – Mars was near the Pleiades and Saturn even closer to the Beehive Cluster (M44) in Cancer. We did look for M36, M37 and M38 in Auriga, but none were positively identified. Orion was well seen just north of overhead, and the Orion Nebula was very clear as seen in telescopes, in spite of the sky conditions. Castor the northernmost of the twin stars in Gemini was observed – this is now a fine double. We looked at M41 in Canis Major, and Jan Plomp drew our attention to NGC 2362, a compact open cluster surrounding Tau Canis Majoris.

Later in the evening we looked towards the south. We noted the position of the Large Magellanic Cloud, (a line from Sirius to Canopus with half its length added coincides with the LMC) but the cloud itself could not be seen. Some of the star clusters in Carina were seen, (e.g. I 2602 around Theta Carinae, and NGC 3532, a superb open cluster), but these will be better seen later in the year.

The 12" was used solely for observing Saturn, giving everyone a chance to spend quality time at the eyepiece to have a real good look. It is strange that during hazy nights the view of bright objects is better than on so-called clear nights. This may be due to the fact that the extra sky brightness decreases the contrast slightly and an otherwise very bright picture, where details are washed out, are dimmed just enough to make detail visible.

Cloud bands on Saturn, as well as the Cassini Division were seen, as well as the shadow of the rings on the planet and the planet's shadow on the rings. Some of Saturn's moons were also noted.

Amongst the other telescopes was Johan Smit's own hand-made 6" which had its official public first light. It is not completed yet, and the unpainted cardboard tube did look quite strange amongst the other telescopes. To the amazement of most people this telescope, resembling a giant toilet roll, gave quite good views. We are still looking for a suitable name for it. Jan has already used the KADBOD name for his observatory, so "my telescope is still nameless" says Johan. He hopes that his effort will inspire would be telescope builders to join our class and embark on the most amazing learning experience.

**STARGAZING WEEKEND**

PRETORIA ASTRONOMY SOCIETY

**Let's get away from the city lights and go under the Milky Way...**

- **WHERE?** NYLSVLEY NATURE RESERVE, near Naboomspruit, about 160Km north of Pretoria.
- **WHEN?** Friday to Sunday, 26<sup>th</sup> – 28<sup>th</sup> May 2006

Nylsvley nature reserve is an ideal dark sky site for keen observers. For bird-lovers, there are also 365 recorded bird species, 5 bird-viewing hides and other game for daytime leisure.

**Dormitories:** 2 units, each consisting of 8 rooms with 2 single beds. Mattresses only. **Pls. bring own bedding.** Most rooms have a mains-plug. Units include separate communal men and ladies toilet+bathroom, 1bathtub and 2 showers. **Note!** Dormitories are not luxurious, more like a veldschool setup, but still pleasant and very peaceful.

**Cooking Facility:** One large kitchen. 2 ovens, 2 fridges and 1 freezer. 2 sinks for dishwashing and cupboards to store your food. **Bring own, pots, plates, knives and forks.** There is a braai-place available adjacent to a lapa and a few chairs, **however I recommend you bring at least 1 fold up chair. Bring your own charcoal.**

**Costs:** R180.00 per person for the whole weekend, non refundable.  
Children under 12 years free.

**No shop on premises. Closest town, Naboomspruit 10km. NB! Borehole water only. Advisable to bring your own drinking water.**

**Directions:** From the N1 take Nylstroom off ramp at the Kranskop toll plaza. Turn right onto the R101 towards Potgietersrus and Naboomspruit. Keep heading towards Naboomspruit with the mountains on your left. Turn right at the Boekenhout sign onto a gravel road for about 8km. Look carefully for the Nylsvley sign on the left.

Please try to arrive before 18:00 because the main gate will be locked and arrangements will have to be made to unlock the gate which may take an hour!

Please respect our strict 20:00 curfew to switch off all of the lights so that we may all commence stargazing without the interruption of nearby lights, after all that is the main reason why we will be there.

**Kindly deposit** your payment into the following account and fax a copy of your deposit slip, with your telephone number to Rynhart van Rooyen at (011)-4413288 (w).

Account holder: **ASSA Pretoria Center**

Bank: **ABSA Rose bank**

Branch code: **630805**

Account Number: **4058335681**

**Note: Please specify your FULL NAME and NYLSVLEY as a reference for the deposit or else we won't know who the payment is from.**

**First come, first serve, so book soon! Please confirm your booking by contacting Wayne Mitchell.**

**For more info: Wayne Mitchell: 0724657739 or (012)-7199065 (w).**

## The Chicxulub Crater - Michael Poll

The Mexican town of Puerto Chicxulub lies on the northern coast of the Yucatan Peninsula in the Gulf of Mexico. Formerly Chicxulub (a Maya phrase for "horns of the devil") thrived on the cultivation and export of sisal fibre, but demand for sisal dwindled and so did the town's fortunes.

It is suspected that a huge impact crater, buried under a thick layer of limestone sediment, lies directly beneath the town. The crater is thought to be the one that triggered a mass extinction when it was formed 65 million years ago.

Such a crater had been sought since 1980. In that year a research group at the University of California at Berkeley led by father and son Luis and Walter Alvarez proposed that the impact of an asteroid, and the resulting effects, caused the sharp boundary between the Cretaceous and Tertiary (K-T) geologic periods. Evidence for this idea was an enormous excess of the element iridium, first seen in Italy and Denmark, in the thin layer of clay, which marked the boundary. Iridium exists in the earth's crust only in small traces, but it is much more abundant in meteoroids, and by extension, asteroids, because many meteoroids have an asteroid as a parent body. There is more iridium in the centimeter of clay at the K-T boundary than in 3 metres of the underlying limestone. It was proposed that the impacting body needed to be 10 kilometres across to deliver the necessary quantity of iridium and spread it worldwide, and that it would create a crater 150 – 220km in diameter. No likely crater had been found. The number of confirmed impact craters on earth is less than 200, often of uncertain age. Any number of others would have been eroded, buried by sediment or broken up by crustal movement, and, in any case, statistically, any impact would be in the ocean, and half of the ocean floor that existed 65 million years ago has been recycled. With the candidate constrained by large size and specific age, most of the known craters were excluded.

Alan R Hildebrand at the University of Arizona, had noted that some exposures of the K-T boundary included thick jumbled deposits of coarse rock fragments, which appeared to be layers of debris scoured from one place and deposited elsewhere, probably by fast moving

sea waves (tsunamis) which must have been several kilometers high. The most pronounced of these rocks clustered around the Caribbean basin, implying an impact into the ocean in this region. In 1990 Hildebrand visited a small mountain village in Haiti called Beloc to examine an exposure of the KT boundary where the bed was half a metre thick. Hildebrand found a greenish-brown clay with excess iridium, glass spherules as much as 8mm in diameter and shocked quartz grains, and the whole had the look and composition of ejecta from an impact. It was estimated that ground zero would be within 1000km of the site.

Hildebrand and his faculty adviser William Boynton presented their findings at the March 1990 meeting of the Lunar and Planetary Science Conference in Houston, Texas. They were not able to offer a site for the crater. Early suspects were off the northern coast of Colombia where a semicircular structure had been detected under the sea floor, and the western tip of Cuba, the site of a thick impact wave deposit. However, at this 1990 meeting, a reporter for the Houston Chronicle, Carlos Byars, told Hildebrand about a huge crater buried under the northern Yucatan peninsula. Byars had heard about the crater in 1981 from a local geophysicist, Glen Penfield who had come across it in 1978.

In 1978 Pemex, (Petroleos Mexicanos the Mexican national oil company), had contracted the Western Geophysical Company in Houston to conduct an aerial magnetic survey of the whole of the Yucatan peninsula. Penfield was sent to Merida, a town about 30km inland from Chicxulub, to check progress. As he sifted through hundreds of feet of strip chart recordings, he noticed offshore a broad subterranean arc with its cusps pointing southwards. Penfield realized that such a magnetic signature should not exist in the Yucatan's broad uniform carbonate sediments. He then examined a gravity map of the peninsula that had been prepared by Pemex in the 1960s, and he found that the land contained an exact semicircle orientated in the opposite way. He joined the magnetic map of the sea floor and the gravity map of

the ground and found that they fitted together perfectly to indicate a 180km circle. Penfield was an amateur astronomer and suspected that he had found a buried impact crater. However Pemex owned the data and would not allow it to be released until the project was finished. Eventually, a year after the Alvarez theory was published, Penfield and his supervisor, Antonio Camargo were allowed to describe their findings at the 1981 meeting of the Society of Exploration Geologists, which is where Byars heard about the crater. Most of the nations' cratering experts were away, attending an impact workshop in Utah, so Penfield got little reaction.

Penfield looked for other ways to certify the find. He noted that in some exploratory wells drilled by Pemex in 1951 there was found a thick layer of an igneous rock a called andesite, 1.3km down. This had been interpreted as being a "volcanic dome", but anyone familiar with cratering might have noted it as a huge mass of material melted and uplifted by an impact. Unfortunately the cores from the drillings had been destroyed in a warehouse fire in 1979. In 1990 Penfield and Hildebrand joined forces, and they managed to locate samples of the drillings that had been given to other experts.

At the 1991 meeting of the Lunar and Planetary Science Conference, three independent reports confirmed that the debris

in Beloc was spatter from an extraterrestrial blast, and not from a volcano. The trace elements and minerals found in the KT boundary suggested an impact in the ocean, but the finding in many cases of crystals of shocked quartz in this boundary rock suggested that the impact was near a continent, because the ocean floor effectively does not contain quartz.

The glass found at Beloc had a composition that suggested two source materials – one was a black glass with a composition similar to the earths crust, the other was a rarer glass with a high component of calcium. It is proposed that the calcium-enriched glass was derived from carbonate sediments that were being deposited under a few metres of water at the edge of the continental shelf. In the drill samples shocked quartz had been found, together with spherules of glass and a breccia composed of fragments of igneous and sedimentary rocks.

The Chicxulub crater is currently The Candidate, but there are two other known craters of about the same age. There is one in Manson, Iowa, nearly buried and 35km across which has been dated at 65.7 million years, but this is considered to be too small. There is also the 100km diameter Popigai crater in north central Siberia that may also be of the right age. Some have even suggested that all three formed at about the same time.



References

Killer Crater in the Yucatan? J Kelly Beatty Sky & Telescope July 1991 p 38

It came from outer space Nicola Swinburne New Scientist February 20<sup>th</sup> 1993

## Telescope Uncovers Hints Of Mega Solar Systems...

NASA's Spitzer Space Telescope has identified two huge hyper giant stars circled by monstrous disks of what might be planet-forming dust. The findings surprised astronomers because stars as big as these were thought to be inhospitable to planets.

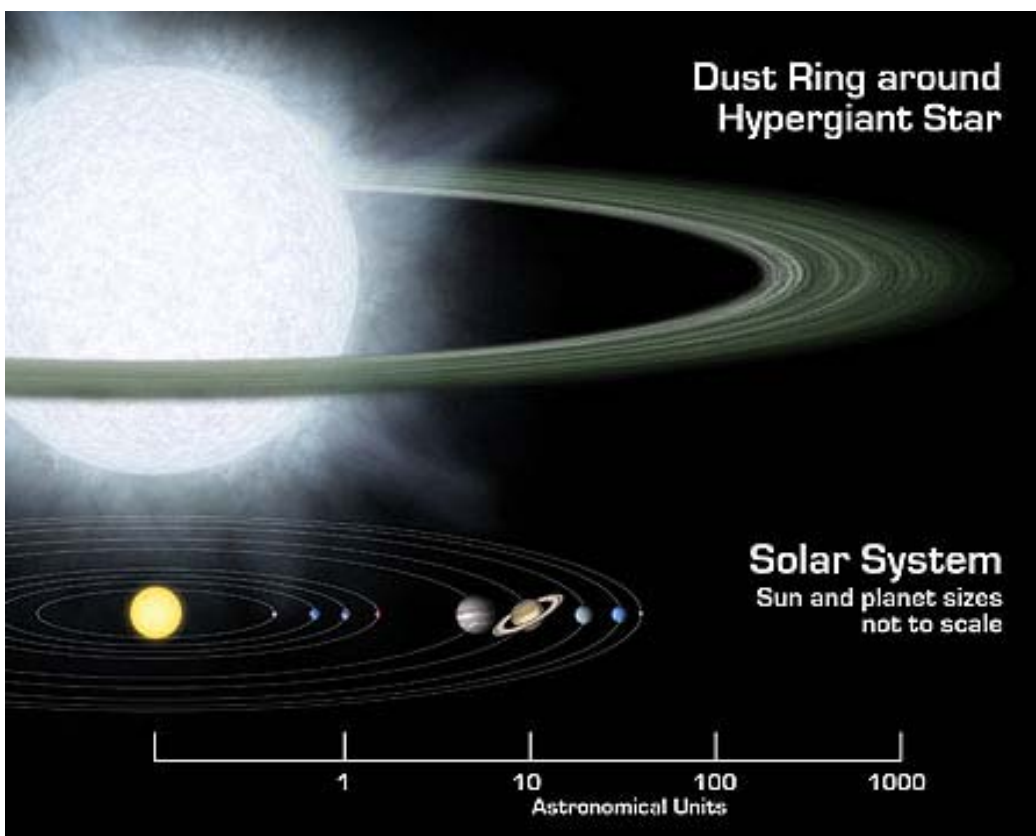
These extremely massive stars are tremendously hot and bright and have very strong winds, "making the job of building planets difficult," said Joel Kastner of the Rochester Institute of Technology in New York. "Our data suggest that the planet-forming process may be harder than previously believed, occurring around even the most massive stars that nature produces."

The new Spitzer results expand the range of stars that sport disks to include the "extra large." The infrared telescope detected enormous amounts of dust around two positively plump stars, R66 and R126, located in the Milky Way's nearest neighbour galaxy, the Large Magellanic Cloud. Called hyper giants, these blazing hot stars are aging descendents of the most massive class of stars, referred to as "O" stars. Their masses are 30 and 70 times the mass of the sun, respectively.

Astronomers estimate that the stars' disks are also bloated, spreading all the way out to an orbit about 60 times more distant than Pluto's around the sun. The disks are probably loaded with about ten times as much mass as is contained in the Kuiper Belt.

Stars as massive as R66 and R126 don't live very long. They burn through all of their nuclear fuel in only a few million years, and go out with a bang, in fiery explosions called supernovae. Their short life spans don't leave much time for planets, or life, to evolve. Any planets that might crop up would probably be destroyed when the stars blast apart.

Website: <http://www.spitzer.caltech.edu/spitzer>



This artist's illustration compares the size of the gargantuan star R 66 and its surrounding dusty disk to that of our solar system. The disk itself is also bloated, with mass equal to several times that of Jupiter. The disk begins at a distance of about 120AU, and terminates at a distance of about 2,500AU.

Website: <http://www.spitzer.caltech.edu/Media/releases/ssc2006-05/ssc2006-05b.shtml>

### ....and of Mini Solar Systems

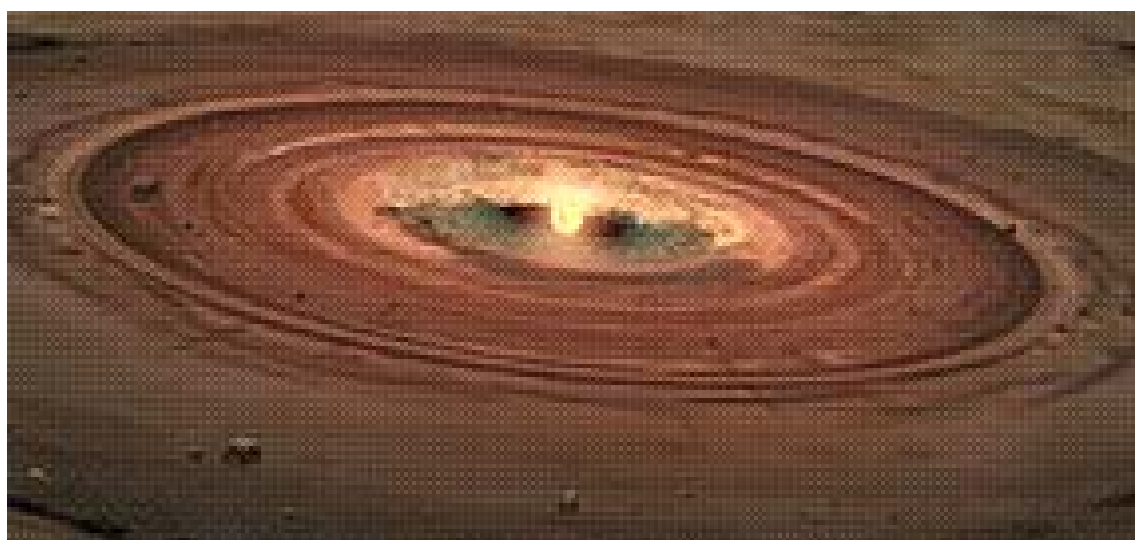
Planets are found everywhere these days. So far, 180 planets circling other stars have been found, and evidence is growing that they also circle "failed," or miniature, stars called brown dwarfs. Now, astronomers using NASA's Spitzer Space Telescope say they have found what may be planets-in-the-making in the strangest of places -- around a brown dwarf that itself is the size of a planet. The little brown dwarf, called Cha 110913-773444, is one of the smallest known. At eight times the mass of Jupiter, it is even smaller than several planets around other stars. Yet, this tiny orb might eventually host a tiny solar system. Spitzer's infrared eyes found, swirling around it, a flat disk made up of dust that is thought to gradually clump together to form planets. Spitzer has previously uncovered similar planet-forming disks around other brown dwarfs, but Cha110913-773444 is the true dwarf of the bunch.

Brown dwarfs are born like stars, condensing out of thick clouds of gas and dust. But unlike stars, brown dwarfs do not grow large enough to trigger nuclear fusion. They remain relatively cool spheres of gas and dust.

Astronomers have become more confident in recent years that brown dwarfs share another trait in common with stars -- planets. The evidence is in the planet-forming disks. Such disks are well-documented around stars, but only recently have they been located in increasing numbers around brown dwarfs. So far, Spitzer has found dozens of disk-sporting brown dwarfs, five of which show the initial stages of the planet-building process. The dust in these five disks is beginning to stick together into what may be the "seeds" of planets.

Last year, Luhman and his colleagues used Spitzer to uncover what was then the smallest of brown dwarfs hugged by a disk. At only 15 times the mass of Jupiter, the brown dwarf, called OTS44, is comparable to the most massive extra solar planets. Now, the team has again used Spitzer, this time to detect a disk around Cha110913-773444, which has only about half the mass of OTS44. The object itself was discovered by Spitzer with the help of NASA's Hubble Space Telescope, the 4 meter Blanco telescope at the Cerro Tololo Inter-American Observatory in Chile, and the Gemini South Observatory, also in Chile. Its cool and dusty disk, however, could be seen by only Spitzer's infrared eyes. The teeny brown dwarf is young at 2 million years old, and lives 500 light-years away in the Chamaeleon constellation.

One thing is clear: the universe produces some strange solar systems, very different from our own. Website: <http://www.spitzer.caltech.edu/Media/happenings/20051129/>



This artist's illustration shows brown dwarf OTS44 surrounded by a swirling disk of planet-building dust.

### Jupiter and moons

Jupiter on 21 February 2004 when the shadow of Io moved onto its disk and Europa appeared from behind it. The moon on the right is Ganymede. This image was produced by aligning, stacking and unsharp masking of 589 frames taken with a 8" F5 Newtonian telescope fitted with a 2 X Barlow lens and a QuickCam Pro 4000 webcam. Photographer: Mauritz Geysler, a member of our Centre. Image & caption from his website at: <http://www.etacarina.co.za>



Dear Astro Colleagues—the non-stop changes in my life over the past two years came to a head and I had no option but to lighten the load by relinquishing my astronomy activities. I need to concentrate on my new job and settle my personal affairs. My membership continues and I will pop in to meetings when time allows. Thank you committee for your support and adapting so readily to the change.

Best Regards—Neville Young

### PRETORIA CENTRE COMMITTEE

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